

African Languages in Time and Space

A Festschrift in Honour of
Professor Akinbiyi Akinlabi

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Foreword

Professor Akinbiyi Akinlabi, born March 05, 1958, is one of the foremost distinguished Nigerian linguists who migrated to the USA in the late 1980s. He studied at the University of Ibadan between 1978 and 1984 and was one of the star students at both the undergraduate and graduate studies. Some of his colleagues in the Department of Linguistics & African Languages at the University of Ibadan include Professors Francis Oyetade, Yetunde Schleicher, Solomon Oyetade, Dotun Ogundeji as well as other linguists and language scholars, who themselves have made significant impact on the global linguistic scene. Professor Akinlabi is a veteran teacher whose former students include Professors Francis Egbokhare, Eno-Abasi Urua, Bolanle Akeredolu-Ale (nee Kassal), Harrison Adeniyi, Christine Yetunde Ofulue, Tayo Bankale and many others.

Professor Akinbiyi Akinlabi has made important contributions to linguistic research on Nigerian and indeed African linguistics, particularly in the area of phonology and phonological theory. In addition, he has mentored, encouraged and supported many students and colleagues in their academic careers.

Professor Akinlabi served as the President of the World Congress of African Linguistics from 2009 to 2015; and is the current President of the Association of Contemporary African Linguistics (ACAL). He is also a Council member of the West African Linguistic Society (WALS/SLAO).

To ensure the sustainable development of the next generation of African linguists, he co-founded the African Linguistics School (ALS) in 2008. ALS is a biennial summer programme that provides two weeks of intensive study in core areas of Linguistics *pro bono* to African and non African graduate students who plan to carry out research on African languages. So far, ALS has been held in Accra 2009 (Ghana), 2011 (Benin), Ibadan 2013 (Nigeria), 2016 (Cote d'Ivoire); the most recent just held in 2019 (South Africa).

Professor Akinbiyi Akinlabi was a Fulbright Fellow (2015-2016) at the Universite Felix Houphouet Boigny in Cote d'Ivoire. In recognition of his contribution and leadership role in the growth and development of African Linguistics, he was awarded the distinguished Ivorian National Medal and title, 'Officier de l'Ordre de Merite Ivoirien' in 2017.

Professor Akinlabi turned 60 year last year. This collection of essays is to mark this diamond milestone and to thank the Almighty God for his life. Contributors to this volume include his colleagues in Nigeria and in the Diaspora as well as his former and current students. The papers cut across most areas of linguistic and language studies. Being a Phonologist himself, it

is hardly surprising that the majority of papers in this volume come from Phonology.

African Languages in Time and Space: A Festschrift in Honour of Professor Akinbiyi Akinlabi will serve as an important book of readings to those interested in understanding African languages and for the study of African languages.

Eno-Abasi Urua
August 2019

Ogègè

Atótó Arére, orin tuntun dé!
Mo sèbá fọba tó lójó òní,
Mo júbà fọba to dá gbogbo ẹni,
Ọba Èdùnmàrè tò kan Akínbíyíí dá,
Olúwa wa, abá'ni-múlẹ, má-da'ni.
Ìbà rẹ o, Ọba tó dá baba Malik tó ní milíki.

Mo wágbó tíítí, èmi ò rí kékeré ẹyẹ igúnnugún,
N ò sì rí màjèsín àkàlámàgbò níjù,
Kò sẹyẹ tí yòò sẹ bí ọkín, ẹ má fọmọ wọmọ
Ọkan sošo àràbà, kíi sẹgbẹ ẹgbàá ọsúnsún,
Akinbíyíí dé!
Ọmọ Akinlabí tó tún b'Akin lẹmọ
Akinlábi, alákarà tí kíi pé kẹlòmíràn ó má dín,
Ọkọ Olúwatóyìn táyé ní fẹ,
Ìràwọ ọsán, tí í bàwọn àgbà lẹrù.

Òkun dé, baba gbogbo omi,
Ọsà dé, baba odòkódò,
Ọjò ríla tìi yawé àgbàgbà, baba Malak,
Akínlabí, Akin là ní kó jade
Akinlabí, Akin tó j'Akin lẹ
Akínbíyíí, Ògìdán 'kùnrin imọ ẹdà ẹdè
Ogúnlégbẹje ọkùnrin, àdàpẹ ilú, tí wọn ní pẹ lẹnikan sošo
Akọ ẹran imọ tí í jewé e gbégbé,
Ibi tí wọn ní kí gbégbé ó má gbé, ibẹ ní í gbé
Ibi tí wọn ní kí tètẹ ó má tẹ, ibẹ ní í tẹ
Ẹni tí wọn ní, wọn ò bù kù,
T'Ólódùmarè ní bù kún
Ọkọ Mọriam tó dọgba délẹ bí irù ẹşin,
Aye tẹşin ò jẹ, irù idí ẹ ní jẹ ẹ,
Ẹ bá mi sẹ gbòsà fún iríjù Òdùmarè

Àwa yín la nílú, ẹ má pẹ wá lálejò mọ,
Akinlábi dé, ọrosọ mọdì gbàbọn lẹwọ ojo,
Ó bàwọn núbẹ, ó jù wọn.
Òtítọ şàgbà èké, Akínbíyíí bàwọn núbẹ, ó dọgá fún gbogbo wọn,
Onímọ ẹdà ẹdè àtàtà, táwọn Òyínbó aláwọ funfun ní kan sáára sí,
Ààrẹ onímọ-ẹdà ẹdè fún gbogbo adúláwọ tọ wà láyé,
Akín nílẹ, Akin níbi gbogbo,
Ọgá àwọn ọgá,
Ọjògbọn táwọn Ọjògbọn ní gbòşùbà fún,

A-tó-fojò-mò, baba Akinolá
 Ọwàrà ọjó ìmò, ọlọgbón tí gbogbo ayé n wá kiri
 Aníyikáyé, a-fimò-dánìlẹ̀kun-ì-še-kánndú
 Onímò fónólòjì tó tayọ gbogbo wọn,
 Baba Malik tó dàpésin

Akinbíyí ọmọ Akinlabí, baba Akinolá,
 Ọmọ Akin tó tún b'Ákin
 Ọmọ Noimat Àdùnní tó níyí ká gbogbo ayé,
 Ọkọ Mòriam to mòye,
 Baba Malak t'Ọyìnbó n wá rí fún,
 Ọmọ Nasiru Adégòkè Àdisá, Ọjó tí pé, mó fẹ bá ọ délẹ baba à re,
 Akinlabí, ọmọ olójú ògùn
 Akinlabí, baba Bílẹ̀wọ̀mọ
 Akinlabí lókè lẹ̀rú, ó tún lókè lóbinrin
 Akinlabí, baálẹ̀ Okékéye
 Ọmọ ọyìnbó fòkun ẹ'òná
 Ọmọ alábẹ̀rẹ̀ ọyìnbó, kó má yẹràn síba
 Ọmọ iba kò lákùsà, kiní yóó fabẹ̀rẹ̀ rán
 Ọmọ kúkú jeun jeje
 Ọmọ ebi kò gbòògùn
 Ọmọ àrùn kò gbóni bí ìmẹ̀lẹ̀
 Imẹ̀lẹ̀ gbóni, ó ju ààrẹ̀ lẹ
 Ọmọ kúkú kí i, ọmọ kí i má yàn án lódi
 Ọmọ abẹ̀sẹ̀ peḽẹ̀be bíi ti orogún iyá ẹ
 Akinlabí, ọmọ ẹ̀lẹ̀sin mẹ̀rìndìlógún, tí mẹ̀jọ n jẹko, tí mẹ̀jọ n sàrìnje.
 Akínbíyí Akinlabí, onímò tó mètò,
 Baba Olúwatósìn tó n ẹ tOlúwa ọba,
 Baba Akinolá tó n fúnrùgbìn ìmò ká gbogbo ayé,
 Igi ọdán ìmò, oníbòòji kánrinkése.
 Akínbíyí ti di igi ọgègè, ó wá lé ténté, bí oṣu tuntun,
 Gbogbo ara, kíkì ọwò!
 Ẹ bá mi dá músò fún baba Málík tó n ẹ bebe,
 Akínbíyí ti gún ọgègè, igi ọlà ló gùn!
 Baba ò, Baba ò, Baba ò,
 Kólúwa dá bàbá sí fún wa!
 Baba ò, baba ò, baba ò
 Kólúwa dá bàbá sí fún wa!

Olúṣẹ̀yẹ̀ Adéṣolá
 Yale University, 2019

The Feature [stress]

Paul de Lacy

Abstract This article argues that lexical entries cannot contain prosodic structure. To account for contrastive ('lexical') stress, a privative feature [stress] that inhabits root nodes is proposed. Lexical stress involves preserving underlying [stress] and requiring that an output root node with [stress] must be the designated terminal element of a Prosodic Word. A prediction of this theory is that there cannot be any lexical secondary stress, unless it is mediated through derivational bases or paradigmatic uniformity. A further consequence is that there can be morphemes that contain a floating [stress] feature. Both predictions are explored, and challenges for prosodic accounts of lexical stress are identified.

*The Feature [stress]**

1. Introduction

The goal of this article is to propose that there is no underlying prosodic structure whatsoever, apart from tone: i.e. the morphs of lexical entries never contain moras, syllables, feet, prosodic word nodes, or any other node in the prosodic hierarchy. Of course, there are two obvious challenges for such a proposal: how to account for contrastive length, and how to account for contrastive ('lexical') stress.

Due to space limitations, segmental length will not be discussed here, though I believe there are compelling arguments against having moras in underlying forms. Instead, this article is entirely about lexical stress.

Many languages have contrastive stress. For example, in Cupeño words that lack long vowels, stress falls on either the first or second syllable, unpredictably.

- (1) *Cupeño lexical stress* (Hill 2005:23, Alderete 1999)
- (a) ['ə.jət] *eyet* 'thief'
 - (b) ['tʃa.lal] *chalal* 'bark'
 - (c) ['su.lit] *sulit* 'one'
 - (d) [pa.'xal] *paxal* 'cradle'

* I wrote this paper in honor of my friend and colleague, Akinbiyi Akinlabi, in celebration of his 60th birthday. As a colleague, he helped me become a better academic and professor. As a researcher, he has greatly influenced my thinking about phonology and morphophonology (e.g. see section 4).

- (e) [siʔ.'qal] si'qal 'cover'
 (f) [na.'xa.niʃ] naxanish'man'

'Stress' is the phonetic realization of a phonological structure consisting of a head mora that is dominated by a head syllable that is dominated by a head foot. So, if stress is contrastive in some languages but there is no underlying prosodic structure, how is lexical stress possible?

The solution proposed here is that there is a privative segmental feature [stress] that inhabits the root node. Underlying [stress] can be preserved in output forms by using the constraint IDENT[stress] (defined in section 2). A root node that bears [stress] in the output must also be the 'designated terminal element' (DTE) of a prosodic word (PrWd) – i.e. the head root node of the head mora of the head syllable of the head foot of a PrWd (Lieberman & Prince 1977, de Lacy 2006§2.3.3.1).

For example, the underlying form of *paxalis* is /paxál/, where /á/'s root node contains the feature [stress]. In Cupeño, IO-IDENT[stress] outranks constraints requiring a left-headed foot, and so the winning form is [(pa.'xál)], where ' marks the head syllable and the acute accent marks a root node with a [stress] feature. To be clear, the output still contains prosodic structure – the feature [stress] occurs in tandem with prosodic heads and constituency.

I suspect that the feature [stress] will not be welcomed because of an aversion to 'representational redundancy': the idea there should never be distinct phonological elements that are phonetically interpreted the same way. For example, Levin (1985) argues that the feature [±syllabic] is unnecessary because prosodic structure does the same work. However, the value of apparently redundant representation is that different representational elements can be treated as *computationally* distinct. This article will argue that [stress] and prosodic structure have different functions: [stress] enables contrast (and limits it in striking ways); underlying prosody, on the other hand, is never preserved simply because it is never present in lexical entries.

Section 2 delves into the theoretical proposal in detail. Section 3 discusses the implications of [stress] preservation for the typology of lexical stress, specifically discussing the absence of lexical secondary stress. Section 4 explores the feature-like behavior of [stress], focusing on morphemes that cause stress mutation and movement. Conclusions are presented in section 5.

2. Theory of [stress]

The idea that there is a feature [stress] goes back to the beginning of Generative Phonology (Chomsky & Halle, 1968: 66ff). However, the need for a [stress] feature in SPE was motivated by the lack of prosodic structure in that theory. Here, the proposal is that there is a feature [stress] *in addition* to prosodic structure.

SPE's [stress] feature was multivalued (p.66). In contrast, the feature proposed here is privative. While it is possible that the feature is binary [±stress], or even three-valued (unstressed vs. secondary vs. primary stressed), the evidence discussed in sections 3 and 4 suggests that privative [stress] can adequately account for the typological variation seen in lexical stress and stress-related morphemes.

The feature [stress] inhabits the root node, along with other major class features such as [sonorant] and [consonantal] (McCarthy 1988: 97ff). By placing [stress] inside the root node, it is predicted to behave like major class features: i.e. it should not assimilate or dissimilate in the same way as subsegmental features. (It is possible that [stress] depends on the presence of [+vocalic] – a convincing case of contrastively stressed consonants would resolve the issue, though such consonants are rare, no doubt for functional reasons).

Stress is subject to the same kind of faithfulness constraint that exists for other features. Whether the constraint is IDENT[F] or MAX[F] depends on one's views on featural autonomy and the best expression of privativity. Here, the relevant [stress]-related constraint will be taken to be (2), following the schema in McCarthy & Prince (1999).

- (2) IDENT[stress] "Incur a violation for any pair of segments *x* and *x'* where (a) *x* corresponds to *x'*, and (b) the root node of *x* contains [stress], and (c) the root node of *x'* does not contain [stress]."

The feature [stress] must connect with a specific prosodic structure in the output. A highly restrictive theory is proposed here: i.e. that a root node that contains [stress] must be the DTE of a PrWd (Lieberman & Prince 1977, de Lacy 2006§2.3.3.1). In other words, a [stress] root node must be the head root node of the head mora of the head syllable of the head foot of a PrWd. The DTE of the PrWd is phonetically realized as having primary word-level stress.

There are a variety of ways of formally implementing the requirement that [stress] root nodes must be PrWd DTEs. One conception is that a [stress] root node that is not a PrWd DTE is uninterpretable, in the sense of de Lacy (2007). It is also possible that the requirement is violable

However, the consequences of having a [stress] root node that is not a PrWd DTE could be bizarre, or at least look like derivational opacity: a vowel that is not a DTE of a foot or PrWd would behave as if it were stressed for the purposes of phonological processes that refer to the [stress] feature. Such a loosening of the theory will be left for elsewhere; the more restrictive conception will be maintained here: a root node that contains [stress] must be a PrWd DTE.

2.1 Prosodic Theories of Stress Preservation

The alternative to having a feature [stress] is an entirely prosodic approach: lexical items would contain prosodic structure that is preserved by constraints (e.g. Alderete, 1999, Revithiadou, 1999). However, such prosodic theories face formal and typological challenges in dealing with contrastive stress.

Defining a constraint that preserves the 'main stress' prosodic structure (i.e. the PrWd DTE structure) has clearly not been easy. Many definitions of 'IDENT-Stress' do not provide a formally precise definition, but are "relatively informal" – it is clear what they should do, but not how they do it (e.g. Pater 2000: 252).

A significant problem is that preservation of certain kinds of prosodic structure is clearly undesirable. Specifically, an empirically adequate theory must not generate 'contrastive syllabification'. For example, no grammar has a surface contrast between [.pa.ka.] and [.pak.a.], or between [.pai.] and [.pa.i.] (holding prosodic and morphological structure constant). Luckily, contrastive syllabification is easy to prevent by either prohibiting underlying syllable structure, by banning constraints that preserve input syllable constituency, or by doing both.

However, it is necessary to go one step further to prevent contrastive syllabification: there must not be any input foot constituency, either (or constraints that preserve it). Otherwise, contrastive syllabification is easy to generate: /pukati/ and /puk(ati)/ could surface as [pu('ka.ti)] and [puk('a.ti)] respectively, with the syllable affiliation of the [k] varying due to different underlying foot affiliation. To avoid contrastive syllabification, then, it is essential to ban input prosodic constituency up to the PrWd level, or prohibit constraints that preserve such prosodic structure.

If underlying prosodic constituency cannot be preserved, lexical stress presents a conundrum. A prosodic approach would have to separate constituency from headedness: i.e. heads (or 'DTE'ness) of constituents would have to be preserved, but not constituency. Even then, to avoid contrastive syllabification, mora DTE status could not be preserved: e.g. /pak^ua/ → [.pak^u.a.] vs. /paka/ → [.pa.ka.]. Similarly, syllable DTEs must

not be preserved: e.g. /pa^ui/ → [.pa.i.] vs. /pa^ui/ → [.pai.]. If there is no lexical secondary stress (see section 3), then foot DTEs should not be preserved, either. The only headedness relation – and underlying prosodic structure – that could be preserved, then, is the PrWd DTE – i.e. the head mora of a head syllable of a head foot. Preservation of any other prosodic structure – whether constituency or headedness – would have the undesirable consequence of permitting contrastive syllabification.

This conclusion – that only headedness can be preserved – is essentially embodied in Alderete (1999: 18)'s theory of grid mark preservation, and Revithiadou (1999)'s theory of accent preservation. By using grid mark and accent notation, both theories avoid the issues that preservation of prosodic constituency encounters. However, these theories do not avoid all problems. Both preserve foot-level prominence, so /tapa^ui*/ could surface as [(ta.'pa)(i)] while /tapa^ui/ would surface as [ta('pai)], producing a surface syllabification contrast between disyllabic [pa.i] and monosyllabic [pai].

There is a further important point to make about prosodic structure and preservation: prosodic structure is preserved on dimensions other than input-output. It is preserved between derivational bases and derived forms (Benua 1997:ch.5), between bases and reduplicants (Zukoff 2015), in inflectional paradigms (McCarthy 2005), and in surface correspondence (Stanton & Zukoff 2018).

So, for prosodic theories of stress preservation, there are a multiplicity of prosodic faithfulness constraints that hold of all dimensions except the input-output one; curiously, only one constraint holds between inputs and outputs: it preserves PrWd DTE status.

In contrast, in the [stress] feature theory, there are faithfulness constraints that preserve prosodic constituency and headedness along every dimension, including input-output. However, there is no underlying prosodic structure so input-output prosodic faithfulness constraints will apply vacuously. Without underlying prosodic structure, though, some other mechanism is necessary to account for lexical stress: i.e. the feature [stress].

3. [Stress] and Lexical Stress

The feature [stress] is privative and any output root node that contains it must be a PrWd DTE. In this section, preservation of [stress] is illustrated, and a consequence of the theory is explored: i.e. that there is no lexical secondary stress.

3.1 Preservation of Primary Stress

Preservation of contrastive primary stress in a grammar is driven by IO-IDENT[stress] being decisive in at least some competitions, and outranking at least some metrical constraints (see section 4.3 regarding OI-IDENT[stress]).

In Cupeño, for example, stress always falls on a long vowel if it is present. It is only when there are no long vowels in a word that stress is unpredictable: it can fall on either the first or second syllable. Largely following Alderete (1999)'s analysis, IO-IDENT[stress] must be ranked between metrical constraints, as illustrated below. As above, an acute accent marks a root node with a [stress] feature, ' marks head syllables of PrWds, and , marks foot heads that are not PrWd heads.

(3) Cupeño stress ranking, simplified

(a) Stressing heavy syllables beats stress preservation

/síβu:ru/	ALLFTL	STRESSHEAVY	ID[stress]	TROCHEE
☞ (a) (si.'βu:ru)			*	*
(b) ('sí.βu:ru)		*!		

(b) Left alignment beats stress preservation

/patakán/	ALLFTL	STRESSHEAVY	ID[stress]	TROCHEE
☞ (a) ('pa.ta)kan			*	
(b) pa(ta.'kán)	*!			*

(c) Stress preservation emerges

/paxál/	ALLFTL	STRESSHEAVY	ID[stress]	TROCHEE
☞ (a) (pa.'xál)				*
(b) ('pa.xal)			*!	

(d) Stress preservation accords with default stress

/tʃálal/	ALLFTL	STRESSHEAVY	ID[stress]	TROCHEE
☞ (a) ('tʃá.lal)				
(b) (tʃa.'lal)			*!	*

There are no candidates like [('pa.xál)], where the [stress] root node is not the PrWd DTE – either GEN does not generate them, or they are rejected by the interpretive component (de Lacy 2007). It is possible – and assumed above – that not all PrWd DTEs must also have a [stress] feature (e.g. 3(b)(a)), though the consequences of having a winner with a PrWd DTE without a [stress] feature will have to be explored elsewhere.

3.2 Lexical Secondary Stress

The theory of [stress] presented above does not allow for preservation of 'secondary stress' – i.e. preservation of foot DTEs that are not the heads of PrWds. The requirement that a [stress] root node must be a PrWd DTE effectively prevents such preservation. In practical terms, no language will have two lexical output forms that differ solely in the presence of secondary stress: e.g. ['pa.ka.te] 'cat' vs. ['pa.ka.te] 'dog'. The claim that there is no lexically contrastive secondary stress is found in van der Hulst (1994), but is disputed by Alderete (1999:24). Alderete (1999)'s counter-examples are examined below, with several additional cases.

The challenge in identifying lexical secondary stress is that there are several mechanisms that produce something that looks like contrastive secondary stress: metrical alignment with morpheme boundaries, category-specific metrical conditions, PrWd parsing, and transderivational faithfulness. Such cases will be illustrated below. This section will conclude with a discussion of what real lexical secondary stress would look like.

A caveat to this discussion is how secondary stress is detected: in many cases, it seems that a secondary stressed syllable (i.e. a foot DTE that is not a PrWd DTE) has no special acoustic realization – its status can only be detected through head-sensitive (morpho-) phonological processes (e.g. vowel reduction, fortition, infixation to prosodic heads). Without such head-sensitive phonological processes, the evidence for secondary stress is usually impressionistic, with all the caveats that go with such evidence (e.g. de Lacy 2009).

•Class-specific metrical conditions

Different lexical classes can have distinct phonological – including metrical – restrictions (Itô & Mester 1995, Smith 2002, Inkelas & Zoll 2007). For example, in Lynch (1978)'s description of Lenakel (Tanna), secondary stress falls on alternating syllables in nouns, arrayed right-to-left from the main stress: e.g. [tu.p^wa.lu.'ka.luk] 'lungs'. However, in verbs and adjectives, secondary stress starts at the left edge: e.g. [nɪ.ma.rok.'kej.kej] 'he liked it'.

In Optimality Theory, Lenakel nouns and verbs/adjectives cannot be analyzed as having different underlying secondary stresses because secondary stress is entirely regular, differing predictably based on part of speech. Due to Richness of the Base, one must ask what would happen to verbs with underlying secondary stress on their second vowel; the answer is, of course, that it would be ignored and secondary stress would proceed from left to right. For further discussion of Lenakel, see Hayes (1995§6.1.8), where a category-specific metrical rule is proposed.

A very similar situation is found in Huariapano, which has been claimed to have lexical secondary stress (Alderete 1999:24). The following discussion is based on Parker (2013)'s impressionistic description. There are two classes of words – called 'L' and 'R' here. Primary stress works in the same way for both classes: it falls on a final heavy syllable, otherwise on the penult: e.g. [ka('no.ti)] 'bow (weapon)', [ja('wiʃ)] 'opossum'. In foot terms, Huariapano has a final quantity-sensitive trochaic head foot. (A few words have final or antepenultimate main stress).

However, secondary stress is different for each class. For L class words, secondary stress falls on the initial syllable and on every other syllable up to (but not adjacent to) the primary stress: e.g. [mʷ.rəj.βa.'ʃi.ki] 'we found'. However, in the R class, secondary stresses start at the primary stress and fall on alternating syllables left to right: e.g. [mi.'βom.bi.'ra.ma] 'you (plural)', [a.'ri.βah.'kaŋ.ki] 'they repeated'.

The Huariapano situation, then, is similar to Lenakel's: Huariapano's L class words behave like Lenakel verbs/adjectives and R class words behave like Lenakel nouns. The difference between Lenakel and Huariapano is that there is no clear morphosyntactic difference between the L and R classes. Membership is synchronically arbitrary, just like English dialects' Latinate and Germanic lexical classes (e.g. Fabb 1988), or masculine and feminine classes in Romance languages.

However, instead of an analysis with class-specific metrical conditions, would it be possible to analyze the difference in Huariapano words as involving a difference in underlying secondary stress? Parker (2013: 18) directly addresses this question, observing that whether a word has leftwards or rightwards feet depends on the root, yet the root itself does not necessarily end up with secondary stress in the same place: e.g. ['ra.kw] 'fear', [rah.kw.a.naj] 'to be afraid', [rah.kw.tʃa.'i.ki] 'it's scary' (the root is underlined). Parker (2013:19) comments that, consequently:

"... it would be futile to construct an underlying metrical foot [PdeL: i.e. underlying secondary stress] somewhere in the lexical entries of roots of this type since it is impossible to predict *a priori* where the secondary stress will surface. Rather,...these Huariapano patterns necessitate an analysis whereby parallel co-phonologies [PdeL: i.e. class-specific conditions] are posited for the same language".

Bennett (2013) proposes another analysis of Huariapano where the difference between word classes is not direction of footing, but type of foot: class L has trochees while R has iambs. For present purposes, Bennett (2013)'s analysis makes the same point as Parker (2013)'s: secondary stress cannot be

marked underlyingly – it is foot *type* that distinguishes the two classes, not location of foot heads.

•Bases and pseudo-bases

Kenyon & Knott (1953)'s description of American English has apparent lexical secondary stress: compare [pɪg.mən.'tei.ʃn] 'pigmentation' with [kən.dən.'sei.ʃn] 'condensation'. The second syllable in *pigmentation* is not stressed (and so the vowel reduces), while the second syllable in *condensation* has secondary stress (and does not reduce). There are a number of words of both types (e.g. no stress: *segmentation*, *transformation*; stressed: *condensation*, *importation* – see Pater 2000:251 for discussion and references).

However, *condensation*-like forms have been argued to not exhibit lexical secondary stress, but rather show preservation of their base's primary stress: e.g. the derivational base of *condensation* is *condense* [kən.'dɛns], and the stress on ['dɛns] is maintained in the derived form (Chomsky & Halle 1968, Pater 2000). Such output-output faithfulness to prosodic structure is perfectly admissible in the current theory: recall that the prohibition proposed here is on prosodic structure in inputs (i.e. lexical entries), not on other forms. While there are faithfulness constraints that preserve prosodic structure, they cannot apply on the input-output dimension because the input does not contain any prosodic structure. However, they can apply on the base-derived form (output-output) dimension (Benua 1997; and any other dimension – base-reduplicant, surface-surface, inflectional paradigm).

Even so, there is an apparent problem with forms like [ɪn.kəɪ.'nei.ʃn] *incarnation* and [ɔ.sten.'tei.ʃn] *ostentation*. *Incarnation* should be *[ɪn.kəɪ.'nei.ʃn] – the only reason for pre-tonic secondary stress to occur here is that it preserves a primary stress in its derivational base. However, there is no independent base *incarn* [ɪn.'kɑɪn], nor is there a base *ostent* [ɔ.'stɛnt]. So, how can the pre-tonic secondary stress be due to output-output faithfulness?

The solution involves pseudo-bases. In some languages there are words that behave as if they consist of a root with affixes, but no independent root exists. An example is the Māori verb *titiro* [titiro] 'examine'. When reduplicated verbs are suffixed, they drop their reduplicants (Bauer et al. 1993:516). So, *titiro* becomes *tirohia* [tirohia] 'titiro+passive', not *[titirohia], and [tirohaŋa] 'tiro+gerund', not *[titirohaŋa].¹ However, for at least some

¹ More precisely, verbs with passives other than *-tia* drop initial CV reduplicants, for good prosodic reasons: cf. [ha-hae-tia] 'be slit', [hi-hiri-tia] 'be checked'. See de Lacy (2004, 2017) for discussion and references.

speakers, there is no independent morpheme *tiro* – only *titiro*. In other words, for affixation purposes *titiro* is treated as if it consisted of a prefixal reduplicant and a root even though there is no root *tiro*. Zuraw (2002) provides similar examples from Tagalog.

So, in American English there are pseudo-bases *incarn* /ɪnkaɪn/ and *ostent* /ɔstənt/. They would be realized as [ɪn.'kaɪn] and [ɔ.'stənt], and *incarnation* and *ostentation* preserve their pseudo-base's output main stress. The interesting issue with pseudo-bases is why a learner would add such entries to their lexicon when they do not ever encounter them independently; clearly, learners must be capable of deducing the existence of lexical items based on their apparent inclusion in attested morphologically complex items.

Halle & Kenstowicz (1991) argue that there are actually two different classes of words, and that the *condensation/incarnation* class has a specific condition that requires stress on heavy syllables. However, Liberman & Prince (1977: 299) and Pater (2000: 252) observe that proposing class behavior misses the generalization that the exceptional pre-tonic secondary stress depends on the existence of primary stress in the corresponding location in the base. To put it slightly differently, exceptional pre-tonic secondary stress *only* occurs when there *is* or *could be* a base which has primary stress in that position, thus requiring pseudo-bases (c.f. Pater 2000: 252, which assumes that *incarnation* words have a lexical secondary stress).

•Pseudo-compounds and multiple PrWds

In certain situations, single morphs can be parsed into multiple PrWds. When they do, they behave phonologically like compounds, and the multiple PrWd structure can be mistaken for secondary stress.

For example, Fijian has a maximum size restriction on its PrWds: they cannot be large enough to contain two feet, so they are never larger than three syllables (this condition may well be common to all Central Pacific languages: de Lacy 2004, Ketner 2006). As shown in (4), long strings are parsed into several PrWds. In Fijian compounds, the rightmost PrWd is the head, so the head syllable of the head PrWd is marked with a double accent ('). The prosodic parsing here is my own; the data is adapted from Schütz (1978).

(4) Fijian pseudo-compounds

- | | |
|--------------------------------------|---------------------------------------|
| (a) [{{'mini}{si} ta:}}] 'minister' | (e) [{{pa'lasɪ} ta:}}] 'plaster' |
| (b) [{{ota}{kə} risi}}] 'watercress' | (f) [{{pe'resi} te'ndi}}] 'president' |
| (c) [{{'koni}{tə} raki}}] 'contract' | (g) [{{te'reni}{sisi} ta:}}] |
| (d) [{{'para}{kə} raβu}}] | 'transistor' |
| 'paragraph' | |

Crucially, there are lexical distinctions in PrWd parsing. Compare 'minister' with 'plaster': the former consists of two disyllabic PrWds while the latter has a trisyllabic PrWd followed by a monosyllabic one. The present theory provides a way to account for such lexical differences by having different underlying [stress] locations: 'minister' is /mínisita:/ while 'plaster' is /palásita:/. To preserve underlying [stress], keep PrWds adequately small, and have default footing (a rightmost quantity-sensitive trochee), /mínisita:/ is necessarily realized as [{{'míni}{si} ta:}}]; *[[{mí'ni}{si} ta:}}] is impossible because [stress] is not preserved. In contrast, 'plaster' must be parsed as [{{pa'lási}{ta:}}], not the unfaithful *[[{pala}{si} ta:}}].

How are pseudo-compounds relevant to lexical secondary stress? Pseudo-compounds are occasionally misanalyzed as consisting of a single PrWd, so that the component PrWds are thought to be secondary stresses. For example, Hayes (1995:143-4) reports [{{(mini)si} ta:}}] and [{{pa} lasi} ta:}}]. With such stressing, it looks as if *minister* and *plaster* differ solely in the placement of a lexical secondary stress. However, the underlying [stress] root nodes actually appear in the DTE of a PrWd, as required by the present theory.² Importantly, there is no need for underlying secondary stress.

Finnish also has single morphemes that behave like compounds, giving the effect of lexical secondary stress. Kiparsky (2003: 113) identifies two relevant word types: (a) 'movable': e.g. *Kálevàla* cf. *Kálevalà-ssa* 'Kalevala', and (b) 'fixed': *Álabàma* cf. *Álabàma-ssa* 'Alabama'. The fixed type are called 'quasi-compounds': this type's secondary stress often initiates a vowel harmony domain, while the movable type's secondary stress "very seldom" does. Kiparsky (2003)'s analysis is that the fixed forms (at least when suffixed) consist of two PrWds (e.g. {Ála}{bámassa}), while movable forms have one (e.g. {Kálevalàssa}). In present terms, *Alabama* has underlying

² Another analytical option is that the words in (4) are single morphemes with *two* morphs. So, *minister* is stored in the Lexicon as having two morphs /mini/ and /sita:/, while *plaster* is /palasi/ and /ta:/. Each morph is assigned its own PrWd (as is regular for Fijian). It is well known that single morphemes can have multiple morphs (e.g. circumfixes). Again, with such an analysis, there is no need for lexical secondary stress.

[stress] on its third /a/. To both preserve underlying [stress] and have head feet be leftmost in the PrWd, *Alabama* breaks into two PrWds: $[[\text{Ála}]\{\text{bámassa}\}]$, $*[[\text{Álabamàssa}]]$, $*[[\text{Alabámassa}]]$. As with Fijian, there is no underlying secondary stress: the different surface secondary stresses in the movable and fixed types follows from their different PrWd structure.

• *Other lexical stress preservation cases*

In some cases, [stress] can be realized as secondary stress in compounds, but only via faithfulness to a base form (as in American English *condense~condensation*). For example, Gouskova (2010) argues that Russian compounds do not have recursive PrWd structure, yet preserve lexical stress as secondary stress under certain conditions: e.g. /v'ér-o-iz-po-v'ed-án-ij-o/ → $[[(\text{vi}^{\text{e}})\text{r}-\text{ə}-\text{is.pə}(\text{vi}^{\text{i}}\text{d}^{\text{á}}\text{nij}^{\text{ə}})]$, $*[[\text{vi}^{\text{e}}\text{r}-\text{ə}-\text{is.pə}(\text{vi}^{\text{i}}\text{d}^{\text{á}}\text{nij}^{\text{ə}})]$. While an underlying [stress] appears in the output as a foot DTE but not a PrWd DTE, the location of the secondary stress of the first root must be due to output-output faithfulness, not input-output faithfulness. In other words, underlying [stress] can appear as secondary stress in the output, but only if it is mediated through base-identity.

The same point can be made for apparent lexical secondary stress in Tübatulabal (cf. Alderete 1999:24). In Voegelin (1935)'s description, main stress falls on the final vowel of the PrWd and secondary stress falls on every other syllable going leftwards from the main stress: e.g. $[\text{.im}^{\text{b}}\text{t}^{\text{h}}\text{wiba}'\text{at}]$ 'he is wanting to roll string on his thigh', $[\text{p}^{\text{i}}\text{t}^{\text{i}}\text{p}^{\text{i}}\text{t}^{\text{i}}\text{di}'\text{nat}]$ 'he is turning it over repeatedly' (V76). However, some roots always have stress on their final vowel: e.g. $[\text{k}^{\text{u}}\text{tu}'\text{ga}-\text{t}]$ 'the firewood', $[\text{k}^{\text{u}}\text{tu},\text{ga}-\text{t}-\text{a}]$ {obj.}; $[\text{t}^{\text{u}}\text{gum}'\text{ba}-\text{l}]$ 'the beads', $[\text{t}^{\text{u}}\text{gum}'\text{ba}-\text{l}-\text{a}]$ {obj.}; $[\text{t}^{\text{u}}\text{gu}'\text{wa}-\text{n}]$ 'his meat', $[\text{t}^{\text{u}}\text{gu},\text{wa}'\text{j}^{\text{i}}\text{n}]$ {obj.} (V78). For at least *firewood* and *meat*, such preservation leads to the root's primary stress being a secondary stress in derived forms: /kütugá-t-a/ → $[\text{k}^{\text{u}}\text{tu},\text{gá}'\text{ta}]$. However, it is clear that this effect is due to preservation of the derivational base's (i.e. $[\text{k}^{\text{u}}\text{tu}'\text{ga}-\text{t}]$) primary stress rather than preservation of the underlying stress because *only* the stresses that are primary in derivational bases are preserved (at least in the examples provided).

Özçelik (2014:231-2) proposes that pre-stressing suffixes can result in multiple lexical stresses in a word in some dialects of Turkish. As pre-stressing suffixes involve preservation of an underlying [stress] feature (see section 4 below), a form like $[\text{din}'\text{le}-\text{me}-\text{di}-\text{de}]$ (where both [me] and [de] cause pre-stressing) seems to involve preservation of a [stress] feature that is realized as secondary stress – i.e. on [di]. However, Kabak & Vogel (2001) propose that pre-stressing suffixes in Turkish actually introduce a PrWd boundary, similar to class II suffixes in English dialects. In the dialect described in Kabak & Vogel (2001), there is only one stress per word (or, at

least, secondary stress position is controversial). So, the word cited above would have the PrWd structure $[[\{\text{din}'\text{le}\}\text{medide}]]$. In this vein, the difference in the Özçelik (2014) dialect would be that each pre-stressing suffix initializes a new PrWd, each PrWd has its own head, and the leftmost PrWd is the head of its structure: i.e. $[[\{\text{din}'\text{le}\}\{\text{me}'\text{di}\}\text{de}]]$.

Finally, Alderete (1999:24) identifies Bolozky (1982)'s description of Modern Hebrew as involving lexical secondary stress. Main stress typically falls on the final syllable, with alternating secondary stresses propagating leftwards (e.g. $[\text{ame},\text{vuga}'\text{rim}]$ 'the adults'). However, for five syllable words with exceptional penultimate main stress, there are two possible realizations: e.g. $[\text{ke},\text{jea}'\text{melex}]\sim[\text{ke},\text{jea},\text{melex}]$ 'when the king'. The initial-stressed form is "more typical" utterance-initially, and the peninitial-stressed form is found "commonly" elsewhere. As the initial stress pattern is conditioned by environment, it clearly does not involve contrastive secondary stress.

However, Bolozky (1982:277) notes that "in some of these nouns only the first syllable can be stressed in [utterance-]initial position", citing $[[\#,\text{ve},\text{afo}'\text{teret}]]\sim[[\#,\text{vea},\text{fo}'\text{teret}]]$. Even so, it is far from clear that such forms require underlying specification of secondary stress. It may be the case that there is a difference in frequency between initial- and peninitial-stressed forms in utterance-initial position, and that frequency may depend on the identity of individual words. However, there is no clear evidence of a categorical ban on peninitial stress for specific words, and that such words contrast with other words that have freer secondary stress. Modern Hebrew deserves further investigation.

• *Convincing evidence for lexical secondary stress*

Putative lexical secondary stress can be mimicked by faithfulness to stress in derivationally-related forms (including pseudo-bases), pseudo-compounds, PrWd formation that is sensitive to morpheme (and pseudo-morpheme) boundaries, and class-specific metrical behavior. If all of these factors are taken into account, what would a convincing case of lexical secondary stress look like?

An example would be a language with three different roots with the forms $[\text{σ}\text{σ}'\text{σ}]$, $[\text{σ},\text{σ}'\text{σ}]$, $[\text{σ}\text{σ}'\text{σ}]$ (appropriately controlling syllable shape). If pseudo-bases and -morphs are ruled out, it would not be possible to claim that the variation in secondary stress is due to different morphological boundaries. While it is still possible to argue that the words are in different lexical classes, this proposal could be investigated by seeing if longer words fall into the three classes, too.

Otherwise, it will be difficult to easily identify a convincing case of lexical secondary stress – there are too many other ways of generating ‘fake’ cases, so any argument must carefully eliminate all other possible explanations.

Of course, one issue looms over this entire discussion: whether reported secondary stresses really exist. Secondary stress often has no phonetic realization, and descriptions rarely specify exactly how secondary stress is realized (see discussion in de Lacy 2014). It is possible, then, that many reported cases of secondary stress are actually artefacts of the perceptual systems of the grammar author. In the future, I hope that either phonological or phonetic evidence (and ideally both) will be provided as a precursor to any claim about secondary stress, rather than impressionistic reports alone.

I should add that if lexical secondary stress does exist, it is rather trivial to extend the theory suggested here. If underlying stress can be realized as secondary stress (as suggested for some Turkish dialects), then it is possible that the feature [stress] could be realized on any foot DTE, regardless of whether it is the PrWd DTE. Alternatively, [stress] could be multivalued, as in SPE. However, I am not aware of any convincing cases, so at the moment it seems reasonable to assert that there is never any underlying specification of secondary stress, or any computational pressure to realize underlying [stress] on non-PrWd DTEs.

4. [Stress] Morphemes

If there is a feature [stress], one could expect it to behave like other segmental features morpho-phonologically. Other features can be part of phonologically impoverished segments, and even be the sole exponent of morphemes. Such morphemes can trigger mutation, and seek out particular segmental environments. This section argues that the [stress] feature theory provides a coherent formal account of morphemes that consist of stress alone, and explains why pre-stressing and post-stressing morphemes always involve primary stress.

4.1 Afar’s [stress] Morpheme

Previous research has established that there are morphemes that consist of a single feature, or a featurally impoverished segment (Akinlabi 1996). Here, it is argued that there is a morpheme in Afar that consists of a single root node with the feature [stress] (for a different analysis, see Ulfsbjorninn 2016). Bliese (1981)’s description is adopted here; all page numbers refer to that work.

There are two classes of nouns in Afar: masculine and feminine. They are easy to distinguish by their morphological behavior: masculine nouns occur with masculine verb agreement, and feminine nouns take feminine agreement (e.g. [amo t-an] ‘head_{FEM} FEM-be’ ‘There is a head’ cf. [ha.gid j-an] ‘business_{MASC} MASC-be’ ‘There is business’ – p.180).

Masculine nouns exhibit the default word-level prosodic structure of Afar – a quantity-sensitive right-aligned trochee. The data in (5) is from p.162 unless otherwise stated; all foot structure is my own.

- (5) *Afar masculine nouns* (L=(C)V, H=(C)VC or (C)V:)
- (a) LL: [(‘sa.ku)] ‘thinness’, [(‘ba.ra)] ‘night’, [(‘gi.ta)] ‘road’
 - (b) LH: [mu(‘tuk)] ‘butter’, [a(‘rah)] ‘place’, [hu(‘sul)] ‘meter’
 - (c) HL: [(‘na:’fi)] ‘dew’, [(‘hor)ra] ‘men’s song’, [(‘ham)du] ‘thanks’ (24)
 - (d) HH: [nam(‘maj)] ‘second’, [mo:(‘tar)] ‘car’ (179)
 - (e) LLL: [ba(‘ha.ri)] ‘meadow’ (181)
 - (f) LLH: [ka.ra:(‘rat)] ‘mirror’ (17)
 - (g) σHL: [ger(‘sit)tu] ‘another’ (181)

In contrast, feminine nouns all surface with a final stressed short vowel, as in (6).

- (6) *Afar feminine nouns*
- (a) LL: [a.‘mo] ‘head’, [ha.‘do] ‘meat’, [ha.‘le] ‘mountain’, [ba.‘da] ‘daughter’ (21)
 - (b) HL: [ba:r.‘ra] ‘woman’, [hat.‘ri] ‘perfume’, [duj.‘je] ‘stuff’ (172)
 - (c) LLL: [he.re.‘ja] ‘warthog’ (15)
 - (d) σHL: [ru.ga:‘ge] ‘calf’ (180), [ha.da:‘ga] ‘market’ (22), [ul.lul.‘lu] ‘slope’ (166)
 - (e) HLL: [cam.mu.‘re] ‘cloud’ (11)

Crucially missing from feminine nouns are forms that end in a heavy syllable (H, σH, σσH); in other words, all feminine nouns end in a short stressed vowel.

The evidence for Bliese (1981)’s description of stress is not just impressionistic: many morphemes exhibit stress-sensitive behavior, and mid vowels can appear stem-finally only if they are stressed (p.180). For example, certain animate nouns can appear in both feminine and masculine forms: e.g. [dum.‘mu]_F, [‘dum.mu]_M ‘cat’; [ka.taj.‘sa]_F, [ka.‘taj.sa]_M ‘friend’ (181). As expected, final mid vowels become high in masculine forms: /habule+FEM/

→ [ħa.bu.'le]_F, but /ħabule+MASC/ → [ħa.'bu.li]_M 'insane person'; also [di.rab.'le]_F, [di.'rab.li]_M 'liar' (p. 181).

In the present theory, the Afar feminine morpheme is a suffix that consists of a root node with a [stress] feature: $\acute{\sigma}$. As an example, /ħale₁+ $\acute{\sigma}$ ₂/ surfaces as [ħa.'lé_{1,2}], where the suffix's featurally minimal root node merges with the preceding segment. An analysis is sketched in tableau (7).

(7) *Afar feminine*

/ħa ₁ le ₂ + $\acute{\sigma}$ ₃ /	IDENT [stress]	DEP-FEATURE	ALIGN-R (FEM,PrWd)	FOOT FORM
(a) (ħa ₁ .'lé _{2,3})				*
(b) ('ħa ₁ .le _{2,3})	*!			
(c) ('ħa _{1,3} .le ₂)			*!	
(d) ħa ₁ (le ₂ .'í ₃)		*!		*

An important property of the Afar feminine [stress] morpheme is that it *must* appear at the right edge of the root. This requirement is enforced by the constraint ALIGN-R(FEM,PrWd) which requires the feminine's root node to be the rightmost root node in its PrWd.³

•No consonant-final feminine forms

A striking consequence of the right-alignment requirement is that there can be no consonant-final feminine forms: e.g. *[butúk_{FEM}].⁴ Underlying /butu₁k₂+ $\acute{\sigma}$ ₃/ cannot surface as *[bu.'tu₁k_{2,3}] because the PrWd DTE [u] does not bear the [stress] feature. It also cannot surface as *[bu.'tu_{1,3}k₂] because the feminine morph is not rightmost in this form. Unfortunately, there are no alternations (and can be none) that show exactly what happens to final consonants when the feminine is attached. In tableau (8), it is assumed that they are deleted.

(8) *Afar feminine: Consonant-final roots are altered*

/bu ₁ tu ₂ k ₃ + $\acute{\sigma}$ ₄ /	ALIGN-R (FEM,PrWd)	MAX-C	FOOT FORM
(e) (bu ₁ .'tú _{2,4})		*	*
(f) bu ₁ ('tú _{2,4} k ₃)	*!		
(g) ('bú _{1,4} .tu ₂ k ₃)	*!		

³ ALIGN-R(FEM,PrWd) is a rather brute-force constraint. It is possible that the right edge of every PrWd must align with the right edge of a stem-final morpheme in Afar, but evidence for such a claim would take us too far afield here.

⁴ Bliese (1981:180) notes a few exceptions in the Aussa dialect: e.g. [mo:'tar] 'car', [um@mat] 'people'. For at least some animate nouns, consonant-final forms can take feminine agreement (p.182), though it is not clear whether the noun itself is marked as feminine.

Long vowels are not permitted word-finally except in monosyllables (Bliese 1981: 225). So, it is impossible to know exactly what happens to forms with demonstrably underlying final long vowels when the feminine morpheme attaches.

•Alternatives

An alternative analysis is that there is no feminine morpheme, but rather so-called 'feminine' nouns are simply those that have underlying final stress. Such an analysis faces three problems. One is that 'feminine' is clearly a lexical class because feminine nouns match with feminine agreement on other items in their noun phrase: e.g. ['baða-w] 'son_M+vocative_M' cf. [dum'mu-j] 'cat_F+vocative_F' (183).

Another challenge is that it is not *roots* that are marked as feminine, but rather words: the feminine morpheme's stress falls on the rightmost vowel in the PrWd, which sometimes belong to a suffix. For example, the 'Particular' noun suffix /-jta/ attaches to masculine nouns and stress falls as expected: [(dum)mu] 'tomcat_M' cf. [dum('mu-j)ta] 'particular tomcat'; [wa('kali)] 'companion' cf. [waka('li-j)ta] 'particular companion', [ħu('tuk)] 'start' cf. [ħu('tuk)-ta] 'particular star' (p.175). However, when the Particular is suffixed to feminine forms, the final vowel of the suffix is always stressed: [ga.ʃam.'bo] 'bread' cf. [ga.ʃam.bo-j.'ta] 'particular bread'; [ħa'le] 'mountain' cf. [ħale-j'ta] 'particular mountain', [dum'mu] 'vixen' cf. [dummu-j'ta] 'particular vixen'. Here, it is possible that the Feminine's morph follows the Particular's morph underlyingly: e.g. /dummu₁-jta₂+ $\acute{\sigma}$ ₃/ → [dummu₁-j'tá_{2,3}], *[dum'mú_{1,3}-jta₂]. Alternatively, the need for the Feminine morph to be rightmost in its PrWd may force it to appear at the right edge.

Similarly, the 'abstract' marker /i:no/ receives penultimate stress with masculine nouns as expected (e.g. [ab('b-i:)nu] 'responsibility', [ka.taj('s-i:)nu] 'friendship'), but the feminine forces it to have final stress: e.g. /inki_F-i:no- $\acute{\sigma}$ / → [inki:'nó] 'singularity+FEM'; /mano_F-i:no- $\acute{\sigma}$ / → [mani:'nó] 'life+FEM' (184). Finally, the feminine follows the plural: /amo_F-VCa- $\acute{\sigma}$ / → [amo:'má] head-pl-fem 'heads', /gile_F-CVa- $\acute{\sigma}$ / → [gile:'lá] knife-pl-fem 'knives' (177).

Finally, animate masculine nouns can become feminine: e.g. [ka'tajsa] 'male friend' ~ [kataj'sa] 'female friend' (p.181). Here, the meanings 'female' and 'male' are clearly attached to the masculine and feminine morphemes, respectively, and the final stress of the feminine form clearly cannot be analyzed as underlying – it must be introduced by a morpheme.

So, proposing that the Afar feminine is / $\acute{\sigma}$ / provides a straightforward analysis. The [stress] feature is preserved in the same way as other segmental features (through an ident constraint). The Afar feminine is thus an unremarkable morpheme, formally speaking.

•Nominative

Like the feminine, the nominative suffix is also featurally defective. It consists of a root node that has three features: [stress], [+high], and [-round] (symbolized here as / $\acute{\sigma}$ /). So, it merges with the final vowel of a masculine root: /gita- $\acute{\sigma}$ / → [gi'tí] 'road'_M, /buuti- $\acute{\sigma}$ / → [buu'tí] 'pot'_M (p.164).

However, like the feminine, the nominative must be rightmost in its stem. Consequently, it deletes when it is faced with attachment to consonant-final masculine roots: e.g. /rusas- $\acute{\sigma}$ / → [ru.'sas] 'bullet'_M, *[ru.'sís]; /marub- $\acute{\sigma}$ / → [ma.'rub] 'sheep'_M, *[ma.'rīb].

The nominative also cannot attach to feminine roots: e.g. /naḥna₁- $\acute{\sigma}$ ₂- $\acute{\sigma}$ ₃/ → [naḥná_{1,2}], *[naḥnú_{1,2,3}], *[naḥnú_{1,3}]. In this situation, coalescence of the feminine with the nominative would obliterate any distinctive realization of the feminine in the output, falling afoul of constraints that require that at least some element of a morpheme have an independent exponent (e.g. Wolf 2005).

The importance of the Afar nominative is that it combines [stress] with other segmental features ([high], [round]), just as one would expect of a segmental feature (for other detailed examples, see Akinlabi 1996, de Lacy 2012).

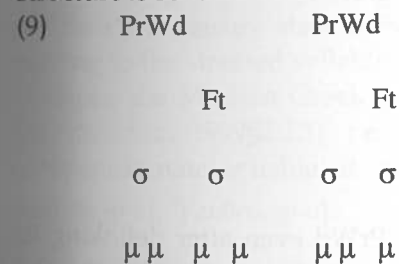
•Prosodic Conceptions of the Feminine

In theories that permit underlying prosodic structure and have no feature [stress], the Afar feminine would have to underlyingly consist of a head mora of a head syllable of a head foot (/μ/): e.g. /butu+μ/ → [bu.'tú], where the mora docks onto the rightmost vowel (and/or merges with the rightmost underlying mora).⁵ In contrast, a theory without underlying prosodic structure and the feature [stress] must claim that the Afar feminine morpheme is a root node with a feature [stress].

⁵ The feminine could not simply be a head foot node (Ft). If it were, there would be no problem with /butuk+Ft/ → [bu('túk)] as the feminine's foot node is rightmost in the word. If the feminine was instead a head syllable node (σ), the same problem arises. So, in a prosodic analysis the feminine morph must at least consist of a head mora of a head syllable.

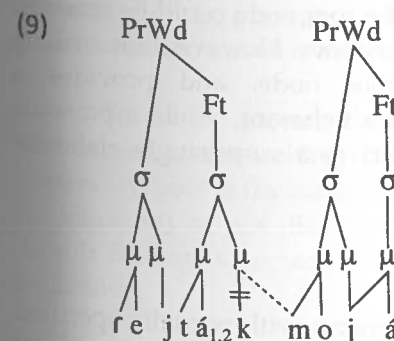
There is evidence that the feminine does in fact contain a root node. The postposition /-k/ 'genitive' appears as [k] *except* with some feminine roots. When it suffixes to a feminine root, it remains [k] before a vowel-initial word, but geminates the following consonant when consonant-initial words follow: e.g. /amo₁- $\acute{\sigma}$ ₂-k inti/ → [a.'mó_{1,2}.kin'ti] 'a head's eye', /rejta₁- $\acute{\sigma}$ ₂-k mojja/ → [rej'tá_{1,2}m:oj'ja] 'a goat's skull' (170). The genitive /k/ remains faithful elsewhere: e.g. [da'nán-a-k ṣabál] 'donkey-gen blood' 'blood of a donkey' – the only place where it geminates is between a feminine stressed syllable and a consonant.

As established above, the feminine morpheme seeks to be the rightmost root node in its PrWd. Before vowel-initial roots, syllabifying the genitive [k] into the following PrWd allows the feminine root node to be final: [{a.'mó_{1,2}}{kin.'tí}]. However, the genitive /k/ cannot be pushed into the following PrWd when that PrWd already starts with a consonant because complex onsets are not permitted. The solution is for the /k/'s root node to delete, ending up with a geminate consonant: [rej.'tá_{1,2}m:ojjáj]. The output structure is schematized in



r e j t á_{1,2} k m o j á

Deletion of the /k/'s root node means that it is no longer – strictly speaking – the rightmost root node in the leftmost PrWd: the rightmost root node that belongs *fully* to the first PrWd is [á_{1,2}]. In other words, by geminating the final consonant, the feminine becomes the rightmost root node.



The same behavior is found with other morphemes. With feminine forms, another genitive morpheme surfaces as [h] before vowel-initial words, and as a geminate elsewhere: /saga_F-[•]-h iba/ → [{sa'gá}{'hiba}] 'foot-fem-nom-gen cow' ('cow's foot'), cf. /bu_qa_F-[•]-h mara/ → [{bu'dám}{'ára}] 'people-fem-gen village' ('villagers') (165). Again, the feminine ends up as the rightmost root node that is fully contained in its PrWd.

Could the same restriction be explained if the feminine was a prosodic structure? If the feminine was /[•]/, as defined above, there are challenges in explaining why /-k/ and /-h/ geminate before consonant-initial words. Firstly, the feminine's μ must be required to be final in its PrWd to explain why the feminine cannot attach to consonant-final stems: i.e. /butu₁k₂-[•]₃/ → *[butú_{1,3}k₂], *[butu₁k_{2,3}]. However, for /rejta-k moj'a/, geminating the /k/ to form [rej'tám:oj:'a] does not make the feminine's mora rightmost: as seen in

(9) PrWd		PrWd	
Ft		Ft	
σ	σ	σ	σ
$\mu\mu$	$\mu\mu$	$\mu\mu$	μ

rejt_{á1,2}k mo j á

, the genitive's mora is still rightmost in the PrWd even after delinking its root node. In other words, if the feminine is a mora /[•]/, geminating the /k/ and /h/ morphemes serves no purpose as it does not allow the feminine's morph to align with the PrWd's right edge.

The solution for the prosodic analysis could simply be to extend the morpheme so that it includes a root node: i.e. the feminine morph would consist of a head root node dominated by a head mora dominated by a head syllable (and perhaps by a head foot). Then, the root node could be required to be rightmost, providing the same analysis as above. However, it is striking that the [stress] theory necessitates a root node, and provides a straightforward account of the Afar feminine's behavior, while a prosodic conception of a 'stress morpheme' must resort to a surprisingly elaborate structure.

4.2 Pre- and Post-stressing Morphemes

Some morphemes combine fully specified segments with partially specified root nodes that bear [stress]. Such morphemes either attract stress away from

the default position or other lexical positions (i.e. 'pre-stressing' and 'post-stressing' morphemes); or their morphs travel to the default stress position (infixing), or they only ever appear next to stressed syllables.

For example, the construct state infix in Ulwa suffixes to the primary stressed syllable (McCarthy & Prince 1993:112, Green 1999:52). In present terms, the morpheme is underlyingly /[•]ka/. Footing is iambic, starting at the left edge; the head foot is leftmost: e.g. /siwa₁nak-[•]₂ka/ → [(si'wá_{1,2})kanak] 'root'; /ana:1la:ka-[•]₂ka/ → [(a'ná:1,2)kala:ka] 'chin'.

Forms like /kafa₁smak-[•]₂k₃a/ → [(ka'rá_{1,2}s)k₃amak] 'knee' illustrate an important point about the present theory: adjacency requirements can be relaxed in some grammars, as in [...á_{1,2}sk₃]. In Ulwa, the suffix's root node /[•]/ can end up separated from its following underlying segment if syllable and foot requirements force it: e.g. the adjacency-preserving *[(ka'rá)kasmak] is less optimal than the winner [(ka'rás)kamak] because it lacks a heavy foot head.

Pre- and post-stressing morphemes have the same underlying form as Ulwa's construct state infix; they differ in that instead of the morph moving to the stressed syllable, the stressed syllable moves to the morph. For example, the Modern Greek genitive singular is a pre-stressing morpheme (Revithiadou, 1999§2.2.1): i.e. /[•]u/. So, while stress usually falls on the antepenultimate syllable, it is attracted to the penult in /anθro₁p-[•]₂u/ → [anθ'ró_{1,2}p-u], *['anθro_{1,2}p-u].

Finally, morphemes that only attach to stressed syllables also have an underlying defective root node with [stress]. For example, the American English noun-attaching *-ful* only suffixes to words whose last syllable has main stress (Siegel 1974:168-174). Examples include ['pis-ft] 'peaceful', [sə'spens-ft] 'suspenseful', [dɪsɪə'spekt-ft] 'disrespectful', and not *['wɪzɪdəm-ft] 'wisdomful', *[wɪknəs-ft] 'weaknessful', *['ɪn'ventʃən-ft] 'inventionful'. In present terms, the suffix is underlyingly /[•]fl/. When it cannot attach to a final main-stressed syllable, it is blocked from appearing.

So, in the present theory, the representation of pre-/post-stressing morphemes, stress-seeking infixes, and affixes that only appear adjacent to a stressed syllable is the same: the underlying fully specified string is preceded (or followed) by a [•]. Exactly how the grammar behaves depends on how default footing is favored with respect to affix edge alignment and morph realization.

The present theory makes a strong prediction about such morphemes: all of them must require primary stress (i.e. PrWd DTE). There

can be no pre-stressing suffix that induces secondary stress, or any affix that seeks out a secondary stress position, or must attach to a secondary stress. Such an affix would be impossible to represent in the current theory since [stress] is only compatible with PrWd DTEs (i.e. primary stress). The correctness of this prediction awaits a thorough review of all such morphemes.

Prosodic accounts of stress-related morphemes face some formal challenges. Suppose the Modern Greek genitive singular is /óu/, where /ó/ is a prosodic structure consisting of a head syllable node. How does such a representation induce stress on the preceding syllable? To do so, the adjacency and precedence relations between the /ó/ and /u/ must be preserved. Unfortunately, that is not possible: there is no precedence or adjacency relation between the σ node and the /u/'s root node – they are on different tiers. Since there is no relation to preserve, the morpheme's /ó/ should be free to float to any position; in fact, as there is no motivation for it to appear on the immediately preceding syllable, it should move to the default stress position.

There are several imaginable ways to avoid this problem. One is to propose that the /u/ also has a syllable node / σ u σ /, and so the order between the syllables is preserved. However, preserving / σ / nodes brings the theory dangerously close to allowing contrastive syllabification. Another option would be to say that the underlying form consists of a root node that is the head of a head syllable. Then, for / σ u/, the immediate precedence relation between the / σ / and /u/ could be preserved.

A general issue relates to where the precedence relation holds. If precedence only holds between root nodes (and tones, presumably), any underlying prosodic structure would have to be anchored to a root node if it was to retain its underlying precedence and adjacency relations. If so, no morpheme that has segmental material could contain floating prosodic structure – every node would have to be anchored to a root node. So, the differences between specifying stress as a feature and a prosodic structure start to disappear: in both theories, stress is tied to the root node tier. A remaining issue for the prosodic theory is how to account for the lack of pre- and post-stressing morphemes that induce secondary stress.

4.3 Lexical Non-stress

The present theory predicts that there should be no lexical contrast involving unstressed syllables: the [stress] feature is privative and there is no active preservation of underlying lack of [stress]. This prediction is the same as in Alderete (1999)'s theory, where underlying prominence is preserved, but not lack of prominence. However, if [stress] was a binary feature [\pm stress], where a [-stress] segment was required to appear inside a segment that is not a foot

DTE and some constraint preserved underlying [-stress], then one should expect to find detectable effects: i.e. morphemes that repel stress from particular positions. Revithiadou (1999) proposes a relevant system, with two possible values for lexical stress – accented and unaccented.

In practice, it is very difficult to detect lexical non-stress because it behaves much like lexical stress. For example, suppose there is an underlyingly unstressed suffix /-tĩ/. In a language with final stress, -tĩ would repel stress onto the penult: [pu'ka] cf. [pu'kaĩ]. However, such a pattern admits a variety of other analyses, such as -tĩ being pre-stressing, or attaching outside the stem's PrWd (e.g. Kabak & Vogel 2001), or provoking faithfulness to the base's stress position (e.g. Benua 1997; section 3.2 above).

More easily detectable cases of underlying unstress would involve pre-unstressed suffixes. For example, suppose a language had consistently final stress, but there was a suffix /- σ tĩ/ that forced stress retraction: e.g. [pu'ka] vs. ['pukā-tĩ] – stress is forced off not only the suffix here, but also kept off the preceding vowel of the root.

I have not found any such cases. However, Revithiadou (1999) argues that Thompson River Salish (Ntɛkɛpmx) preserves underlying unstress. By default, stress falls on the leftmost full vowel, otherwise the rightmost [ə]. However, there are unaccentable roots that repel stress: e.g. [meloq'w-e-s-'t-es] 'knock someone out', [q'w-i. 'n-əm] 'serve as a spokesman', [cuwes='xən] 'measure another shoe' (R44).

What complicates matters here is that there are alternative analyses of the Thompson River Salish metrical system, such as Coelho (2002)'s (C). In C's analysis, morphemes are lexically specified as underlyingly stressed or lacking stress – in present terms, some morphemes have any underlying root node with [stress] and others do not. In effect, surface stress falls on the rightmost suffix with underlying stress. If there are no suffixes with underlying [stress], stress falls on the first suffix.

Crucial to C's analysis is a constraint that is violated when an output segment is stressed but its input correspondence is not. In the present theory, such a constraint is OI-IDENT[stress] "If output *x* contains [stress], then input *x*' contains [stress]." At first glance, such a constraint seems to have an effect very like preservation of lack of stress. However, its effect is slightly different: it favors output stress falling on a segment that had underlyingly [stress], but it does not specifically preserve unstress.

The difference is most clearly visible if there is a three-way distinction between underlying stress, unstress, and lack of specification. Returning to the example with /puka-tĩ/, IO-IDENT-unstress would favor ['pukati] over [puka'ti] and [pu'kati] as the latter two fail to preserve the underlying lack of stress. Of course, this is an undesirable result since such 'pre-unstressing' suffixes do not seem to exist. In contrast, IO-IDENT[stress] and OI-IDENT[stress] assign the same violations to all three forms, and so are irrelevant in this competition.

A complete evaluation of C's analysis of Thompson River Salish is beyond the scope of this paper. It is simply noted here that with a privative stress feature and preservation of [stress] on both IO and OI dimensions, effects somewhat like – but not entirely the same as – preservation of unstress can be produced. Consequently, any apparent preservation of stresslessness requires careful evaluation and consideration of alternative analyses.

5. Conclusions

This article provided part of an argument that there is no prosodic structure in lexical entries. Without underlying prosodic structure, contrastive stress requires a feature [stress] and constraints that preserve it (IDENT[stress]). In the output, only PrWd DTEs can bear the [stress] feature. A consequence is that there can be no lexical secondary stress, no morphemes that require secondary stress to follow/precede them, and no morphemes that seek to attach to secondary stressed syllables. The next step is to show that there are no underlying moras, a task I leave for future work.

Finally, it is now possible to return to the issue of representational redundancy, raised in section 1. Here, it has been argued that while [stress] and prosodic structure do the same representational work in the output, they have different roles in input-output preservation. As there is no underlying prosodic structure, all stress-related contrast is due to the feature [stress]. This point emphasizes that appealing to representational redundancy is a complicated matter: truly redundant features/structures must be redundant in terms of the output, input-output preservation, and computation, as well as being representationally duplicative. Consequently, the [stress] feature is only a partially redundant representational entity: its value is in accounting for contrast, something that prosodic structure cannot be used for.

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Possessive Tone in Tswefap (Bamileke): Paradigmatic or Derivational?

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Abstract

In this paper, I consider two analyses of the possessive pronoun tonal paradigm in Tswefap, a Bamileke language spoken in Batoufam, Cameroon. As in the case of related languages that have been previously described, Tswefap has a rather complex tone system that involves multiple tone heights, tonal contours, and tone alternations. Although simplified, it also maintains several of the inherited noun class distinctions. In this study attention is on the tones of possessive pronouns and their effects on a preceding modified noun. I first present a paradigmatic account as one might find in a descriptive or pedagogical grammar indicating which possessive pronouns receive which tones. I then turn to a more traditional Bamileke and Grassfields Bantu analysis in terms of underlying representations and floating tones. It is argued that all possessive pronouns are preceded by a floating L tone which affects the mid tone of a preceding noun in one of two ways, depending on the syllable shape of the pronoun: (i) if the pronoun begins with a consonant, the mid of the noun becomes a mid to low contour tone; (ii) if the pronoun consists solely of a vowel, the mid of the noun is raised to a high tone. Although I argue for the latter analysis, I conclude by demonstrating that alternate tonal variations indicate on-going change which may ultimately undermine the more abstract phonological analysis in favor of a considerably simplified paradigmatic tone assignment.

1. Introduction

In a number of studies in the 1970s, abstract tonal analyses have been proposed of several Bamileke (Eastern Grassfields Bantu) languages, including Medumba [Bangangte] (Voorhoeve 1971), Fe'fe' [Bafang] (Hyman 1972), Ghomala [Bandjoun] (Nissim 1981), and Yemba [Dschang] (Tadadjeu 1974, Hyman & Tadadjeu 1976). In each case floating tones were posited to capture morphotonemic alternations, which could be quite complex, particularly as followed up in the case of Yemba (cf. Pulleyblank 1986, Hyman 1985, Stewart 1992, Clark 1992, Snider 1999). As Hyman & Tadadjeu (1976) pointed out, these floating tones could be traced back to either lexical or grammatical historical syllables in Proto Eastern Grassfields Bantu (PEGB) whose vowels had dropped out, but could still be posited in abstract synchronic representations. Tadadjeu's (1974:284) minimal quadruplet in Yemba illustrates:¹

	là-tɔŋ	Underlying	PEGB	
(1)	là-tɔŋ	L-H	/là-tɔŋ/	*-tɔŋá *H.H
'feather'	là-tɔŋ°	L-H	/là-tɔŋ-`/	*-tɔŋ-à *H.L
'to call'	là-tɔŋ	L-L°	/là-tɔŋ' /	*-tɔŋá *L.H
'tooth'		L-L	/là-tɔŋ-` /	*-tɔŋ-à *L.L
'to reimburse'				

In these examples the L tone prefix /là-/ marks noun class 5 on nouns as well as verb infinitives. As indicated, bisyllabic *H.H and *L.L transparently yield monosyllabic H and L stems, while *L.H and *H.L result in new surface tonal contrasts: *L.H is realized as a level L pitch syllable, symbolized L°, which contrasts with the falling pitch of L before pause. As shown, the historical *H remains as a floating tone that blocks the automatic "downgliding" of L before pause. The fate of *H.L is even more interesting: In this case the floating L causes the preceding H to become downstepped, thereby creating the unusual contrast between L-H and L-[↓]H. To produce the downstep, Pulleyblank (1986:41) proposed a metathesis of the floating L, while Hyman (1985:72) and Snider (1999, ch.7) present different models which place the L on a second (register) tier. Other Bamileke languages produce still other tonal contrasts. Thus, with a simple /H, L/ contrast, floating tones have been assumed to be the correct mechanism to derive M tones, level L° vs. falling L, rising and falling tonal contours, and contrastively downstepped[↓]H and [↓]L (even double-downstepped^{↓↓}H and ^{↓↓}L in Yemba). Although there are alternatives to abstract floating tones, including less desirable arbitrary diacritics (Hyman 2003), the great achievement was to derive the diverse Bamileke tone systems from a simple binary /H, L/ contrast which, in the generative tradition, was appreciated for its generality and its elegance. The question of course is whether the surface facts justify such abstract analyses, or whether the floating tones are simply a mirror of history.

In the current study I contrast two different tonal analyses of the possessive pronoun paradigm in Tswefap, a member of the Nda?nda? cluster of dialects spoken in Batoufam.² Like Fe'fe', these dialects have developed a M tone which I will take as underlying, hence a three-height contrast between H, M, L.³ The question I will raise is whether the tones of possessive pronouns should be analyzed with floating tones or through a direct

¹Standard abbreviations and tonal accent marks are adopted in this study as follows: H(igh) is marked by an acute (´) accent, L(ow) by a grave (`) accent, M(id) by a macron (¯), downsteps by (ˀ), and contours by combinations of the above accents, e.g. ML (ˀ). L° (°) indicates a level L which contrasts with a falling L before pause.

²Research on Tswefap is based on materials collected in a 2015-16 field methods class at the University of California, Berkeley, with Guy Tchatchouang as consultant. I would like to thank Guy and the members of the course for their contributions and insights in studying Tswefap: Geoff Bacon, Andrew Cheng, Emily Clem, Ginny Dawson, Erik Maier, and Alice Shen. Other consulted work on Tswefap includes Ngantchui (1989, 2002), Gueche Fotso (2013) and my own notes collected in the field in 1974.

³As in Fe'fe', M and L are lexical tones in Tswefap, while H tones either occur on grammatical morphemes or result from grammatical processes, e.g. M to H raising of a noun tone in certain possessives (see Tables 5 and 6 below).

paradigmatic assignment of tones to pronouns according to noun class, person, and number. In §2 I first present the data and then the paradigmatic analysis. In §3 I show that an analysis recognizing a floating L neatly captures the same facts. In §4 I consider current variation and direction for future changes in the system, concluding in §5 with consideration of a few additional facts that may affect the analysis.

2. The possessive paradigm in Tswefap

In this section I will present the different realizations of tone on possessive pronouns in Tswefap. Forms representing all of the relevant combinations of noun + possessive pronouns are given in Table 1 (cl = "noun class").

Table 1: Possessive Pronouns in Tswefap

cl	gloss	noun	1sg	2sg	3sg	1pl	2pl	3pl
Y	'chief'	fɔ	fɔ' à	fɔ' ɔ	fɔ' è	fɔ' yɔ	fɔ' zhi' gə	fɔ' zhub
	pl.	fɔ	fɔ' pɛ	fɔ' pù	fɔ' pə	fɔ' pɔ	fɔ' pi' gə	fɔ' pùb
	'child'	ɲwə	ɲwə à	ɲwə ɔ	ɲwə è	ɲwə yɔ	ɲwə zhi' gə	ɲwə zhub
	pl.	pɲwɔ	pɲwɔ pɛ	pɲwɔ pù	pɲwɔ pə	pɲwɔ pɔ	pɲwɔ pi' gə	pɲwɔ pùb
	'animal'	nòb	nòb à	nòb ɔ	nòb è	nòb yɔ	nòb zhi' gə	nòb zhub
	pl.	nòb	nòb pɛ	nòb pù	nòb pə	nòb pɔ	nòb pi' gə	nòb pùb
Mb	'dog'	mbvɪg	mbvɪg à	mbvɪg ɔ	mbvɪg è	mbvɪ g yɔ	mbvɪ g zhi' gə	mbvɪ g zhub
	pl.	mbvɪg	mbvɪ g pɛ	mbvɪ g pù	mbvɪ g pə	mbvɪ g pɔ	mbvɪ g pi' gə	mbvɪ g pùb
	'egg'	pòb	pòb à	pòb ɔ	pòb è	pòb yɔ	pòb zhi' gə	pòb zhub
	pl.	mbòb	mbòb mɛ	mbòb mù	mbòb mə	mbòb mɔ	mbòb mi' gə	mbòb mùb
	'fruit'	khwə	khwə à	khwə ɔ	khwə è	khwə yɔ	khwə zhi' gə	khwə zhub
	pl.		nkhwə mɛ	nkhwə mù	nkhwə mə	nkhwə mɔ	nkhwə mi' gə	nkhwə mùb
Tm	'ear'	tɔg	tɔ g à	tɔ g ɔ	tɔ g è	tɔ g yɔ	tɔ g zhi' gə	tɔ g zhub
	pl.	ntɔg	ntɔ g mɛ	ntɔ g mù	ntɔ g mə	ntɔ g mɔ	ntɔ g mi' gə	ntɔ g mùb
	'tree'	tsə	tsə à	tsə ɔ	tsə è	tsə yɔ	tsə zhi' gə	tsə zhub
	pl.	ntsə	ntsə mɛ	ntsə mù	ntsə mə	ntsə mɔ	ntsə mi' gə	ntsə mùb
	'hand'	pɲu	pɲu à	pɲu ɔ	pɲu è	pɲu yɔ	pɲu zhi' gə	pɲu zhub
	pl.	mbvɪ	mbvɪ mɛ	mbvɪ mù	mbvɪ mə	mbvɪ mɔ	mbvɪ mi' gə	mbvɪ mùb
Tsm	'tooth'	swɔg	swɔ g tɛ	swɔ g tsù	swɔ g tsə	swɔ g tsɔ	swɔ g tsigə	swɔ g tsùb
	pl.	nswɔg	nswɔ g mɛ	nswɔ g mù	nswɔ g mə	nswɔ g mɔ	nswɔ g mi' gə	nswɔ g mùb
	'name'	tsɪg	tsɪ g tɛ	tsɪ g tsù	tsɪ g tsə	tsɪ g tsɔ	tsɪ g tsigə	tsɪ g tsùb
	pl.	ndzɪg	ndzɪ g mɛ	ndzɪ g mù	ndzɪ g mə	ndzɪ g mɔ	ndzɪ g mi' gə	ndzɪ g mùb
	'leaf'	hwə	hwə tɛ	hwə tsù	hwə tsə	hwə tsɔ	hwə tsigə	hwə tsùb
	pl.	hwə	hwə mɛ	hwə mù	hwə mə	hwə mɔ	hwə mi' gə	hwə mùb
Y	'eye'	tsɔ	tsɔ tɛ	tsɔ tsù	tsɔ tsə	tsɔ tsɔ	tsɔ tsigə	tsɔ tsùb
	pl.	nɔ	nɔ mɛ	nɔ mù	nɔ mə	nɔ mɔ	nɔ mi' gə	nɔ mùb
Ts	'thing'	zhwə	zhwə à	zhwə ɔ	zhwə è	zhwə yɔ	zhwə zhi' gə	zhwə zhub
	pl.	tswə	tswə tɛ	tswə tsù	tswə tsə	tswə tsɔ	tswə tsigə	tswə tsùb

As can be seen in these forms, the tones on possessive pronouns depend on the noun class, as well as on the syllable structure of both the noun and the possessive pronoun. As in the case of neighboring Bamileke languages, the vast majority of nouns are monosyllabic of the shape CV or CVC and carry M

or L tone, e.g. *ɲwə* 'child', *fɔ* 'chief', *tɔg* 'ear', *pòb* 'egg'. They may also have a non-syllabic nasal preceding the initial consonant, e.g. *ɲkɔ* 'nest', *nzhwɪ* 'wife', *ɲjòb* 'axe', *mbvɪg* 'dog'.⁴ Possessive pronouns can have the shape V, CV, CVC or CVCV. The presence vs. absence of an initial C, as well as the identity of the initial C depend on noun class.

In Table 1 the nouns have first been grouped by noun class, identified by the initial consonant of the first person plural possessive *yɔ*/*yɔ*, *pɔ*, *mɔ*, or *tsɔ*. These in turn have been grouped into singular/plural pairs (or genders), of which there are four: *y/p*, *y/m*, *ts/m* and *y/ts*, the last being quite marginal. These are compared in Table 2 to other studies of Tswefap and with Proto-Eastern Grassfields Bantu and Proto-Bantu (PB) noun class numberings.

Table 2: Tswefap Noun Classes

	This study	Ngantchui (1989)	Gueche Fotso (2013)	Hyman (1974)	PEGBI/PB
sg	y()	y ~ w	W	w()	1
pl	p	p	P	p	9
sg	y	y	Y	y	2
pl	m	m	M	m	3, 7
sg	ts	Ts	Ts	ts	4, 6
pl	ts	Ts	Ts	ts	5
					8, 10

As indicated, there are some differences between the present and previous studies. Ngantchui (1989:137) mostly recognized a *y* class (as our speaker for this study also has) with a restricted *w* variant, while Gueche Fotso (2013:52) has *w*. Historically the situation was as indicated in the Hyman (1974) column: There was originally a distinction between class 1 *w*() vs. class 9 *y*(), which merge as *y*() in the speech of our consultant, but apparently as *w*() in Gueche Fotso (2013).⁵ The L () tone indicates a different possessive tonal pattern from the other classes (see below).⁶

⁴Transcriptions generally follow IPA except that *y* is used for [j], and *zh* is used for [ʒ], the realization of /y/ before a high vowel. Note that while there is an extensive set of onset consonants, the only coda consonants are /b, g, m, ɲ, ʔ/, where /b, g/ are realized voiceless and unreleased in final position.

⁵Interestingly, the initial *w* also appears in the plural object pronouns *wɔ*, *wigə*, *wub*, whose tones vary in context between H and M.

⁶Unfortunately Gueche Fotso (2013:44, 76) indicates all possessive tones as L. Since all of his examples in the *w* class are animates, it is not clear if inanimate class 9 nouns also moved into the *w* class or whether they merged with the *y* class. Ngantchui (1989:139) marks both *y*() and its plural *p* class with L, the *y* class with H, and the others with M (independent of person and number). Finally, in my 1974 notes, based on two hours of elicitation, I did not consistently distinguish H vs. M (except in a H-M sequence). However, I indicated plural pronouns as L in the *w*() and *y*() classes and wrote *sú* 'wɔ'our friend'

Focusing on the data in Table 1, we first note that except for the $y(\cdot)$ class, which has L tone throughout (in green), the plural person pronouns 'our', 'your pl.' and 'their' have M tone throughout (yellow). These latter are thus analyzed as $/-\bar{o}/$, $/-\bar{i}g\bar{e}/$ and $/-\bar{u}b/$, respectively. All that needs to be added is that M nouns become ML, e.g. $pfw\bar{o}$ 'children', $pf\bar{o}$ $p\bar{o}$ 'our children'. This leaves predicting the tones of singular person pronouns. In the $y(\cdot)$ class (plural p), the singular person pronouns all have the shape V with a L tone, $/\bar{a}/$, $/\bar{o}/$, $/\bar{e}/$, while the plural person pronouns begin with a consonant: $/y-\bar{o}/$, $/y-\bar{i}g\bar{a}/$, $/y-\bar{u}b/$. In the y class (plural m), the singular person pronouns also have the shape V, this time with M tone (yellow). In addition, a preceding M tone noun becomes H: $t\bar{o}g$ 'ear', $t\bar{o}g\bar{a}$ 'my ear'. The other singular person pronouns are all CV, also with predictable tone: First and second person pronouns have L° (level L) tone (in pink), while third person singular pronouns are M (yellow). As in the case of plural person pronouns, if the preceding noun is M, it becomes ML: $ts\bar{i}g$ 'name', $ts\bar{i}$ $gts\bar{e}^{\circ}$ 'my name', $ts\bar{i}$ $gts\bar{u}$ 'your (sg.) name', $ts\bar{i}$ $gts\bar{a}$ 'his/her name'. This completes the summary of the tonal data in the possessive pronoun paradigm.⁷

The above constitutes a "paradigmatic" approach to accounting for the tones of possessive pronouns (and their effects on preceding M tone nouns), i.e. as one might find in a descriptive or pedagogical grammar dealing with tone. The ordered "rules" can be stated as follows:

- (2) a. if the possessive pronoun is in the $y(\cdot)$ class, assign a L
- b. if the possessive pronoun is plural, assign a M
- c. if the possessive pronoun is singular:
 - i. assign M to the V in the y class
 - ii. assign L° to second person singular CV pronouns
 - iii. assign M to third person singular CV pronouns
- c. concerning a preceding M noun
 - i. raise it to H before a M tone V possessive pronoun (y class singulars)
 - ii. change it to ML before a CV possessive pronoun

As seen, in order to account for all of the patterns, the above descriptive rules have to refer to noun class, person and number, as well as syllable structure. The question is whether an analysis in terms of underlying representations can do better. This is taken up in the next section.

(class 1), $n\bar{j}\bar{o}p$ 'yà 'our axe' (class 9). The two classes merge as $y(\cdot)$ in the speech of our consultant, who however also has a variant with M tone, e.g. $s\bar{u}y\bar{o} \sim s\bar{u}y\bar{o}$ 'our friend', $n\bar{j}\bar{o}p\bar{y}\bar{o} \sim n\bar{j}\bar{o}p\bar{y}\bar{o}$ 'our axe'. See also §4.

⁷Since our goal is only to predict the tones, we will not be concerned with predicting the different syllable shapes, the $y \sim zh$ alternation in the y classes, and the different vowels in V vs. CV singular possessive pronouns: a vs. $C-\bar{e}$, o vs. $C-u$, e vs. $C-\bar{a}$.

3. A representational analysis of the possessive paradigm

As mentioned in the introduction, the tradition in Bamileke (and Grassfields Bantu) studies has been to posit abstract underlying forms with $/H/$ and $/L/$, which may be linked or float. The question is whether such an approach can be helpful here. Can we reduce the number of "rules" in (2) and replace them with a more unified representation of possessive tone? Since the four tone patterns in Yemba in (1) have merged to a simple M vs. L contrast on monosyllabic nouns, we can assume that the historical $*H-H$, $*H-L$, $*L-H$ and $*L-L$ stem tones have been restructured, with two possible nominal tones, $/M/$ vs. $/L/$. As we have seen, M and L also contrast on possessive pronouns, although a L° tone is also observed. I shall now consider a derivational analysis with a floating L preceding all possessive pronouns. My proposal is that possessive pronouns can have one of three underlying tones:

- (3) a. $y(\cdot)$ class possessive pronouns are $/L/$
- b. CV first and second person singular possessive pronouns are $/LM/$
- c. remaining possessive pronouns are $/M/$, i.e.
 - i. all plural person possessive pronouns
 - ii. third person singular possessive pronouns

In this interpretation, $/M/$ is the default and all pronouns are preceded by a floating L. In the case of the $y(\cdot)$ class, all of the possessive pronouns are L, so nothing more need be said about these (other than the variation that will be pointed out in §4). I suggest that the L° of the CV first and second person singular possessive pronouns derives from the simplification of an underlying $/LM/$ contour, e.g. $/n\bar{o}b \text{ } ^{\circ}p-\bar{e} / \rightarrow n\bar{o}bp\bar{e}^{\circ}$ 'my animals', $/ts\bar{i}g \text{ } ^{\circ}ts-\bar{e} / \rightarrow ts\bar{i}gts\bar{e}^{\circ}$ 'my name'.⁸ While the floating L has no effect in the first example, it is responsible for the ML falling tone of $ts\bar{i}g$, which also occurs before M and L CV possessors: $/ts\bar{i}g \text{ } ^{\circ}ts-\bar{o} / \rightarrow ts\bar{i}gts\bar{o}$ 'his/her name', $/n\bar{j}\bar{w}\bar{o} \text{ } ^{\circ}y-\bar{o} / \rightarrow n\bar{j}\bar{w}\bar{o}y\bar{o}$ 'our child'. I suggest that the floating L is also responsible for the raising of M to H before a M tone V possessor, as when $/t\bar{o}g \text{ } ^{\circ}\bar{a} /$ is realized $t\bar{o}g \bar{a}$ 'my ear'. This is attributable to the fact that the expected output $*t\bar{o}g \bar{a}$ is ill-formed: the language doesn't permit a ML falling tone when the input is CVC+V. (It does however allow it when the input is CV+CV, e.g. $/pfw\bar{o} \text{ } ^{\circ}p-\bar{a} / \rightarrow pfw\bar{o}p\bar{a}$ 'his/her children'.) Instead, the L causes a M to raise. What this means is that the floating L has two different realizations on a preceding M noun: (4) a. it converts M to ML before a CV possessive pronoun
- b. it converts M to H before a M tone V possessive pronoun (y class)

⁸In an equivalent analysis the M of the possessive could be floating: $/^{\circ}p-\bar{e} /$, $/^{\circ}ts-\bar{e} /$. I assume that the second tone is M rather than H since, as mentioned, H tone is restricted to grammatical morphemes and derived environments, e.g. the $M \rightarrow H$ raising rule before M tone V possessors.

When the preceding noun is L, the floating L has no effect: /pòb `y-5/ → pòby5 'our egg'. While one could argue that the derivational analysis in (3) does not have a great advantage over the paradigmatic analysis in (2), the fact that it is possible to derive the alternations by positing three different underlying pronominal tones, /L/, /M/, /LM/ and a floating L tone at least maintains a link with the historical source and relation to other dialects. However, in the next section we will see that on-going changes are undermining this link.

4. Reconstruction and change in progress

In the preceding section we saw that there are two reasonable analyses of the possessive tonal paradigm in Tswefap. The relation to PEG and class 1/2 forms from other Eastern Grassfields languages and dialects can be compared in Table 3 below from Hyman (2018).⁹ The PEGB forms at the bottom of the table show that the first and second singular pronominal roots reconstruct with *L tone, while the remaining pronouns reconstruct with *H(-H). In addition, the class 1 prefix reconstructs with *L, while class 2 reconstructs with *H. In principle this would produce four possibilities: *L+L, *L+H(-H), *H+L, *H+H(-H). This is reflected in the first three languages, whose pronouns are L, LH, HL and H. However, we have only three possibilities in Tswefap: L, M, L°, which correspond to the proto tones as in (5).

(5)	PEGB	*L+L	*L+H(-H)	*H+L	*H+H(-H)
	Tswefap	L	L(-L)	M ~ L°	M

As indicated, both *L+L and *L+H(-H) correspond to L, while *H+H(-H) corresponds to M. The merger of *L-L and *L-H as L is quite general in Tswefap, e.g. PEGB *m-fonà>fɔ 'chief', *li-s-ɔŋà>swɔŋ 'tooth'. This leaves *H+L, which corresponds to M if V (e.g. tɔŋā 'my ear'), but L° if CV (e.g. tsɪŋtsè 'my name'). Both *H-L and *H-H normally merge, e.g. on nouns: *sɪŋà>tsɔŋ 'bird', *ŋ-gwánà>ŋgwāŋ 'salt'. However, PEGB *H+L somehow yields L° on first and second person singular CV pronouns (which we analyzed as /LM/). Historically, it is a *LHL combination that yields L° in Tswefap, where the initial L is the floating L that we have posited to precede all possessive pronouns. This L in turn likely had a vowel, a schwa that occurs in independent pronouns in certain Grassfields dialects (see Table 4 in §5).

⁹I provide both my 1974 Batoufam w(°)/p transcriptions, where I mistranscribed L° as M, and M as H, as well as the y(°)/p agreements with correct tones on the next line.

Table 3: Eastern Grassfields Bantu class 1/2 possessive pronouns

	class 1 *gù-						class 2 *bá-					
	1sg	2sg	3sg	1pl	2pl	3pl	1sg	2sg	3sg	1pl	2pl	3pl
Mankon	ya	yò	yié	wəyó	wəŋó	wàá	bā	bō	byé	báyó	bəŋó	báá
Bamenyan	wiè	yò	yé	wū	wō	wō	piè	pō	pé	pú	pó	pó
Babadjou	ya	yò	yè	wò	wèi	yàp	pā	pō	pé	pó	péi	páp
Mbui	wā	yò	wi	wii	wō	wā	bā	búó	bí	bíi	bō	bá
Dschang	ya	wú	yi	wòk	wé	wòp	pá	pú	pí	pók	pé	póp
Ngwe	ya	yò	gyé	wòk	wā	wāp	bā	bó	bé	bók	bá	bāp
Babete	à	ò	è	wòk	wū	wòp	pá	pú	pé	pók	pú	póp
Bati	à	ù	ì	pò	yì	yàp	pá	pú	pí	pò	yí	yàp
Bagam	à	ò	è	wiŋi	wūŋ	wòp	pá	pó	pé	piŋi	púŋ	póp
Bangang	à	ò	ì	wòk	yi	wòp	pā	pú	pé	pók	pí	póp
Baloum	à	ò	ì	wū	wé	wòp	pá	pú	pí	pū	pé	póp
Fomopea	à	ò	ì	wòk	wé	wòp	pá	pú	pí	pók	pé	póp
Bamendjou	à	ò	ì	wòk	wū	wòp	pá	pó	pí	pók	pú	póp
Baleng	à	ò	è	wòk	wé	wūp	pá	pú	pyé	pók	pé	púp
Bandjoun	à	ò	è	yòk	yò	yàp	pā	pú	pyó	pók	pó	páp
Batie	à	ò	è	yòk	yèè	yàp	pé	pó	pé	pók	péé	páp
Bangou	à	ù	ì	yòh	yū	yòp	pé	pō	pó	póh	pú	póp
Bangwa	è-à	ù-ò	ì-è	yò	zyà	zúp	pé	pú	pí	pó	pyó	púp
Batoufam1	à	ù	ì	wò	wūyà	wūp	pé	pū	pó	pó	pūyà	púp
Batoufam2	à	ò	è	yò	zyà	zúp	pé	pū	pā	pō	pūyà	pūb
Fotouni	à	ù	ì	yò	yè	yàp	bā	bó	bí	bó	bé	bāp
Fondanti	à	ò	ì	yò	yì	yàp	bā	bó	bí	yó	yí	yāp
Fe'fe'	à	ò	ì	yòh	yii	yàà	bā	bō	bí	bōh	bī	bāā
Bali	à	ù	ì	yū?	yin	yàp	bā	bú	bí	bū?	bín	báp
Bamun	à	ù	ì	wū	wūn	àp	pá	pú	pí	pú	pūn	páp
Bapi	à	ù	ì	yú?	yūn	yòp	pá	pú	pí	pú?	pūn	póp
Bangangte	àm	ò	è	yàg	zin	yòb	cám	có	tsó	cághà	tsínà	cóbà
Limbum	yà	yò	yi	yèr	yèè	yàb	wá	wó	ví	Wér	wéé	wāb
Adere	wām	wò	wi	-wūt	-wūn	-wō	bām	bó	bí	-wūt	-wūn	-wō
PEGB:	*gù-à	*gù-ò	*gù-ì	*gù-ítà	*gù-ínà	*gù-ábà	*bā-à	*bā-ò	*bā-ì	*bā-ítà	*bā-ínà	*bā-ábà

While the link to PEGB possessive tones is clear, there are some on-going changes that will ultimately obscure the tonal connections. These involve the y(°) class, which we have already seen to be a merger of earlier classes 1w(°) and 9 y(°). The direction of change is away from L tone possessive pronouns towards M. Interestingly, the change is proceeding differently with singular vs. plural pronouns. When the pronouns are plural, M tone is becoming an alternative independent of the tone of the noun, e.g. after L tone nòb 'animal' and M tone mbvɪŋ 'dog':

(6) 'our'	'your pl.'	'their'			
nòbyò	nòbzhìgà	nòbzhùb	~	nòb yò	nòbzhìgà nòbzhùb
mbviŋ yò	mbviŋ zhìgà	mbviŋ zhùb	~	mbviŋ yò	mbviŋ zhìgà mbviŋ zhùb

When the pronouns are singular, M is an alternative to L only if the noun is L, hence after *nòb*, but not after *mbvĩg*:

(7) 'my'	'your sg.'	'his/her'				
<i>nòb à</i>	<i>nòb ò</i>	<i>nòb è</i>	~	<i>nòbā</i>	<i>nòbō</i>	<i>nòbē</i>
<i>mbvĩg à</i>	<i>mbvĩg ò</i>	<i>mbvĩg è</i>	vs.	* <i>mbvĩg ā</i>	* <i>mbvĩg ō</i>	* <i>mbvĩg ē</i>

If continuing to play out in this way, classes *y()* and *y* would of course merge, a process that has been taking place over some time in the area. However, while most of the diachronic studies of noun class merger and loss in the Grassfields area have focused on segmental marking (e.g. Hyman 1972, Good 2012), this last change in progress is strictly tonal. It is not surprising that the direction should be towards the majority pattern, pronouns with M tone.¹⁰ The ultimate endpoint is of course loss of noun classes altogether, thereby greatly simplifying the paradigm.

5. Conclusion

In the preceding sections I have presented both the segmental and tonal properties of the Tswefap possessive pronoun paradigm. I've suggested that a representational analysis is still possible even though the historical origins have been considerably obscured. While the floating L + M configuration works quite well for noun classes other than *y()*, the one perhaps unexpected effect is the raising of M to H before when a noun precedes a M tone possessive pronoun of the shape V. This was attributed to the floating L analysis, something which is confirmed in the independent possessive pronoun forms in Table 4 (where the *y()* class shows evidence of earlier *w* concord). If we assume that the initial marker is /ā`/, we can predict the H tone that appears before M in the *p* class third person forms.

Table 4: Independent Possessive Pronouns

<i>y()</i> class:	əwè	'mine'	əyō	'ours'
	əwò	'yours (sg.)'	əzhīgā	'yours (pl.)'
	əzhì	'his/hers'	əzhūb	'theirs'
<i>p</i> class	əpē	'mine'	əpū	'ours'
	əpù	'yours (sg.)'	əpīgā	'yours (pl.)'
	əpū	'his/hers'	əpūb	'theirs'

¹⁰The alternative is to merge towards the marking of a "prominent" class. This has happened in the Ewo dialect of Teke (Republic of the Congo) where segmentally identical classes 1 and 3 have merged with the L tone agreement pattern of class 1, since this class includes animate beings and also tends to be where borrowings are found (Hyman, Lionnet & Ngolele 2019).

Although I have suggested that M raising occurs because of the following floating L, there is a potential problem in generalizing this account. As seen in the following examples, a similar M to H raising process occurs in the 'noun1 of noun2' possessive construction when noun1 belongs to any but the *y()* noun class:

Table 5: M Tone Raising of Noun1 before a M tone Noun2

	class	noun	noun1	noun2
	<i>p</i>	<i>pfwō</i> 'children'	<i>pfwō</i>	<i>mbvĩg</i> 'children of dog'
	<i>y</i>	<i>tōg</i> 'ear'	<i>tōg</i>	<i>mbvĩg</i> 'ear of dog'
	<i>m</i>	<i>ntōg</i> 'ears'	<i>ntōg</i>	<i>mbvĩg</i> 'ears of dog'
	<i>ts</i>	<i>tsīg</i> 'name'	<i>tsīg</i>	<i>mbvĩg</i> 'name of dog'
But:	<i>y()</i>	<i>ŋwā</i> 'child'	<i>ŋwā</i>	<i>mbvĩg</i> 'child of dog'

As seen in the last row, if noun1 belongs to the *y()* class, its M does not raise to H, rather it becomes a ML falling tone (as in possessive pronoun paradigm). Since the fall in *ŋwāmbvĩg* 'child of dog' is clearly attributable a floating L, something else is needed to produce the M to H raising in *pfwōmbvĩg* 'children of dog'. The most straightforward analysis would be a floating H tone, which also affects M tone nouns when the possessor noun2 is L tone, as in Table 6 below. Again, there is no M raising when noun1 belong to the *y()* class.¹¹ Because of this, whenever a *y()* noun does not have a distinct plural, the only difference between a singular and plural noun1 input will be tonal: *mbvĩg ŋwā* 'dog of child' vs. *mbvĩgŋwā* 'dogs of child', *mbvĩg fō* 'dog of chief' vs. *mbvĩg fō* 'dogs of chief'. It would appear that a floating H is required or perhaps a sequence of floating tones.¹² Since M to H raising occurs elsewhere in the language, including in the verbal paradigm, more research is needed to determine a full and comprehensive analysis.¹³

¹¹The floating L does not appear on *ŋwā*, rather is "absorbed" before L tone *fō*.

¹²Similar problems arise in Fe'fe', which also has M to H raising (Hyman 1976).

¹³One such construction worthy of further study is the presentative, marked by *ā* before a L tone, HM before a M: *ānòp* 'it's an animal', *āŋwā* 'it's a child'. The HM appears to occur only before nouns. Thus compare: *āpō* 'it's us', *āwūb* 'it's them'. Presentative *ā* is likely related to the initial marker of the independent possessive pronouns in Table 4.

Table 6: M Tone Raising of Noun1 before a L tone Noun 2

	<i>Class</i>	<i>noun</i>		<i>noun1</i>	<i>noun2</i>	
	P	pɸwɔ̃	'children'	pɸwɔ̃	fɔ̃	'children of chief'
	Y	tɔ̃g	'ear'	tɔ̃g	fɔ̃	'ear of chief'
	M	ntɔ̃g	'ears'	ntɔ̃g	fɔ̃	'ears of chief'
	Ts	tsɪ̃g	'name'	tsɪ̃g	fɔ̃	'name of chief'
<i>But:</i>	y(̣)	ɲwɔ̃	'child'	ɲwɔ̃	fɔ̃	'child of chief'

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A Toneless Theory of 2-and-a-Half Tonemes in Gbè*

Victor Manfredi

Abstract
Akinlabí (1985) pioneered a path away from treating tones as primes of natural language. By reanalyzing surface **M** as “underlyingly toneless” he trimmed the synchronic inventory of Yorùbá from ternary **H,M,L** to binary **H,L**, tuning up Galilean elegance, toning down exotic typology, capturing synchronic generalizations and clarifying diachronic developments (cf. Bámgbósé 1965, Oyèláràn 1970, Maddieson 1974a, Stahlke 1974). Further progress of tonal underspecification was stalled by technical blips of derivational rules and output filters (Pulleyblank 1983; 2004) but the proposal was vindicated belatedly, when top tonologists came to reject “universal tone features” in favor of “monodimensional... scales... interpreted in the phonetics” (Clements & al. 2010, 20, cf. Hyman 2010). The prospect of obtaining tones without tonology flows from the conjunction of two well-supported, independent hypotheses. (i) Underlying pitch-accent (McCawley 1970) opens the possibility that “metrical structures alone would be sufficient for pitch interpretation” (Clements 1990, 61, cf. Clements & Ford 1979, 198) and permits “a non-tonal analysis of tonal mapping” (Köhnlein 2016, cf. Clark 1978, Bamba 1991, Manfredi 1995, Idsardi & Purnell 1997, Akinlabí & Liberman 2001, Kimenyi 2002, Dilley 2005). (ii) Cyclic spellout at PF entails default constituent prominence alias “nuclear stress” (Chomsky & Halle 1968, Bresnan 1971, Cinque 1993, Kahnemuyipour 2004, Zwart 2004, Wagner 2005, Zubizarreta & Vergnaud 2006, Sato 2009), allowing morphosyntactic, “floating” tones to be demystified as phrasal accents (Manfredi 2008, 2018, *in press*). The Gbè **M~L** alternation falls out neatly. In Gbè, iambic [*ws*] footing is diagnosed from the systematic absence of trochaic [*sw*] cues like nonautomatic downstep and initial **L** raising (Manfredi 2003), by a Westafrican (quantity insensitive) version of the iambic-trochaic law that holds in languages with moraic (quantity sensitive) stress (Allen 1975, 78, Hayes 1985, 438, Ramus & al. 1999). Foot-initial *w*, denoting a sternohyroid laryngeal gesture, maps to the CV skeleton at the “beginning of the word” i.e. the DP phase (Lowenstamm 1999, Scheer 2012) where it’s checked by a sonorant onset if any and otherwise governs the initial vowel if any plus the following rime in case the onset is a voiced obstruent—inherently transparent to sternohyroid articulation. When mapped to a vowel, the same gesture yields low perceived pitch/ F_0 (Halle & Stevens 1971, Nissenbaum & al. 2002). The distribution of audible **H** is much simpler: lexically prelinked *s* denotes a cricothyroid gesture and yields a high F_0 correlate. In this way, Gbè’s core tonal data (Ansre 1961, Stahlke 1971) reduce to automatic e-language performance, without rule-based reference to taxonomic tones.

1. Destroying the toneme in order to save it

[O]ne group of language learners in Africa asked a trained linguist to come and try to “get rid of tone” in the local language. (Welmers 1973, 77)

In its half century of existence, phonemic tone notation has missed many chances to upgrade from raw data to descriptive adequacy. In Yorùbá, to capture distributional asymmetries with respect to **H** and **L** (Bámgbósé 1965, Oyèláràn 1970), Akinlabí (1985) proposed to eliminate the **M** toneme, but tonal underspecification fell out of mainstream favor due to technical glitches: it blurs autosegmental geometry and needs *ad hoc* scales of markedness in order to be emulated by output filter procedures (Pulleyblank 1983, 142; 2004, 417f.). Full specification fares no better: early hopes to find Greenbergian “universals of tone rules” (Hyman & Schuh 1974) crashed on the fact that “observed patterns of [tone] alternation... are typically random and arbitrary” (Clements & al. 2010, 20). In sum, specified tones are both too abstract, and at the same time not abstract enough, to express linguistically significant generalizations.

How did tonology get bogged down in this quagmire?¹ Minimal lexical contrasts of perceived pitch (F_0), first notated in colonial research (Jones & Woo 1912, Jones & Plaatje 1916), were codified as “tonemes” by a mid-century middle-American behaviorist who trained an anticommunist missionary brigade (Pike 1948, cf. Calvet 1981). Retooled as generative “autosegments” (Goldsmith 1976) in Building 20, MIT’s “magical incubator” of Cold War spinoffs (Penfield 1997), tonemes should have been summarily dismissed by the critique of inductive discovery procedures (Halle 1959, Chomsky 1964). Instead, the more coherent alternative of pitch accent (McCawley 1965, 1970, 1978, Clark 1978) was shunned beyond the pale (Clements & Goldsmith 1980, Poser 1984, Hyman 2009), conveniently enough, avoiding arduous reanalysis of decades worth of impressionistic tonal data compiled by legions of semiamateur Bible scribes (cf. Williamson 2002, Epps & Ladley 2009). To further compound the formal inconsistencies, tones and accents were blended together nonrestrictively, whether in ToBI transcription (Pierrehumbert 1980, Goldsmith 1978, Breen & al. 2012) recapping Pike (1945) or in the parallel representational tiers of “laboratory phonology” (Clements 1990, Ladd 1996).

But the toneme has worse faults than nontrivial redundancy (Dilley 2005). Belying rapid coverage of the nonwestern world, better studied languages yielded diminishing returns. In Japanese, “sparse tone” needs nonlinear, “context-dependent” interpolation (Pierrehumbert & Beckman 1988, 34, 52f., cf. Haraguchi 1988, 134–38, Akinlabí & Liberman 2001, 16f.). In Kinande-Luyiira, binary **H/L** contrasts of nominal roots are unrecoverable without invoking ‘global’ rules, diacritic ternary **H/L/∅** oppositions or

indeed both at once (Hyman & Valinande 1985, Mutaka & al. 2008, Jones 2014). In Gbè, the semi-complementarity of M and L has spawned an inconclusive literature (Welmers & Ansre 1960, Ansre 1961, Rouget 1963, Sprigge 1967, Smith 1968, Stahlke 1971, Hyman 1973, Clements 1977, 1978, Fréchet 1994). Reviewing assorted quandaries of this kind, Clements & al. reluctantly abandon “universal tone features” in favor of “monodimensional... scales... interpreted in the phonetics” (2010, 20f., citing Lání.ran & Clements 2003, cf. Hyman 2010). Repeating the history of the Vietnam War, tonal phonologists are obliged ‘to destroy the town [sc. toneme] in order to save it’ (cf. Arnett 1968) and then withdraw, declaring *Peace with Honor*.²

Tonology’s unceremonious retreat invites a less adventurist approach from firmer premises like the following. (i) In languages that lack moraic contrasts of syllable weight, metrical features are available to encode pitch contrasts by lexical prelinking (Haraguchi 1988, Manfredi 1991, 93, Pöchtrager 2006, Köhnlein 2016). The device of underlying foot structure adds no cost, assuming that lexical ‘words’ are not X^0 atoms (heads) but contain branching phrasal constituents (Kaye 1988, Hale & Keyser 1993). (ii) Nonlexical pitch excursions, traditionally blamed on ghostly interventions by morphosyntactic ‘floating’ tones, straightforwardly default PF prominence assigned by cyclic spellout under derivation-by-phase (Chomsky 2001, cf. Chomsky & Halle 1968, Bresnan 1971, Cinque 1993, Zwart 2004, Kahnemuyipour 2004, Wagner 2005, Zubizarreta & Vergnaud 2006, Sato 2009, Richards 2010). The only objection to such a procedure is a methodological ban on audible syntactic boundaries (Selkirk 1984, Nespor & Vogel 1976), a “fatalistic and slightly empty” taboo “inherited from American structuralism” (Rotenberg 1974, 16, 73, cf. Scheer 2012). Analyses of Gbè, with tones (§2) and without (§3), can now be compared.

2. Tones in the Saussurean gulf

In Vietnamese and nearby languages, minimal lexical F_0 contrasts emerged from historic differences in consonant phonation (Haudricourt 1954, Matisoff 1973), and similar effects hold synchronically in Korean (Kim & Duanmu 2004). Some of these patterns may reduce to shared laryngeal gestures (Halle & Stevens 1971, 208f., Kaye & al. 1990, 216, Cyran 2014, 9f.), but M~L alternations of the Gbè cluster of Benue-Kwa (Niger-Congo) go further to implicate categorial structures of morphosyntax.³

In Pecígbe, a NW Èwè variety (Ansre 1961, cf. Westermann 1930, Capo 1991), a nominal stem takes either L or LH (a lexical choice) if the onset is a voiced obstruent, otherwise M or H. The initial vowel if any (another lexical choice) is always *a-* and its F_0 is similarly predictable: M before a sonorant, otherwise L, never H.⁴

	voiced obstruent onset	voiceless obstruent onset	sonorant onset
(1)a.	gà lá ‘the metal/money’ à-gò lá ‘the palm-tree/-fruit’	te lá ‘the yam’ è-éi lá ‘the market’	nyi lá ‘the cow’ a-wu lá ‘the dress’
b.	víí ‘child’ à-vùú ‘dog’	fyá ‘axe’ à-tí ‘tree’	ṛṛ ‘worm’ a-nyi ‘bee’

Stahlke (1971) observes that three subcases of the M~L alternation converge on one syntactic slot. (i) The L that follows a stem-initial voiced obstruent is absent stem-internally, whether the nominal is opaque or transparently compounded.⁵

(2)	àdádí ‘pepper’ *àdádí	àdè-ví ‘hunting dog’ *àdè-ví	nú-flé-gà ‘shopping money’ *nú-flé-gà
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(ii) A transitive non-H verbroot is pronounced M if the direct object’s first onset is a sonorant, otherwise L, (3a). (iii) A pitch drop occurs between a transitive H-bearing verbroot and a consonant-initial direct object unless the onset is a voiced obstruent, falling to the same M or L that would begin a vowel-initial counterpart, (3b).⁶

(3)a.	flé gà lá ‘bought the metal’ flé à-gò ‘bought coconuts’	flé te lá ‘bought the yam’ flé fyá ‘bought an axe’	flé nyi lá ‘bought the cow’ flé a-wu lá ‘bought the dress’
b.	kpó gà lá ‘saw the metal’ kpó víí ‘saw a child’ kpó à-gò ‘saw coconuts’	kpó-ṛ te lá ‘saw the yam’ kpó-ṛ fyá ‘saw an axe’ kpó à-tí ‘saw a tree’	kpó-ṛ nyi lá ‘saw the cow’ kpó-ṛ ṛṛ ‘saw a worm’ kpó a-nyi ‘saw a bee’

Unifying these contexts, Stahlke posits a segmentally null (floating) L to the left of a consonant-initial nominal, triggering the same phonation rules that apply with an initial vowel. But what are these rules and why do they care about this position? A tonal framework necessarily assumes that phonation and tones can be distinguished analytically/on *a priori* grounds:

[C]onsonants affect tone but tone does not affect consonants. Thus... consonants interfere with natural tonal assimilations.

(Hyman 1973, 171, emphasis original)

[C]onsonants interfere with natural tone rules...

(Hyman & Schuh 1974, 106).

If this claim is not circular, it’s a promise to demonstrate the existence of tone rules independent of phonation. But if such evidence is not eventually forthcoming, the only remaining possibility within the reach of standard generative phonology is to conclude that “tone behaves like a segmental feature” (Leben 1973, 126).

Currently however the choices look different. For “OT”⁷, formerly phonological distinctions dissolve in the welter of e-language output, a big-data manifold that “integrates linguistic change with phonetics, phonological

theory and sociolinguistics, resolutely rejecting even the least vestige of any Saussur[e]an gulf between them" (Kiparsky 2016, 464).

By contrast, an i-language perspective gives abstract analyses like Saussure's (1879) decomposition of Indo-European ablaut into schwa plus a laryngeal on-/off-glide.⁸ The conceptual distance from Jakobsonian features is illustrated by Verner's Law, a rule of Proto-Germanic that blocked voicing of an inherited voiceless spirant after an accented vowel.⁹ Generative phonology can express this as coarticulation, spreading a laryngeal feature from a vowel to a following continuant (Calabrese & Halle 1998, 59f., Iverson & Salmons 2003).¹⁰ Treated as assimilation, Verner joins other apparent counterexamples to Hyman's claim that "tone does not affect consonants" (cf. Maddieson 1974b, Poser 1981) but the progress is pyrrhic, because if tone-voicing causality is truly bidirectional *contra* Hyman, then the autonomy of tone *vis-a-vis* phonation is undermined. Instead, the Saussurean/i-language take on Verner denies that any assimilation is involved and instead treats intervocalic voicing as lenition:

The segmental properties do not play any role because the triggering factor is purely positional... It is therefore inconsistent to say that a process is an instance of lenition but in fact involves the transmission of some property from an item to another. (Scheer 2015, 228)

Then the crux of the matter is how to define "position"—the lenition context. If tones are phonemes not positions their relevance to Verner is less than clear, but if tones are positions they're not paradigmatic phonemes, and tonology is out of business.

Handling tones as autonomous phonological units, Hyman infers a "tendency of L-H to become M-H" (1973, 168) but notices that this "natural rule" of "vertical tonal assimilation" is blocked in Gbè either by a preceding voiced obstruent, cf. *dà lá* (1a), or by an intervening nonsonorant regardless of voice, cf. *à-tí* (1b). In general:

L becomes M before a H if 1) any intervening consonant is a sonorant, and 2) the L syllable does not begin with a voiced obstruent. If there is no intervening consonant, i.e. there is an underlying LH (rising tone) sequence in the same syllable, this LH is modified to a MH rise unless the syllable which it is in begins with a voiced obstruent...

(Hyman 1973, 170)

The prolixity of this rule—scarcely shorter than the paradigms to be explained—matches, point for point, an intricately stated mechanism of laryngeal interference:

[B]oth voiceless and voiced obstruents exert a lowering influence on preceding vowels... [whereas] voiceless obstruents have a raising effect

and voiced obstruents a lowering effect on the F₀ of following vowels. (1973, 169, original italics)

For all its richness, the foregoing formula must be supplemented by "a rule of L-spreading that depends on consonant type" to ensure that *à-vùú* 'dog' contrasts prosodically with *à-tí* 'tree' (1b), and the new sub-domain must exclude sonorants, because the assumed underlying form of 'bee' is **à-nyí* sonorants like *ny* are normally a permissive context for "natural horizontal assimilation" (1973, 165f.).¹¹ But to add the anti-sonorant restriction guaranteeing the opaque outcome *a-nyí* (1b), application of horizontal L-spreading must be bled by vertical L-H raising: "tone spreading applies only to a *phonetic* L-H sequence" (1973, 172, original italics). And if this condition is not theory-internal (circular), it can only be justified on grammar-external grounds:¹²

Thus in Standard Èwè, tone spreading applies only to a *phonetic*... L-H sequence. It *has not yet reached* phonetic M-H sequences. (1973, 170, second italics added)

Reducing extrinsic order to an uncompleted grammaticalization cline predicts that the opaque rule interaction will wither away someday, because "Bleeding order tends to be minimized" (Kiparsky 1968, 199). But even if this Godot does eventually arrive, the mystery will persist why both of the "natural" tone rules (L-spreading, L-H raising) should be restricted to a grammatical (non-"natural") context—the same context that hosts an otherwise unmotivated pitch drop (3b). Nor does the treatment of L-raising as assimilation address the regular stem-medial appearance of M instead of L in compounds like *nú-fle-ga* (2), an environment with no raising trigger at hand. And the stem-medial absence of a supposedly natural phonation effect can't be brushed off as a local quirk of Gbè, because the same synchronic limitation also holds in far-flung Tibetan, Korean and Wu Chinese (Duanmu 1992, Kim & Duanmu 2004, 62, 89).

In sum, saving the toneme by dumping the competence/performance distinction into Kiparsky's "Saussurean gulf" doesn't make any of these problems disappear. The remaining possibility is to throw the tonal baggage overboard instead. Consider how.

3. The remaining possibility

What matters seems to be... whether the tone is 'level', 'above-level' or 'below-level'. (Siertsema 1958, 583)

No low tone: L is not present in Yorùbá nuclei; what has hitherto been considered as the perception of [L] is in fact the perception of a prosodic constituent. (Harrison 2000, 595)

In Hyman's account of Gbè consonant-tone effects reprised above, the extrinsic ordering of vertical before horizontal tone assimilation contradicts a declared doctrine of his own contemporaneous handbook:

In a stress language prominence is *syntagmatic*; in a tone language prominence is *paradigmatic*. (1975, 229, italics original)

Taken at face value, a syntagmatic rule like Hyman's "horizontal assimilation" should refer to non-tonal entities, such as Akinlabí & Liberman's (2001) "tonal complexes" which ascribe branching structure to both H and L to rescue Yorùbá's underspecified M from Pulleyblank's methodological critiques.¹³ Similar results can be had from less extraordinary metrical formats: headed trees (Liberman 1975, 49, Giegerich 1985, 3) alias "register tones" (Clements 1981), bracketed projections of the timing skeleton (Halle & Vergnaud 1987, Idsardi 1992) or "flat/lateral" CVCV strings respecting "interconstituent government" (Kaye & al. 1990, 210, Scheer 2004, 2013).¹⁴

Without some independent support, foot structure by any other name would be little more than a *pēs (deus) ex māchinā* descending to save tonology from itself. Fortunately, however, motivation is at hand. The following sample of West African languages divides by a cluster of cues diagnosing a [s w] trochaic type, with iambic [w s] as the unmarked default.

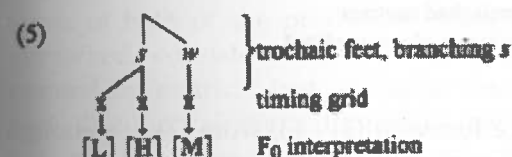
	Àkan ¹⁵	Hausa ¹⁶	Gbè ¹⁷	Yorùbá ¹⁸	Èdó ¹⁹	Ìgbo ²⁰
(4)a. automatic raising of phrase-initial L						
b. automatic H-spreading onto L						
c. some downsteps unrecoverable to latent L						

The respective clustering of trochaic properties of primary language data, as compiled in (4), can be compared to the bootstrappable correlates of the so-called iambic-trochaic law in languages which—unlike Benue-Kwa—pronounce moraic (quantity sensitive) stress (Allen 1975, 78, Hayes 1985, 438, Ramus & al. 1999).²¹

As illustrated in the Appendix, initial L is much nearer in pitch to the following H in Èdó and Ìgbo than it is in Àkan, Hausa, Gbè or Yorùbá (4a).²² Yorùbá fails (4a) for independent reasons noted below, but trochaic footing of Yorùbá is still required by the cue of automatic H-spread (4b) assuming that "spreading does not cross metrical constituents" [sc feet] (Manfredi 1991, 71), treating L as a foot-initial adjunct, cf. (5). Yorùbá presents a second trochaic cue (4c) with cases of unrecoverably elided L.²³ (4c) rests on two premises: (i) tone terracing (alias ±automatic downstep) is a right-branching cascade (Manfredi 1979, Huang 1980, Clements 1981) and (ii) in a head/complement structure, the head is obligatory, the non-head optional. For iambic feet, a downstep caused by an empty [w] between two [s]

terminals would be anti-cyclic (Liberman 1975, 200), hence it follows as a theorem that only trochaic feet can encode underived downsteps.

Granting Yorùbá as trochaic, there are multiple reasons not to analyze Yorùbá L as metrically weak: not only does it spread to a local H (Ward 1952, 54) as noted above, it also replaces M in vowel elision (Bámgbósé 1965, 23) and raises a locally preceding H (Lání.ran 1992, 176f.). Given strong H and weak M and constrained to binary feet, the only solution for strong L is left-adjunction to the head of the foot:

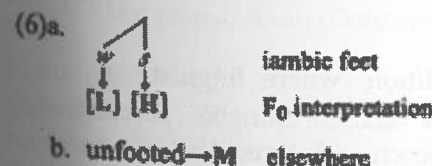


(Yorùbá)

The template in (5) fits two additional facts that lie beyond the reach of tonal analysis: the pitch excursion for LH is steeper than for HL (Manfredi 1995, 175) and stranded L systematically fails to parse before a complement phrase (Déchaine 2001).

Although (4) refers just to F₀ restrictions, there's no reason to exclude phonation as evidence for footing. Encouragingly, Harris argues for trochaic feet in Ìbibio based not on pitch but on the distribution of root-initial onsets (2004, 120-28). His finding supports (4) if Èfik-Ìbibio and Ìgbo are prosodically isomorphic (Green 1949).²⁴

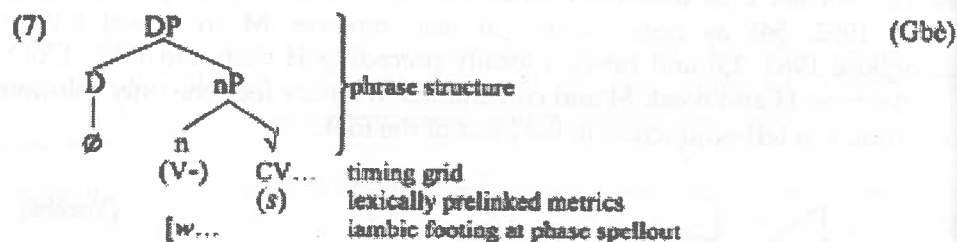
Displaying neither the strong L cues of Yorùbá nor any of the trochaic cues in (4), Gbè is parsed by default in iambic feet [w s] corresponding respectively to L and H F₀ spans, leaving unfooted rimes with neutral F₀ alias M. Thus Gbè is not the prosodic mirror image of Yorùbá, and taxonomic M has different metrical status in the two languages—unfooted in Gbè, w in Yorùbá—despite its elsewhere distribution in both.



(Gbè)

If Gbè is iambic, foot-initial w maps to the CV skeleton at "the beginning of the word" to spell out the DP phase at PF (Lowenstamm 1999, cf. Scheer 2012, 2014).²⁵ The left edge of the domain is the closed-class item identified by Stahlke: the traditional "noun prefix" which is underlyingly

toneless i.e. incapable of bearing accent, and empty also segmentally, apart from epenthetic *a*- arbitrarily attached to some lexical items. A current label for this slot is "little *n*" (Lowenstamm 2007). The other lexically arbitrary choice is whether an accent (*s*) is prelinked to the root (*v*).



In order to obtain the surface forms in (1) - (3) from (7), it's enough that *w* denotes a sternohyroid laryngeal gesture with predictably diverse realization on vowels versus consonants (Halle & Stevens 1971, Nissenbaum & al. 2002). The paradigms follow if:

- (8)a. Phase-initial *w* is checked by a root-initial sonorant, leaving the string completely unfooted as *M* (*a-wu* 'dress') unless an accent is prelinked to the root (*a-nyi* 'bee').
- b. Absent a root-initial sonorant, *w* links to *n* and is realized as *L* on the initial vowel if any (*d-si* 'market', *d-ti* 'tree'), spreading to the root if the onset is a voiced obstruent (*ga* 'money', *d-gi* 'palm-tree/-fruit', *vi* 'child', *d-vu* 'dog').
- c. Nonsegmental *n* is footed as a last resort (*kpɔ̃* *te lá* 'saw the yam' etc.).
- d. Stem-internal *w* is not expected (2) because footing applies to phases.

Q.e.d.

4. External evidence

Rouget considers Gùngbè drummed surrogate speech as evidence for the "perception if not mental representation" of spoken pitch:

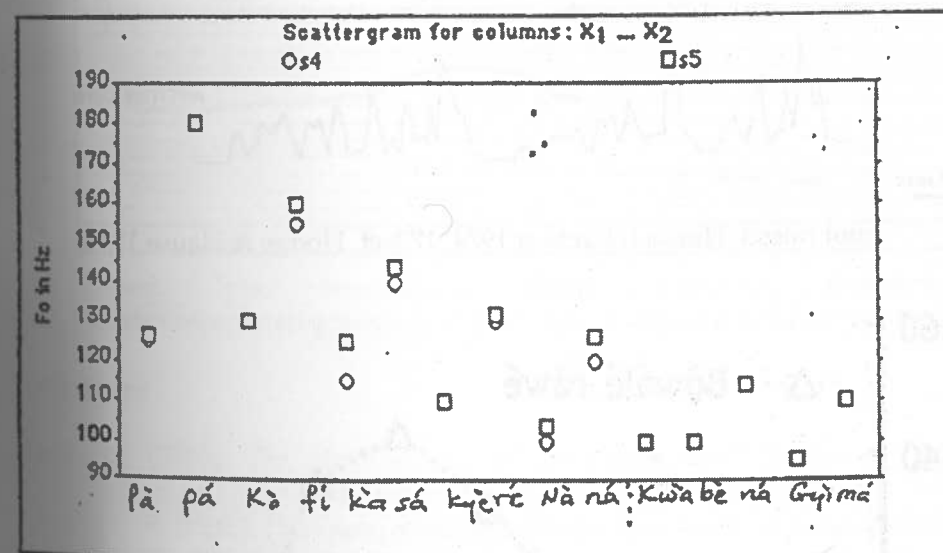
[L]es énoncés tambourinés peuvent être à bon droit considérés comme traduisent la manière dont les locuteurs ressentent, sinon conçoivent, en tout cas interprètent le système des tons tel qu'il fonctionne lorsqu'ils parlent. (1964, 3)²⁶

Unlike the Yorùbá *dùn-dùn* tradition, where linguistic *F*₀ maps iconically to musical pitch (Adégbolá 2003), Gùngbè percussionists distinguish the three tonal outcomes of speech with three distinct attacks on the drumhead based on place and manner of articulation (Rouget 1964, 9f., cf. 1965, 1975, 224).

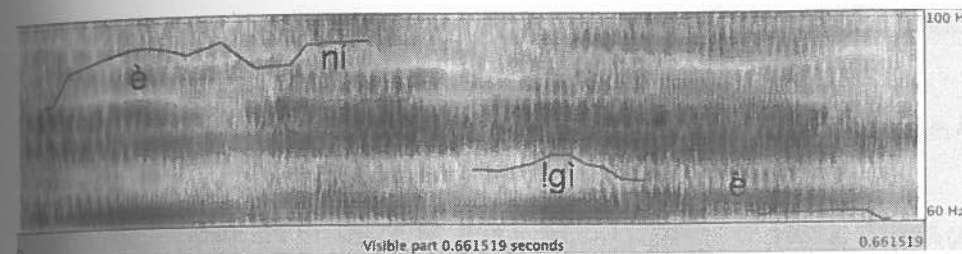
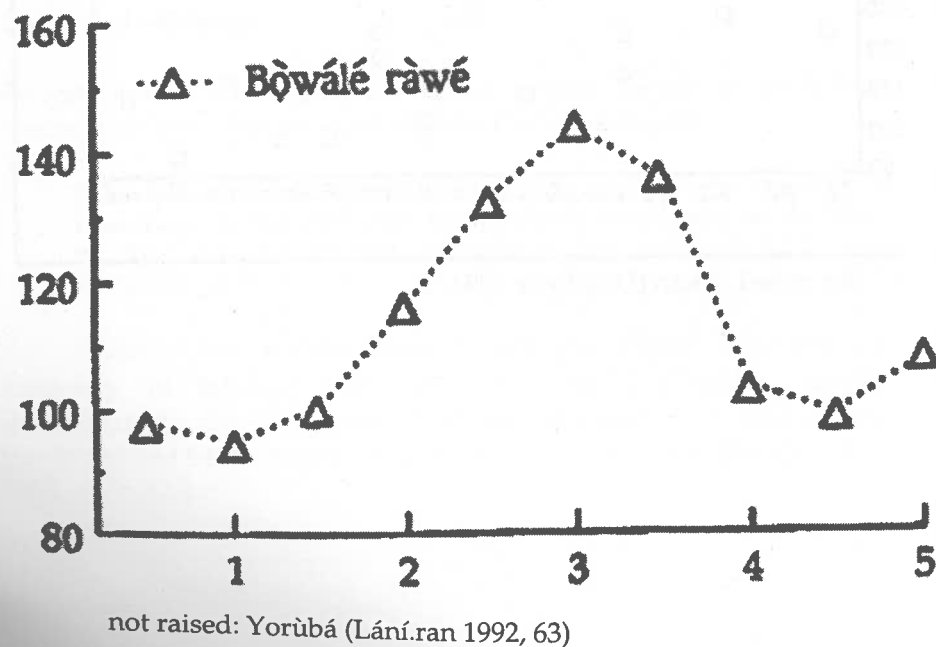
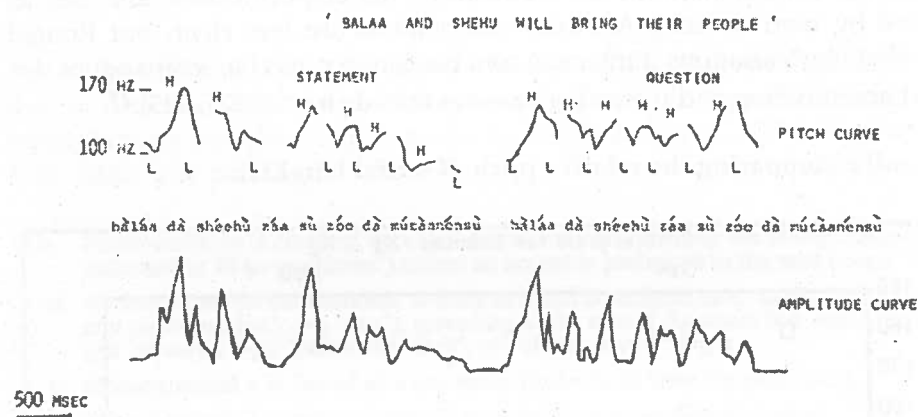
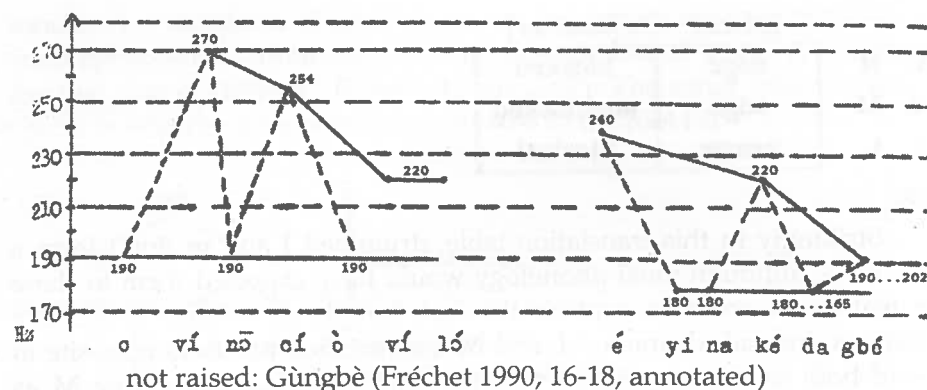
	[place]	[manner]
(9)a. H	edge	blocked
b. M	edge	nonblocked
c. L	centre	blocked

Strikingly in this translation table, drummed *l* and *m* don't form a natural class, although tonal phonology would have expected them to share some feature in order to capture the fact that they undergo productive alternations. Instead, drummed *L* and *M* are specified precisely opposite in terms of both of the production features. The same features define *M* as unmarked, consistent with an Akinlabean underspecification analysis as rescued by metrical feet. Acoustic observations are less clear, but Rouget finds that "les variations d'intensité sont beaucoup plus caractéristiques des faits d'accentuation et d'intonation que des faits de ton" (1975, 225).²⁷

Appendix: comparing the relative pitch of initial *L* in LHL

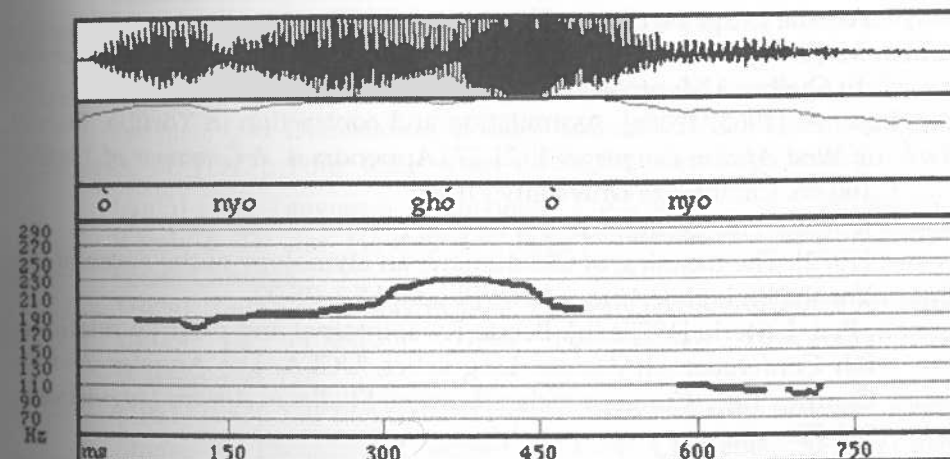


not raised: Àkan (Dolphyne 1994, 5)



raised: Èdó ènǵiè [lh!ll] 'lineage heads' (Éwuarè 2016, 0'38")
 N.b. downstep before l, derived from deleted l, blocks H>L spread (Ámayo 1983, 186)

onyoghonyo LLHLL-Pitch.PICT



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Tonemarking: ['] = high, [˘] = low. For Àkan, Èdó and Ìgbo, no mark = same perceived pitch as preceding syllable (this is Christaller's 1875 convention for Àkan). For Gbè and Yorùbá, no mark = mid (this is Crowther's 1875 convention for Yorùbá, cf. Àjàyí 1960).

1. This question is necessary – apologies to the editors – because research paradigms are not immune to zeitgeist (Kuhn 1962), and when something is thoroughly lost, we can't neglect any avenue of recovery: *Ìnùkínù ní ní mú iwákúwáá wá* (Owómoyèlà 2005, 373).
2. Some unchastened tonologists escalate the war and vaunt 'big data' correlations with biochemistry and climate (Dediu & Ladd 2007, Everett & al. 2015, cf. Manfredi 2015).
3. Benue-Kwa, alias Tano-Congo (Stewart 1983, 20) and East Volta-Congo, is a "dialect continuum" (Williamson & Blench 2000, 17f.) combining the Kwa and Benue-Congo branches of standard Niger-Congo (Greenberg 1963). To refine this historical subgrouping will require stronger evidence than lexicostatistics (Bennett & Sterk 1977a,b, Schadeberg 1986, Williamson 1989), a speculative method that "should be rejected" (Campbell 1998, 186, cf. Armstrong 1983, 146f., Capo 1985, Manfredi 2009, Kropp-Dakubu 2012).
4. Fréchet (1994, 39) cites analogous forms in Gùngbè; further variations across the cluster are reported by Clements (1977) and Gbètɔ (1995 & seqq.). In Gùngbè some tokens of the initial vowel are pronounced [o] (Fréchet 1994, 32). In (1a), nominals that lack stem H are cited in nonfinal position (before *lá*) to control for phrase-final lowering M>L.
5. Although Èwè *àtádí* is synchronically opaque, its historic derivation by compounding can be inferred from the variant *atakui* (Westermann 1905, 451, no tones given) as well as Fòngbè *àtakín* (Segurola & Rassinoux 2000, 75), compared with Yorùbá *ata* (Abraham 1958, 73), all meaning 'pepper'.
6. Data in the left column of (3b), omitted by Ansre, are supplied by Stahlke (1971, 161ff.).
7. E.g. Archangeli & Pulleyblank (2015), Flemming & Cho (2017). *Optimality Theory* is however a misnomer: a theory is falsifiable but OT is a *procedure* – a compiling technique to emulate any given theory (E. Keenan p.c., cf. Fodor & Pylyshyn 1988, Idsardi 2006, Scheer 2010, 214). "Stratal" OT straddles the two worlds, bolting OT's parallel calculus onto lexical phonology's extrinsic order (Kiparsky 1982, 2015, cf. Pesetsky 1979), but the hybrid is stuck with an unsustainable separation of phrasal grammar from listed 'words' (Kaye 1988, Lowenstamm 2013, Giegerich 2015).
8. Eventually the offglide components were attested in inscriptions of extinct Anatolian languages (Kurylowicz 1935), but in 1879 they were completely abstract. Saussure's ablaut theory implicitly inspired Government Phonology (Kaye & al. 1985). On the e-language/i-language distinction, see Chomsky (1986).

9. For example, the *t* of Sanskrit *pitár* 'father' and *bhrá tar* 'brother' receives divergent treatment in the Germanic cognates, as *d* (<*d*) and *ð* (spelled *p*) respectively (Collinge 1985, 205). But the rule also applies in root-initial position – a clue that footing is responsible rather than progressive assimilation, cf. discussion below.

10. For this to work, Calabrese & Halle must equate "stress" to "High tone" as far as laryngeal articulation is concerned (1998, 60) while dismissing Kortlandt's idea that Indo-European roots contrasted in "tone" (1986, 158f., cf. Halle 1997, 310). The tonal view is more plausible if, as it seems, Verner's Law applied *before* Germanic accent shift potentiated Grimm's Law (Iverson & Salmons 2003, 71). Nissenbaum (2005) extends Halle-Stevens' framework to Japanese *rendaku*: lexical L is suppressed in the deaccented right branch of a nominal compound but remains laryngeally 'stable' as shown by the appearance of otherwise unexpected consonant voicing in the deaccented constituent:

hòshí-[j]írúshì LH-HLL 'asterisk' < *hòshí* 'star' LH, *shírúshí* LHH 'symbol'

11. As would have been expected in trademark "natural phonology" (Dressler 1984, 38f.).
12. Pre-OT, a Saussurean Kiparsky treated historical data as "external" to grammar (1973, 87).
13. For Akinlabí & Liberman (2001, 18), both H and L have abstract branching structure.
14. Adopting linear ("string-based") as opposed to autosegmental representation doesn't alter the conclusion that tone rules are computationally closer, within standard hierarchies of complexity, to syntax than segmental phonology is (Jardine 2016, 263, 276).
15. Stewart (1965, 21), Schachter & Fromkin (1968, 110-15).
16. "I have not included Hausa among my 'terraced level' languages simply because Hausa has no contrast, at any point, between 'same' and 'drop' (Welmers 1965, 57).
17. Gbètɔ (1997, 114; 1999, 18). Fréchet (1990) treats Gùngbè as trochaic but does not discuss the headedness cues in (4). In some phrasal contexts of Ànlɔ-Èwè, Clements observes emergent downstep and the raising of lexical M to superhigh pitch – effects which in taxonomic terms can only be understood as "a case of tone split" (1977, 178) but which seem less exotic as consequences of re-footing stray syllables from iambic (left-branching) prosody in right-branching phrases. Similar super-raising phenomena in Mawukakan (Mande, Niger-Congo) are convincingly analyzed in metrical terms by Bamba (1991).
18. L-deletion, which blocks H-spread (Bámgbósé 1966b), is productive and recoverable at phrase boundaries, as in these minimal contrasts where [.] indicates the elided L syllable:

<i>oló.dù</i> MHL	'possessor of a clay cauldron'	< -ní òdù H LL
<i>olódù</i> MH-FL	'possessor of an oracle sign'	< -ní odù H ML

L-deletion is however reported to cause lexical opacity in the *oríkì* (proper name epithet) *Oló.dumarè* (Bámgbósé 1972, critiquing folk etymologies by Idowú 1962). Secondly, as noted by S. Oyèláràn (p.c.), L-deletion also yields unrecoverable restructuring in certain lexicalized expressions, whose stem-initial syllable should compositionally bear the H of the transparently related verbroot, but which is instead pronounced as toneless/M.

i-bejì LML	'twins'	< -bí èjì H LL 'give birth to two'
i-tanràn LML	'settlement of a case'	< -tán òràn H LL 'finish dispute'

To my knowledge, Àkàn, Hausa and Gbè lack comparable examples.

19. Ámayo's pitch notation (e.g. 1983, 185) does not show initial L-raising, but Melzian pointedly apologises for a "simplification of tone marking" obscuring the fact that "[a] low tone is frequently raised before a high tone..." (1937, xiii). Cf. also Elugbe (1977).
20. The [+] of (4b) is attested in many western Ìgbo varieties (e.g. Hyman & Schuh 1974, 89).
21. Thanks to A. Nevins for this comparison.
22. The samples compared are not controlled and the generalization is stated informally but the contrast is undeniable.
23. Cf. note 17 above.
24. A conversation overheard in a quiet *búkà* in downtown Òweré (= colonial "Owerri") in 1984 produced in me the uncanny impression that Ìgbo was being spoken with non-Ìgbo words, but my fellow diners' eavesdropped language turned out to be Ìbibio. A test for the phonation of trochaic footing can perhaps be devised in those Ìgbo varieties with the richest consonantal inventories (Ladefoged & al. 1976).
25. The lexicalization of D in these 'bare noun' languages is arguably null but its referential content is reinforced periphrastically by adjoined, phrase-final appositive modifiers like *lá* in (1), as in Ajíbóyè's analysis of Yorùbá *náà* (2005, 218). Alternatively, Aboh generates *lɔ*—the Gùngbè counterpart of Èwè *lá*—directly in D (2004, 83), but then the only way to obtain observed linear orders like *távò lɔ lɛ* 'the tables' (2004, 77) from the assumed [*lɔ* [*lɛ* [*távò*]]] is by raising different cartographic layers by arbitrarily different types of linearization, whose status in minimalism is anyway unclear. Consistent Kaynean antisymmetric movements alias snowballs would have been expected to strand D in final position, giving ungrammatical **távò lɛ lɔ* unless the last step is diacritically marked as SPEC-to-SPEC excorporation, and such a kludge merely restates the problem without added insight.
26. *translation*: Drummed utterances can rightly be held to express how speakers perceive, if not conceive, and in any event interpret, the system of tones in operation when they speak.
27. *translation*: variations of intensity are more typical of stress and intonation than they are of tone.

Proposals for a Tone Orthography of Nikyob following a Participatory Workshop

Timothy Kempton¹

Report² from the tone orthography workshop, Jos, Nigeria, 18 May to 12 June 2015, led by Dr Constance Kutsch Lojenga. Nikyob language consultants and co-researchers were David Sonkori, Dushe Haruna³ and Jerry Peter Marcus. We are grateful to those people who provided helpful feedback on earlier drafts of this report especially Coleen Starwalt and an anonymous reviewer.

Abstract
The level of literacy in the Nikyob language is currently very low. Nikyob is a tone language, yet tone distinctions are not currently being represented in the orthography. It was suspected that this lack of tone marking was a factor in the low literacy rate but it was difficult to be conclusive because research into Nikyob phonology and orthography, especially in the area of tone, was limited. In order to investigate and help to address these issues, members of the Nikyob community took part in a participatory workshop on tone. The speakers categorised nouns and verbs by their tone patterns as well as observing changes that occurred when these words were included in simple grammatical structures. The analysis shows that tone has a high functional load in the language with many words distinguished by tone exclusively. Most of these are grammatical differences between words. For example, tone is the only feature to distinguish most plural nouns from singular nouns and some verb tenses are also only distinguished by tone. The current orthography guidelines suggest the use of accent marks to indicate tone levels when the text is otherwise ambiguous. However, due to tone complexity, both writers and readers find the guidelines difficult to implement and so the accents are no longer written. This paper showcases the workshop proposal to mark selected grammatical tone distinctions using a prefix symbol for the affected word. The proposal has undergone initial testing and has received support from orthography stakeholders in the community.

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² The online version of this report with audio examples can be found at https://speechchemistry.github.io/faa/nikyob_tone and the SIL Language and Culture archives.

³ Dushe Haruna is one of the Nikyob speakers and has consented to the inclusion of his voice recordings in the online version of this report.

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Report² from the tone orthography workshop, Jos, Nigeria, 18 May to 12 June 2015, led by Dr Constance Kutsch Lojenga. Nikyob language consultants and co-researchers were David Sonkori, Dushe Haruna³ and Jerry Peter Marcus. We are grateful to those people who provided helpful feedback on earlier drafts of this report especially Coleen Starwalt and an anonymous reviewer.

Abstract
The level of literacy in the Nikyob language is currently very low. Nikyob is a tone language, yet tone distinctions are not currently being represented in the orthography. It was suspected that this lack of tone marking was a factor in the low literacy rate but it was difficult to be conclusive because research into Nikyob phonology and orthography, especially in the area of tone, was limited. In order to investigate and help to address these issues, members of the Nikyob community took part in a participatory workshop on tone. The speakers categorised nouns and verbs by their tone patterns as well as observing changes that occurred when these words were included in simple grammatical structures. The analysis shows that tone has a high functional load in the language with many words distinguished by tone exclusively. Most of these are grammatical differences between words. For example, tone is the only feature to distinguish most plural nouns from singular nouns and some verb tenses are also only distinguished by tone. The current orthography guidelines suggest the use of accent marks to indicate tone levels when the text is otherwise ambiguous. However, due to tone complexity, both writers and readers find the guidelines difficult to implement and so the accents are no longer written. This paper showcases the workshop proposal to mark selected grammatical tone distinctions using a prefix symbol for the affected word. The proposal has undergone initial testing and has received support from orthography stakeholders in the community.

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² The online version of this report with audio examples can be found at https://speechchemistry.github.io/faa/nikyob_tone and the SIL Language and Culture archives.

³ Dushe Haruna is one of the Nikyob speakers and has consented to the inclusion of his voice recordings in the online version of this report.

Introduction

Genetic affiliation and language location

Nikyob is a Plateau language spoken in the south of Kaduna State, Nigeria. The classification within Benue-Congo is Plateau, Southwestern, A (Simons & Fennig, 2018) or alternatively Plateau, Ninzic (Blench, 2018). The full name is Nikyob-Nindem (ISO693-3 code kdp) covering the two main dialects. Nindem is reported to vary slightly from Nikyob but the words are similar (Kadima & Jerzyk, n.d.) and the Nindem are said to generally understand Nikyob (Goback & Hon, 2015). Within Nikyob itself there are two dialects: Turan and Nbetcho. There is mutual intelligibility but some sound differences do occur⁴ (Shibiya, 2004). Turan is frequently used as the reference dialect, and often regarded as the prestigious dialect (Markus, 2011).

Background to the workshop

Despite a number of attempts to boost literacy in the Nikyob language, the amount of reading and writing remains very low. Testing by the Nikyob Bible translation and literacy project confirms this as well as language vitality assessments (Kempton, 2016b; Simons & Fennig, 2018). It was suspected that a lack of tone marking was a factor in the low literacy rate. An initial literacy primer (Kadima, 1989) did not include any instructions for writing tone but a more recent guide suggests writing tone with accents marks when “context cannot remove an ambiguity” (Longtau, Mandue, Adewara, & Barau, 2008). However, tone marking has not been observed in practice. Blench (2005b) indicates that tone plays an important role in distinguishing words in Nikyob, but no comprehensive study of the Nikyob tone system has been undertaken to date.

The need for more research in this area led to a participatory workshop in 2015 to investigate the role of tone in Nikyob, and to make suggestions for improving the orthography. The results are presented in this paper.

During the workshop we concentrated on parts of the writing system where ambiguity arises in the current orthography because of tone. Due to the brevity of the workshop, a minimum amount of data was collected to give sufficient confidence in each paradigm e.g. the past tense. This has meant there is a paucity of data in certain areas, so that some of the phonological hypotheses are tentative. More data will need to be collected to confirm these hypotheses.

⁴ For example many words that end with [d] in Turan e.g. [rwad] “house” end in [s] in Nbetcho e.g. [rwas].

We recognise that there is a range of different viewpoints regarding orthography development. At one end of the spectrum is the viewpoint that the vast majority of linguistic problems should be resolved before developing an orthography. At the other end of the spectrum is the viewpoint that the community should be using an orthography as soon as they possibly can. With limited resources we have attempted to navigate somewhere between these two viewpoints. This hasn't always worked perfectly but the aim is an iterative approach where the most pressing linguistic issues are investigated, and then the proposals are subsequently tested. This then feeds back into further linguistic investigation.

Transcription conventions

The transcription in this report uses the following conventions:

- square brackets for [phonetic] data
- forward slashes for /phonemic/ data
- angled brackets for <orthographic> data.

However in most tables brackets are removed for ease of reading and comparison. In these tables the surface tone is written before the orthographic representation e.g. ɬ yon is shorthand for [ɬ]<yon>. Chao tone letters from the IPA are used to indicate surface tone. A phonetic representation of tone is used alongside an orthographic representation of segments because the workshop encouraged participants to write down words, whereas tone was elicited separately. As Nikyob speakers became more conscious of the tones in their language it became apparent that the distinctions they were making were primarily phonemic but with some additional phonetic detail.

Orthography decision makers

Primary decision makers in orthography matters include the language committee and literacy subcommittee of the Nikyob Bible translation and literacy project. Other potential stakeholders include the Kaninkon Development Association and the Kaninkon Traditional Council as well such as the family of Hauwa Kadima (who wrote the first literacy primer in 1989).

Spelling of Nikyob

The exact spelling of the Nikyob language as written by the Nikyob people has varied in the past and is a good example of the way the orthography has changed. The spelling <Ninkyoob> was used in the introductory pages of the first literacy primer (Kadima, 1989). This reflects early orthography recommendations that double vowels be used to indicate a different vowel quality from a single letter (Kadima & Jerzyk, n.d.). However the core material of the very same primer reflected a different convention that one

symbol be used for each vowel quality. This is why the front cover of the primer reads <Ninkyob>.

In 2008 a Nikyob orthography workshop was held that produced a reading and writing guide. The spelling <Nikyob> using the nasalisation diacritic on the front cover, presumably reflects the recommendations of the workshop: that “the [nasal] symbol is preferred over the use of special -n because final -n is permitted in the language”. However this nasal symbol has not always been straightforward to produce (e.g. see Figure 1). Most publications and signs currently do not use the nasalisation diacritic (e.g. see Figure 2). The use of tone diacritics in Nikyob orthography is even rarer and in fact the only publication we have seen them in is the reading and writing guide (Longtau et al., 2008).

It is, of course, possible that the spelling of Nikyob may change again in the future.

Nĩ kyob Bible Translation / Literacy Project

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Figure 1: Reproducing the nasalised vowels has been a challenge



Figure 2: Sign demonstrating that the current spelling of the language is “Nikyob”

Segmental issues and syllable structure

Consonants

The following table shows our current understanding of the consonant phonemes.

	Bilabial	Labiodental	Alveolar	Palatal	Velar	Labial-velar	Glottal
	p b		t d	(c)(ɟ)	k g	kp gb	
Plosive			n	(ɲ)	ŋ	(ŋɔ̃ ^w)	
Nasal	m						
Fricative		f v	s z	ʃ ʒ	(ɣ ^w)		h
Trill			r				
Tap			ɾ				
Approximate				j		w	
Lateral			l				

This table is the same as Blench (2005b) except that consonants in parenthesis are those suggested by Roger Blench that we regard as being labialised or palatalised versions of more elemental sounds just as most of the other consonants can be labialised and palatalised. This includes the “explosive m” [ŋɔ̃^w], a click which Harley (2012) suggests to be a variant pronunciation of /m^w/ for some speakers.⁵ The palatal plosives have been observed as [tʃ] and [dʒ] and appear to be /tj/ and /dj/ underlyingly (see the section on future tense in the appendix). We have seen no evidence of [ɣ] occurring on its own; it is only observed in a labialized form. Whether this sound [ɣ^w] also accounts for the “w with frication” that Blench (2005b) describes is unknown. It may be that [ɣ^w] is just an allophone of /g^w/ - this hypothesis is currently under investigation.

All the above consonants without parentheses can be palatalised or labialised except the trill /r/ and the fricatives /ʃ/ and /ʒ/ (Blench, 2005a). It is possible the latter two sounds could be regarded as palatalised versions of /s/ and /z/ respectively, however the sequence <sy> does seem to occur as well e.g. <nsyen> “bean”.

The existing orthography needs some further work in the area of consonants. Although the 2008 orthography workshop (Longtau et al., 2008) made some important contributions in the documentation and grammar of Nikyob, which this paper relies on, it remains to be seen whether the revision of Nikyob consonants was optimal⁶. At the very least, further orthography testing is needed to confirm the most intuitive representation of these consonants for Nikyob speakers.

⁵ An alternative perspective is that this click is a variant pronunciation of /ŋm^w/ (Harley, M. (2016) personal correspondence).

⁶ For example the workshop reported in (Longtau et al., 2008) used <shw> to replace <khwy> (Kadima, 1990) for representing the voiceless laminal-palatal labialised fricative. The 2008 workshop also used <ch> to replace the <ty> (Kadima, 1990) for the voiceless postalveolar affricate - the section on future tense in the appendix gives some justification for Kadima's original <ty> digraph.

Vowels

	Front	Central	Back
Close	i		u
Mid-close	e		o
Mid-open	ɛ		ɔ
Open		a	

Nasalisation is contrastive for all the vowels except /e/ and /o/, this results in 5 nasalised vowels (Blench, 2005b; Kadima & Jerzyk, n.d.). Vowel length does not appear to be contrastive. When differences in vowel length have been observed, there has been no evidence that it is independent from the tone level, i.e. vowel length appears to be a phonetic correlate of tone.

The treatment of vowels in the existing orthography makes use of the nasal diacritic with 12 vowels written as <i, e, ɛ, a, ɔ, o, u, ĩ, ĕ, ã, ẽ, û>. It is hoped that the increasing availability of technology to add the nasal diacritic (e.g. smartphone keyboards) alongside literacy teaching will encourage people to write nasal vowels.

Syllable structure

The following syllable structures appear in Nikyob. Unambiguous examples are shown below each structure from fieldwork by Markus (2011). The different source of data is the reason that these are phonetic transcripts. A few changes have been made to the original data following tests with Nikyob speakers.

V

[ɪ i] yes

[Nɛʔɛ] no

CV

[ɪ ta] take

VC

[ɪ ar] grandchildren

CVC

[ɪ paɪ̃] all

[ɪ buɪ̃] open

CVCC

[ɪ taɪ̃] nine

[ɪ ɪ ɲsɪɪ̃] gizzard

There appear to be three syllabic nasals:

[m] [ɪmbwɛr] tomorrow
[n] [ɪɲɪɪɪr] crowd
[ŋ] [ɪŋɪgun] fishing line

In these unambiguous examples, there is only a single consonant in the onset of every syllable. Also the nucleus of every syllable is either a single vowel or a syllabic nasal. This suggests that palatalization and labialisation occurring between the onset and the vowel are just features acting on a single consonant onset. Therefore it is a good existing practice that <w> and <y> are written after the consonants rather than <u> or <i> e.g. <mbwɛr> for "tomorrow".

In the course of the workshop we did not notice any difference in tone behaviour between closed and open syllables. However we did notice that only level tones occurred on syllabic nasals.

Nikyob alphabet

An investigation of the words that appear in Kadima (1989) suggests the following mapping of phonemes to letters for the original Nikyob alphabet:

Phoneme	A	b	d	e	ɛ	f	g	gb	h	i	ɜ	k	kp	l	m	n	ŋ	o	ɔ	p	r	r	s	ʃ	t	u	v	w	y	z
Letter(s)	A	b	d	e	ɛ	f	g	gb	h	i	j	k	kp	l	m	n	ng	o	ɔ	p	r	rr	s	sh	t	u	v	w	y	z

Note that Kadima represents the phoneme /ɜ/ with the letter <j>. One problem with this approach is that most Nikyob speakers strongly associate the sound [dɜ] with the letter <j> because they are literate in English and/or Hausa. Since [dɜ] is often a realisation of /dy/ in Nikyob, a number of Nikyob speakers represented both /ɜ/ and /dy/ with the letter <j>. This caused confusion. Representing /ɜ/ completely differently, using the digraph <zh> helped to reduce the confusion. Other minor changes to Kadima's orthographic representations are suggested in Kempton (2016a).

Summary of tone system

Number of tones

In isolated words there appears to be three level tones: low, mid and high which can be labelled with the Chao tone letters [ɿ ɿ ɿ]. There are also tone contours: low-mid rise, mid-low falling and high-mid falling which can be labelled [ɿ ɿ ɿ]. Three monosyllabic words for each surface tone are given in the following table as an example.

Word	Gloss	Word	Gloss	Word	Gloss
ɿ kyom	to look after	ɿ num	drought	ɿ rig	God
ɿ kyom	navel	ɿ za	to buy	ɿ she	egg
ɿ kyom	corpse	ɿ za	season	ɿ yud	sand
ɿ yon	goat	ɿ kyar	monkey	ɿ yud	dew
ɿ zig	knife	ɿ kpo	granary	ɿ rig	rope
ɿ re	stomach	ɿ za	leg	ɿ tyo	head

The tone contour [N] has been observed on past tense verbs. In longer utterances we have observed more than three levels of tone. More research is needed to confirm the reason for this.

Underlying levels

There appears to be three contrastive level tones in isolation forms. One possible interpretation of the patterns observed at the workshop is that there are just two underlying tones in Nikyob but more than two realizations of these tones in the speech of people. These realizations or surface tones arise through processes called downstep and upstep. Downstep occurs when a high tone is realized as a slightly lower tone than a previous high tone. This would sound like a high tone followed by a mid tone. If this process is completely predictable because it is caused by a high-low-high sequence of tones, for example, it is called "automatic" downstep. However, if it is not predictable, it is called "non-automatic" downstep. Non-automatic downstep typically occurs because there is a low tone that is in the mind of the speaker but not pronounced directly. Rather it makes its presence known by causing the high tone to be pronounced slightly lower. A tone that is in the mind of the speaker but not pronounced is called a floating tone. A two tone interpretation of Nikyob would suggest a non-automatic downstep: a floating low tone causes a following high tone to be pronounced lower. Upstep is like downstep except in this case the high tone is pronounced extra high after a low tone that is not pronounced by the speaker. This kind of upstep appears to occur in Nikyob with a two tone interpretation.

This hypothesis is based on observations and suggestions of Dr Constance Kutsch Lojenga at the tone orthography workshop. The data used in this report is primarily isolated words and short phrases so there is limited evidence presented here for the hypothesis of downstep and upstep.

Surface forms and the hypothesised underlying tones are shown below (L = Low, fL = floating Low, H = High). An example of upstep is shown in the third row. Evidence of non-automatic downstep is given in the section on object pronouns in the appendix. However more data, particularly data from longer utterances is needed to lend more support to this hypothesis of two underlying tones.

Surface	Underlying
ɿ	L
ɿ	H
ɿ	H fL
ɿ	L H
ɿ	H L
ɿ	H fL H

Tone patterns on nouns

The noun class system of Nikyob is more eroded than most of the other Plateau languages (Gerhardt, 1989). For many nouns it is difficult to identify the noun class and how this may correlate with tone patterns. At least one class of words in Nikyob displayed a fairly restricted set of tone patterns. We focused more on this class of nouns than other noun classes for this report. These are the nouns characterised by two syllables where the first syllable is a syllabic nasal prefix. For example the tone patterns for singular and plural forms respectively are:

	Singular	Plural	Example	Gloss
1.	ɿ ɿ	ɿ ɿ	Mpad	bag
2.	ɿ ɿ	ɿ ɿ	Nkum	log
3.	ɿ ɿ	ɿ ɿ	Nkim	path
4.	ɿ ɿ	ɿ ɿ	Nkyul	hip
5.	ɿ ɿ	ɿ ɿ	nsher	star
6.	ɿ ɿ	ɿ ɿ	nsh5	bee

Note that for tone group 1, the plural tone pattern matches the singular tone pattern of group 2 and vice versa. The same is true for pattern 3 and 4. Most of the singulars and plurals in this syllabic nasal prefix class are tone minimal pairs e.g. <nkum> "log" in group 2 has the same segments whether singular or plural. However some words also in group 2 change segmentally when pluralised e.g. [ɿ ɿ] <nzwob> "big hoe", has the plural [ɿ ɿ] <nzyob>⁷.

Tone patterns on verbs

Due to workshop time limits, only single syllable verbs were investigated for tone. Five tones were observed (the [N] tone being the only tone not

⁷ This labialisation and palatalisation may be a vestige of earlier noun class prefixes that have now been incorporated into the root. There is some evidence for this in the language of Kuce (which like Nikyob is a Plateau-Southwestern-A (Simons & Fennig, 2018) or Plateau-Ninzic (Blench, 2018) language). The corresponding word in Kuce is [ɿ ɿ] <uhup> "big hoe" which has the plural [ɿ ɿ] <ihup>, which retains the noun class prefixes which may be closer to the proto form (Starwalt, C. (2016) personal correspondence). (Gerhardt, 1989, p366) observes a similar sound change in nouns when comparing Nindem and Nikyob, with Nindem retaining the noun class prefix.

observed), the verbs here illustrating each tone pattern are given in their imperative form.

Verb	Gloss	Verb	Gloss
ɪ tɔ	see	ɪ hag	slaughter
ɪ nog	give	ɪ ta	take
ɪ rɛ	speak	ɪ sorl	run
ɪ yarl	till the soil	ɪ yam	fear
ɪ tɪ	add	ɪ fū	add more

Tone stability

The Nikyob language shows more tone stability than most of the other Plateau languages at the workshop. We present here a summary of the tone stability, *more details and examples are shown under the relevant sections in the appendix.*

We observed no tone changes when nouns were combined with prepositions (i.e. the preposition coming between two nouns). When nouns were combined with demonstratives there was a small change to the noun - the tone [ɪ] changes to [ɪ] in the final syllable of the noun. Possessive pronouns occur after the noun and their tone is influenced by the tone of the noun. There is occasionally a change of tone in the noun that is identical to the change that was observed with demonstratives.

When conjugating verbs, the pronouns remain stable but the tone on the verbs often change, being influenced by the tone on the preceding pronoun. This was certainly the case for the present tense and future tense. For the past tense there was some neutralisation probably from the past tense morpheme, so it was harder to make conclusions. More investigation is needed. We also tested for negation of verbs in the present tense. The pronouns did not change nor did the negation morpheme. However the verb did change, apparently influenced by the tone on the preceding negative morpheme. When object pronouns were placed after the verb, neither the verb nor the object pronoun changed. This was certainly the case for the present and future tense. For the past tense, again neutralisation had an impact. Further details on all these patterns can be seen in the appendix.

So it appears that tones show a high degree of stability but where tone does influence neighbouring words its influence spreads from left to right.

Suggestions for orthography improvement

Description of existing tone orthography

Conventions for dealing with tone in the existing orthography are described in Longtau et al. (2008):

"In most cases, when a word occurs in the context of a sentence, speakers of the language will recognize the meaning of the word and will read it with the correct tone. When the context cannot remove an ambiguity, it may be necessary to mark the tones. (p5)"

"... with the additional proviso that the tone of plural nouns must be marked fully. (p17)"

Plurals

Many plural noun forms differ from the singular only in tone. This creates an ambiguity in the orthography. For example, consider the sentence <mī tɔ kiky> "I see chicken". If the differences expressed through tone are not marked it is not clear if <kiky> "chicken" is singular or plural.

A random sample taken from a 1700 wordlist suggests that over 50% of plurals differ only in tone from the singular form. This seemed to be a larger proportion than average for Plateau languages when compared to those languages at the tone workshop (Iten, Gworog, Koro Waci, Kuce).

There are two main options to deal with this ambiguity. Firstly tone accents could be used to mark the difference in tone. This is the recommendation from the 2008 workshop (Longtau et al., 2008, p17), where tone is only used on the plural form. As mentioned earlier, such tone marking has not been observed in practice. Speakers find it difficult to write. The other option does not involve explicitly marking tone differences. Rather, a symbol can be used to mark the plural form. This is our recommendation from the 2015 workshop. The use of symbols, such as punctuation, to mark grammatical differences in tone languages was pioneered in Africa in the 1960s and continues to be developed by language communities and orthography experts (Bird, 1999; Kutsch Lojenga, 2014; Roberts & Walter, 2012). The symbol we are currently experimenting with is a star but it could be any other symbol. Further investigation is needed to discern whether this is the most appropriate symbol from a literacy perspective as well as a technology perspective. The key issue here is using a symbol for marking grammatical tone, not the particular symbol used, which can be chosen through further community testing. Examples comparing the two options for marking plurals are shown in the table below. The first column shows the unmarked form which is used for the singular in both approaches.

Two ways of representing plurals in the orthography

Gloss	Singular	Tone accents (2008)	Grammatical symbol (2015)
chicken	kikyɔ	kíkyɔ̌	*kikyɔ
Bag	Mpad	m̄paḍ	*mpad
Log	Nkum	ṅkùm	*nkum
mountain	gbyo	Gbyó	*gbyo
chameleon	ntod	ntód	*ntod

During the tone workshop, an experiment was conducted to measure the effectiveness of marking tone accents compared with grammatical marking. This is very similar to examples in the table above (except when testing tone accents, the accents were used on *both* the singular and the plural e.g. <kíkyɔ̌> "chicken", <kíkyɔ̌> "chickens"). At the time of writing this paper, the full analysis of the experiment is yet to be complete but initial results indicate that it is easier to read the plurals that are marked grammatically, than those marked with tone diacritics e.g. it is easier to read <*kikyɔ> rather than <kíkyɔ̌>.

For the nouns that only differ in tone between singular and plural, this will clearly help. But what about the minority of nouns that already differ segmentally? These could be left unmarked but we recommend they still be marked explicitly. The reasons are primarily for writing. Firstly if only some plurals are marked then the writer will briefly hesitate before writing the plural to decide if it should be marked or not. However if all plurals are marked then there will be no hesitation. Secondly this approach is recommended by an expert in Nigerian orthographies⁸, and thirdly it fits with the recommendation of the 2008 workshop that indicates that all plurals should be marked (Longtau et al., 2008, p17).

Possessive pronouns with emphasis

Possessive pronouns by themselves are not ambiguous in the current orthography but ambiguity arises when emphasis is added.

Word	Gloss
ɪ ɪ mini	that yours
ɪ ɪ mini	that yours(pl)
ɪ ɪ mani	that his
ɪ ɪ mani	that theirs

The 2nd person and the 2nd person plural are only distinguished by tone. In the same way the 3rd person and the 3rd person plural are only

distinguished by tone. The way this should be marked in the orthography is still under discussion⁹.

Independent pronouns

The normal subject pronouns that occur before verbs do not have any ambiguity in the way they are written but independent pronouns do. Although independent pronouns do not have a direct equivalent in English, an equivalent gloss has been added to the following table:

ɪ mī	I	ɪ tod	we
ɪ wo	You	ɪ ɪ nzhin	you(pl)
ɪ wo	he/she/it	ɪ ba	they

Note that 2nd and 3rd person singular independent pronouns are only distinguished by tone. We propose that they be written orthographically as <wo> and <wó> respectively. Note that this diacritic is not informing the speaker of the absolute value of the tone, rather it is a grammatical symbol to signal the third person.

Object pronouns

Object pronouns in Nikyob are as follows:

ɪ ɪ	Me	ɪ tod	us
ɪ o	You	ɪ ɪ nzhin	you(pl)
ɪ o	him/her/it	ɪ ba	them

Note that 2nd and 3rd person singular object pronouns are only distinguished by tone just like the independent pronouns. We propose that they be written orthographically as <o> and <ó> respectively. As with the independent pronouns, the diacritic is a grammatical symbol indicating the third person to resolve any ambiguity.

Past tense

The past tense form of a verb is segmentally identical to the present tense and only differs by tone. The only other tenses that have been investigated are the present tense and future tense (see appendix). Further study is needed to determine how this tense might be linked to other TAM (tense-aspect-mood) markers and whether other TAM markers are purely distinguished by tone. Here is a conjugation of a verb in present tense as an example:

⁹ Originally the proposal was that the plural pronouns are marked in a similar fashion to the plural nouns. For example <*mini> "that yours" and <*mani> "that theirs". However the proposal for nouns was that all plural nouns would be marked whether or not they are a tone minimal pair. To be consistent all plural pronouns should be marked as well but this would seem to be excessive.

⁸ Harley, M. (2015) personal correspondence.

	J tɔ	to see (present)			
ɪ mī	ɪ tɔ	I see	ɪ ti	ɪ tɔ	we see
ɪ wo	ɪ tɔ	you see	ɪ ni	ɪ tɔ	you(pl) see
ɪ a	ɪ tɔ	he/she/it sees	ɪ ba	ɪ tɔ	they see

Here is the same verb in past tense:

	J tɔ	to see (past)			
ɪ mī	ɪ tɔ	I saw	ɪ ti	ɪ tɔ	we saw
ɪ wo	ɪ tɔ	you saw	ɪ ni	ɪ tɔ	you(pl) saw
ɪ a	ɪ tɔ	he/she/it saw	ɪ ba	ɪ tɔ	they saw

It can be observed that the change to the past tense also effects some of the pronouns. The identical tone patterns in the past tense suggests a neutralisation of the tones. Along with the unusual high falling tone this verb form appears to be more marked at a phonological/morphological level. Further investigation of the full range TAM markers would be needed to confirm this. As an interim measure we propose to mark this verb form in the orthography to avoid any ambiguity between past and present tense. The proposal is that a symbol is inserted before the verb. We expect this should still be in the peripheral vision of the reader so they can anticipate the difference while reading the pronoun. Currently we are suggesting a colon to indicate past tense. This is placed directly adjacent to the following word without a space to avoid it being confused with a standard colon. For example <ɪ tɔ> for present tense and <ɪ:tɔ> for past tense. As with other grammatical symbols this could be revised through community testing.

Lexical tone minimal pairs

During the workshop we collected a number of lexical tone minimal pairs, that is, where two words only vary by tone. Since we were looking for words that might be confused in the orthography, we did not include words from different word categories (e.g. we have not listed pairs where one word is a noun and the other word is a verb). This was not an exhaustive search and it is likely that more words will be found.

Nouns that only differ in tone

	Word	Gloss		Word	Gloss
ɪ	Yud	sand	ɪ	yud	dew
J ɪ	Nggu	wind	ɪ ɪ	nggu	hair
ɪ	Za	leg	ɪ	za	season
J ɪ	nsher	star	J J	nsher	palm wine
ɪ	Kyom	navel	ɪ	kyom	corpse
J	Rig	God	ɪ	rig	rope

Verbs that only differ in tone

	Word	Gloss		Word	Gloss
ɪ	rag	repair	ɪ	rag	plead
ɪ	su	shake	ɪ	su	break wind

Facilitators at the workshop who had a lot of experience with tone languages commented that this did not amount to many lexical minimal pairs and that it was unlikely to cause too much confusion in the orthography. This may need to be reviewed as more words are collected.

Conclusion and the way forward

In this paper we have shown how the current use of the Nikyob orthography does not adequately represent all the necessary tonal distinctions in the language. This is especially the case for grammatical distinctions, for example tone being the only feature to distinguish most plural nouns from their singular counterpart. Proposals that emerged from the participatory workshop have been described. This includes the proposal to add a prefix symbol such as a star to a plural. At the workshop some initial literacy training material was created. Since then the proposal has undergone initial testing and has received support from orthography stakeholders in the community. Further linguistic investigation will take place while orthographic testing progresses.

Appendix

Tone patterns on verbs

Present Tense

The normal subject pronouns for present tense are as follows

ɪ mī	I	ɪ ti	we
ɪ wo	You	ɪ ni	you(pl)
ɪ a	he/she/it	ɪ ba	they

When conjugating in the present tense, the tone on the pronouns remain stable but the tone on the verb can change slightly. Here is an example conjugation for the verb [J] <ɪ tɔ> "to see"

	J tɔ	to see			
ɪ mī	ɪ tɔ	I see	ɪ ti	ɪ tɔ	we see
ɪ wo	ɪ tɔ	you see	ɪ ni	ɪ tɔ	you(pl) see
ɪ a	ɪ tɔ	he/she/it sees	ɪ ba	ɪ tɔ	they see

It can be observed above that the verb [J] <ɪ tɔ> remains as the tone [J] after the pronoun [J] <a> but changes to the tone [ɪ] after all other pronouns.

This observation can be written as:

[J] VERB →	[J] VERB after [J] <a>
	[N] VERB after all other pronouns

Here is another example for the verb with a different tone [ɬ]

	ɬ nog	to give			
ɬ mĩ	ɬ nog	I give	ɬ ti	ɬ nog	we give
ɬ wo	ɬ nog	you give	ɬ ni	ɬ nog	you(pl) give
ɬ a	ɬ nog	he/she/it gives	ɬ ba	ɬ nog	they give

This can be written as:

[ɬ] VERB → [ɬ] VERB after all pronouns

For verbs with the tone [ɪ] the following example illustrates the pattern observed:

	ɪ rɛ	to speak			
ɬ mĩ	ɪ rɛ	I speak	ɬ ti	ɪ rɛ	we speak
ɬ wo	ɪ rɛ	you speak	ɬ ni	ɪ rɛ	you(pl) speak
ɬ a	ɪ rɛ	he/she/it speaks	ɬ ba	ɪ rɛ	they speak

This can be written as

[ɪ] VERB →	[ɬ] VERB after [J] <a>
	[ɪ] VERB after all other pronouns

There was a couple of exceptions (2 out of 8 verbs with the tone [ɪ]) e.g. [ɪ] "to cook" which appeared to show a slight difference:

[ɪ] VERB →	[ɬ] VERB after [J] <a>
	[ɪ] VERB after all other pronouns

This may be due to a different underlying tone pattern that is not revealed in the isolated form. More investigation is needed to confirm this.

The summary of patterns seen on all the verbs are shown below:

[J] VERB →	[J] VERB after [J] <a>
	[N] VERB after all other pronouns
[ɬ] VERB →	[ɬ] VERB after all pronouns
[ɪ] VERB →	[ɬ] VERB* after [J] <a>
	[ɪ] VERB after all other pronouns
[ɬ] VERB →	[ɬ] VERB* after [J] <a>
	[ɪ] VERB after all other pronouns
[ɪ] VERB →	[ɬ] VERB after [J] <a>
	[ɪ] VERB after all other pronouns

* Exception for verbs with the tone [ɪ] (2 out of 8 verbs) e.g. [ɪ] <ru> "to cook": [ɪ] VERB → [ɬ] VERB after [J] <a>

* Exception for verbs with the tone [ɬ] (1 out of 3 verbs) e.g. [ɬ] "growl":

[ɬ] VERB → [ɬ] VERB after [J] <a>

Past Tense

The normal subject pronouns for past tense are very similar to the subject pronouns for present tense. The segments are identical but the tones for past tense all become mid tone.

ɬ mĩ	I	ɬ ti	we
ɬ wo	You	ɬ ni	you(pl)
ɬ a	he/she/it	ɬ ba	they

The summary of patterns seen on all the verbs are shown below:

[ɪ] VERB →	[ɪ] VERB
VERB →	[N] VERB for all other verb tone classes

For example:

	ɪ ɬ	to see (past)			
ɬ mĩ	ɪ ɬ	I saw	ɬ ti	ɪ ɬ	we saw
ɬ wo	ɪ ɬ	you saw	ɬ ni	ɪ ɬ	you(pl) saw
ɬ a	ɪ ɬ	he/she/it saw	ɬ ba	ɪ ɬ	they saw

Future Tense

For future tense, the normal subject pronouns are also have identical segments when compared to present tense. The tones are different as follows:

ɬ mĩ	I	ɬ ti	we
ɬ wo	You	ɬ ni	you(pl)
ɬ a	he/she/it	ɬ ba	they

With future tense, the particle [ɪ] <i> is inserted between the pronoun and the verb. Also the first consonant of the verb root becomes palatalized, as the following table shows (pronoun not shown):

Present	Future	Gloss
ɬ hug	ɬ i ɬ hyug	burn
ɬ za	ɬ i ɬ zya	buy
ɬ yarɪ	ɬ i ɬ yarɪ	till the soil
ɬ ru	ɬ i ɬ ryu	cook
ɬ ɬ	ɬ i ɬ tyɔ	see
ɬ tā	ɬ i ɬ tyā	bite

Note that <ty> is pronounced [tʃ]. The pattern of palatalisation indicates why Kadima (1989) chose the digraph <ty> before the suggestion to replace it by <ch> (Longtau et al., 2008). As a more complete example, the verb [J] <to> "to see" is conjugated as follows:

	J ty	to see (future)					
1 mĩ	1 i	J ty	I will see	1 ti	1 i	J ty	we will see
1 wo	1 i	J ty	you will see	1 ni	1 i	J ty	you(pl) will see
1 a	1 i	J ty	he/she/it will see	1 ba	1 i	J ty	they will see

The summary of patterns seen on all the verbs are shown below:

[J] VERB →	[J] VERB after all pronouns
[ɬ] VERB →	[ɬ] VERB after all pronouns
[ɭ] VERB →	[ɬ] VERB* after all pronouns
[ɰ] VERB →	[ɰ] VERB after all pronouns
[ɱ] VERB →	[ɱ] VERB after all pronouns

* Exception for verbs with the tone [ɭ] (1 out of 4 verbs) e.g. [ɭ] <hug> "to burn":

[ɭ] VERB → [ɬ] VERB after all pronouns

Negation

We investigated negation on tones in the present tense. A negation particle follows the pronoun. The only difference to the pronouns is the third person singular which has different segments and tone. The negation particle itself has a tone that is difficult to predict. The following fragments show the general pattern.

1 mĩ	1 ang	I don't	1 ti	1 ang	we don't
1 wo	1 ang	you don't	1 ni	1 ang	you(pl) don't
1 wo	1 ang	he/she/it doesn't	1 ba	1 ang	they don't

The following example shows how the tone on the negation particle can influence the tone on the verb:

	1 re	to speak					
1 mĩ	1 ang	1 re	I don't speak	1 ti	1 ang	1 re	we don't speak
1 wo	1 ang	1 re	you don't speak	1 ni	1 ang	1 re	you(pl) don't speak
1 wo	1 ang	1 re	he/she/it doesn't speak	1 ba	1 ang	1 re	they don't speak

The summary of patterns seen on all the verbs are shown below:

[J] <ang> [J] VERB →	[J] <ang> [J] VERB
[ɬ] <ang> [J] VERB →	[ɬ] <ang> [ɱ] VERB
[J] <ang> [ɬ] VERB →	[J] <ang> [ɬ] VERB
[ɬ] <ang> [ɬ] VERB →	[ɬ] <ang> [ɬ] VERB
[J] <ang> [ɭ] VERB →	[J] <ang> [ɬ] VERB
[ɬ] <ang> [ɭ] VERB →	[ɬ] <ang> [ɭ] VERB
[J] <ang> [ɰ] VERB →	[J] <ang> [ɬ] VERB
[ɬ] <ang> [ɰ] VERB →	[ɬ] <ang> [ɭ] VERB

Object pronouns

Object pronouns in Nikyob are as follows:

1 i	Me	1 tod	us
1 o	You	1 ɱ nzhin	you(pl)
1 o	him/her/it	1 ba	them

For example:

[J] <a>	[J] <to>	[ɬ] <i>
He	Sees	me

Following a similar structure to this example the general pattern that occurs after the third person [J] <a> is recorded as follows:

[J] VERB →	[J] VERB before all pronouns
[ɬ] VERB →	[ɬ] VERB before all pronouns
[ɭ] VERB →	[ɬ] VERB before all pronouns
[ɰ] VERB →	[ɰ] VERB before all pronouns

If verbs are in the future tense the object pronouns behave the same. For example:

[J] <a>	[ɬ] <i>	[J] <ty>	[ɬ] <i>
he	will	see	me

If verbs are in the past tense the object pronouns have different tones. When compared to the present tense, most object pronoun tones are one step lower (this could be due to non-automatic downstep but more data is needed to verify this hypothesis).

1 i	Me	1 tod	us
1 o	You	1 ɱ nzhin	you(pl)
1 o	him/her/it	1 ba	them

For example:

[ɬ] <a>	[ɬ] <ɔ>	[ɬ] <ɪ>
he	saw	me

Following a similar structure to this example the general pattern that occurs after the third person [ɬ] <a> is recorded as follows:

[ɬ] VERB →	[ɬ] VERB before all pronouns
[ɬ] VERB →	[ɬ] VERB before all pronouns
[ɬ] VERB →	[ɬ] VERB before all pronouns
[ɬ] VERB →	[ɬ] VERB before all pronouns

Demonstratives

The common demonstratives are as follows:

ɬɔ	this / these
ɬɬɔnɔ̃	that / those
ɬɬɬɪyoyo	yonder

When combined with the noun the demonstrative remains stable and usually the noun root remains stable e.g.

ɬɬɬɪnkim		path	ɬɬɬɪnkim		paths
ɬɬɬɪnkim	ɬɔ	this path	ɬɬɬɪnkim	ɬɔ	these paths
ɬɬɬɪnkim	ɬɬɔnɔ̃	that path	ɬɬɬɪnkim	ɬɬɔnɔ̃	those paths
ɬɬɬɪnkim	ɬɬɬɪyoyo	yonder path	ɬɬɬɪnkim	ɬɬɬɪyoyo	yonder paths

However if a noun ends in a mid-low falling tone [ɬ] then this changes to mid [ɬ] when combined with the demonstratives e.g.

ɬɬ nsag		spoon	ɬɬ nsag		spoons
ɬɬ nsag	ɬɔ	this spoon	ɬɬ nsag	ɬɔ	these spoons
ɬɬ nsag	ɬɬ yɔnɔ̃	that spoon	ɬɬ nsag	ɬɬ yɔnɔ̃	those spoons
ɬɬ nsag	ɬɬɬ yɔyɔ	yonder spoon	ɬɬ nsag	ɬɬɬ yɔyɔ	yonder spoons

Possessive pronouns

Possessive pronouns were combined with nouns. As with all nouns the focus was on the well studied class of nouns characterised by two syllables where the first syllable is a syllabic nasal prefix. Here is an example for the word "path":

ɬɬɬɪnkim	Path	ɬɬɬɪnkim	paths
ɬɬɬɪnkim ɬɪmu	my path	ɬɬɬɪnkim ɬɪmu	my paths
ɬɬɬɪnkim ɬɪmi	your path	ɬɬɬɪnkim ɬɪmi	your paths
ɬɬɬɪnkim ɬɪma	his path	ɬɬɬɪnkim ɬɪma	his paths
ɬɬɬɪnkim ɬɪmod	our path	ɬɬɬɪnkim ɬɪmod	our paths
ɬɬɬɪnkim ɬɪmin	your(pl) path	ɬɬɬɪnkim ɬɪmin	your(pl) paths
ɬɬɬɪnkim ɬɪman	their path	ɬɬɬɪnkim ɬɪman	their(pl) paths

Some possessive pronouns realise the same tone. The possessive pronouns <mi, ma> have the same tone which is always [ɬ]. The possessive pronouns <mu, mod, man> have the same tone which varies between two tones: [ɬ, ɬ]. The following table shows this variation of these tones for words representing the different tone groups. The table shows the pronoun: <mu> "my". If there were tables showing the pronouns <mod> "our" and <man> "their", then the tones would be identical.

Singular	mu	Gloss	Plural	mu	Gloss
1. ɬɬɬɪmpad	ɬɪmu	my bag	ɬɬɬɪmpad	ɬɪmu	my bags
2. ɬɬɬɪnsag	ɬɪmu	my spoon	ɬɬɬɪnsag	ɬɪmu	my spoons
3. ɬɬɬɪnkim	ɬɪmu	my path	ɬɬɬɪnkim	ɬɪmu	my paths
4. ɬɬɬɪnkyul	ɬɪmu	my hip	ɬɬɬɪnkyul	ɬɪmu	my hips
5. ɬɬɬɪnjam	ɬɪmu	my njam tree	ɬɬɬɪnjam	ɬɪmu	my njam trees
6. ɬɬɬɪnshɔ̃	ɬɪmu	my bee	ɬɬɬɪnshɔ̃	ɬɪmu	my bees

(Note that 3 & 4 aren't exact opposites- see the mu morpheme) <min> shows its own pattern which varies between two tones: [ɬ, ɬ]:

Singular	min	Gloss	Plural	min	Gloss
1. ɬɬɬɪmpad	ɬɪmin	your(pl) bag	ɬɬɬɪmpad	ɬɪmin	your(pl) bags
2. ɬɬɬɪnsag	ɬɪmin	your(pl) spoon	ɬɬɬɪnsag	ɬɪmin	your(pl) spoons
3. ɬɬɬɪnkim	ɬɪmin	your(pl) path	ɬɬɬɪnkim	ɬɪmin	your(pl) paths
4. ɬɬɬɪnkyul	ɬɪmin	your(pl) hip	ɬɬɬɪnkyul	ɬɪmin	your(pl) hips
5. ɬɬɬɪnjam	ɬɪmin	your(pl) njam tree	ɬɬɬɪnjam	ɬɪmin	your(pl) njam trees
6. ɬɬɬɪnshɔ̃	ɬɪmin	your(pl) bee	ɬɬɬɪnshɔ̃	ɬɪmin	your(pl) bees

Prepositions

The following prepositions were elicited:

Preposition	Gloss
ɬɬɬɪkyɔ̃g	under
ɬɬɬɪityo	on top (on head)
ɬɬɬɪigyan	by
ɬɬɬɪisin	beside (on tree trunk)
ɬɬɬɪimwing	inside

Note the consistent occurrence of the prefix [ɬ] <i>. This appears to be a general locative morpheme.

Prepositions are placed between two nouns e.g.

[ɬ] <gyarɬ> [ɬ ɬ] <ikyo> [ɬ] <bang> "an axe under a bed"

In checking many different combinations of prepositions and nouns, no changes of tone were observed, indicating a high degree of tone stability for this construction.

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The Fortis-Progressive Interface in Leggbó

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

1. Introduction

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

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

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

2. low vowels > mid vowels > high vowels

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

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

3. high vowels > mid vowels > low vowels

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

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

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

4. Leggbó consonant and vowel systems

a. lenis consonants	fortis consonants
p t c k kp	pp tt cc. kkk kp
b dg gb	bb dd gg gb
v z	ff ss
l yw	vv dd zlly yww
b. short vowels	long vowels
i u	ii uu

e	o	ee	oo
ɛ	ɔ	ɛɛ	ɔɔ
a	aa		

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

2. Theoretical Issues

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

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

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

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

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

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

- (i) Well-formedness constraints: These constraints encode principles of markedness. Markedness is a linguistic concept that can roughly be defined as the tendency for certain linguistic elements to be more frequent in the world's languages, based on issues like naturalness, salience and ease of articulation in terms of phonological features (Hansen, 2006). Markedness then is achieved in a system through a set of redundancy rules logically derived from the markedness constraints (Hansen, 2006; Roca & Johnson, 1999). They trigger change to ensure least marked outputs.
- (ii) Faithfulness constraints: These constraints put pressure on lexical forms and their surface counterparts to be identical, without any form of deletion, insertion, feature change, *et cetera*. They oppose all forms of change.
- (iii) Input-output identity constraints: These require the input and output to be glued together along the edges of specific prosodic constituents.

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

3. Fortis-Progressive Marking in Leggbó

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

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

Lexical form	Sentential form
5.a. tú 'dance'	é-túèzù 'he will dance'
ttú-í 'dancing'	é-ttú-îèzù 'he is dancing'
b. dú 'pound'	é-dúèdèi 'he will pound pepper'
ddú-í 'pounding'	é-ddú-îèdùisè 'he is pounding pepper'
c. ké 'put'	é-kéyénkénzún 'he will put it in his nose'
kké-í 'putting'	é-kké-íyénkénzún 'he is putting it in his nose'
d. ts 'let/allow'	é-témánméséñ 'he will allow us to go'
tté-i 'letting'	é-tté-ímántàméséñ 'he is letting us to go'
e. tá 'contribute'	é-tàèkpùànsé 'he will contribute his money'
ttá-í 'contributing'	é-ttá-îèkpùànsé 'he is contributing his money'
g. gbá 'block'	é-gbàèdensé 'he will block the road'
ggbá-í 'blocking'	é-ggbá-îèdensé 'he is blocking the road'
h. kpé 'learn'	é-kpénwèné 'he will learn(book)'
kkpé-i 'learning'	é-kkpé-ínwèné 'he is learning (book)'

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

6. double consonant > single consonant

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

7. $*C_{prog}$
No single consonant in progressive forms

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

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

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

8. $nuc/[i] > nuc/...$
Nucleus with /i/ is stronger than that with any other sound

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

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

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

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

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

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

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

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

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

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

9. IDENT-IO (S)

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

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

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

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

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

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

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

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

13. Prog.M= -i

The progressive marker is an -i suffix

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

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

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

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

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

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

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

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

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

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

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

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

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

15. voiceless obstruents > voiced obstruents

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

16. Fric/vce

If a fricative, then not [+voice]

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

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

/vɔŋ + i/ (prog)	*C _{prog}	Prog.M=-i	nuc/i>nuc/...	*V:	Fric/vce	MAX-IO	DEP-IO	IDENT-IO (S)
a. vɔŋ	*!W	*W	*		*W	*W	L	L
b. fɔŋi	*!W		*				*L	*
c. vvɔŋŋi			**!W	*	**W		***W	L
d. ffɔŋŋi			**!W	*			***W	**
e. vvɔŋi			*		*!W		**	L
f. ffɔŋi			*				**	**
g. vv		*!W	*			*W	L	L
/zɛɛl + i/ (prog)								
a. zɛɛl	*!W	*W	**W	*W	*W	*W	L	L
b. zzɛl		*!W	*		*W	*W	L	L
c. sselli			*				*	**
d. ssɛlli			**!W	*W			**W	**
e. zzelli			*		*!W		*	L
f. zzɛli	*!W		*		*W		L	L
g. zɛl	*!W	*W	*		*W	**W	L	L

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

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

4. Conclusion and Future Work

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

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The Evolution of Word-Initial Nasalised Vowels in Igasi

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Abstract

This article reports that Igasi, a language spoken in the Akoko area of Ondo state is in the process of change whereby word-initial nasalised vowels are being developed. Many nouns in the language have the VNCV structure on the surface but the VN component of this structure is now being simplified in one of two ways: (1) by the elision of the prefix vowel, which results in the NCV structure, and (2) by the deletion of the nasal. The option involving the deletion of the nasal is particular to words having the high vowels /i/ or /u/ in prefix position, and the deletion usually occurs after the prefix vowels have been nasalised. Thus, following the deletion, what is left is a nasalised /ĩ/ or a nasalised /ũ/ in word initial position, a fact that is considered extremely marked in comparison to most of the other related West Benue-Congo languages around it. This pattern is very common in casual speech among Igasi speakers; although they consciously suppress it in careful speech, it still shows up frequently. It is then argued that the language is presently undergoing a process of change, which may eventually become phonologised.

Introduction

Several studies exist on nasals and nasalisation in African languages (Hyman 1972; Williamson 1973; Elugbe 1983; Hombert 1986; Clements & Rialland 2006; Salffner 2009 to mention only a few), but there is still much to be known about the phenomenon. For instance, in Rolle's (2013) survey of 168 languages and language clusters, independent evidence was presented in support of both areal spread and innovation as the sources of nasalised vowels in African language, with no generally agreed source for the sounds. The Edoid group is a representative case; Rolle posits that nasal vowels in Edoid languages are products of areal spread since those geographically close to Yoruba (e.g. Ehueun and Edo-Bini) have nasal vowels but lack /e/ and /õ/, while those geographically close to Ijo languages (Okpe, Eruwa, and Urhobo) "have a full set of nasal counterparts including /ẽ/ and /õ/" making their inventories similar to those Ijo languages (Rolle 2013: 243), whereas the others that are farther from these influencing languages (Eastern Edoid languages such as Ghotuo, Etsako, and Uneme) lack contrastive nasal vowels. Rolle also shows that "West Nigerian languages innovated nasalization..." More categorically is the case of the widespread absence of /ẽ/ and /õ/ in West-Africa which is itself a phonetically natural gap and

serves as proof that nasalised vowels may be clear products of innovation (Rolle 2013:237).

The nature of nasalised vowels in Igasi presents some insight into the plausibility of languages developing the phenomenon. The fact that nasalised vowels in Igasi can also occur as prefixes of nouns is another issue worth studying. This study is therefore a contribution to scholarship on the nature, distribution and source of nasalised vowels in African languages. Further, Igasi is an understudied language, and so this work is a contribution to its documentation.

The Igasi People and Language

Igasi is spoken by about 45, 000 natives in the Akoko North-western part of Ondo state, Nigeria (Talabi, 2016). It is one of the 10 mutually exclusive speech forms spoken in that region. The other speech forms are Arigidi, Erúsú, Oyín, Ùrò, Ọjọ, Ajè, Àfá, Udò, and Ọgè (Olumiyiwa & Oshodi 2012). Igasi village, which is the Igasi-speaking area, is surrounded by Yoruba and Edoid language communities. Specifically, Yoruba is the language of the immediate community to the Igasi people, and it has also been observed that many of the young children in Igasi land are proficient only in Yoruba (Bhadmus, 2016). This underscores the state of endangerment of Igasi language.

The Vowel System of Igasi

Igasi has seven oral and five nasalised vowel phonemes (Bhadmus 2016). A point to note from Table 1 is that it is the close-mid vowels that lack nasalised counterparts as is common of languages in Western Nigeria (Rolle 2013). Also, the fact that Igasi has both oral and nasalised vowel phonemes is predicated on the contrast between members of both groups in the environment of oral consonants where the nasalised ones are not contextually predictable (1a-e).

Table 1: Phonemic vowel chart of Igasi

	Front	Central	Back
Close	i		u
	ĩ		ũ
Close-mid	e		o
Open-mid	ɛ		ɔ
	ẽ		õ
Open		a	
		ã	

(1) Non-predictable nasalised vowels in Igasi

- òwĩ "light"
- āwāwā "armpit"

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- c. òtītī "darkness"
- d. òdòrū "mouth"
- e. wēřī "now"

The Structure of Igasi Nouns

The most common structure among the nouns in Igasi is the disyllabic V-CV, which is akin to those attested in the other languages spoken in South-western Nigeria (2a-b). The language also has multisyllabic structures, having a V in noun prefix position followed by multiple CV sequences (3-4).

- (2) V-CV nouns
 - a. ūvō "hand"
 - b. ídžù "eye"
- (3) V-CV-CV nouns
 - a. òdòrū "mouth"
 - b. íkpùkpū "sand"
- (4) V-CV-CV-CV and longer words
 - a. Ígírígò "knee"
 - b. íkpákávō "arm"

Igasi also has nouns that lack noun prefixes (5-6). These are however rare, and appear mostly in nativised borrowed words. More specifically, examples (6a-b; 7a-b) show that nasal consonants can appear independently as syllables within Igasi nouns. The independence of the nasal consonants is not in doubt in these cases since they often bear tones different from those on adjacent vowels.

- (5) CV-CV: kpērē "trick"
- (6) CV-ŋ-CV
 - a. kpáñsō "blemish"
 - b. kpáñkē "(to be) slender"
- (7) a. V-CV-CV-CV-ŋ-CV: ògòlòmñtí "pawpaw"
- b. V-CV-ŋ-CV: èřēñtē "afternoon"

Finally, some nouns have the Vowel-Nasal VN cluster in the prefix position. These are exemplified in examples (8a-g). One fact that becomes apparent from examples (8a-g) is that all the seven oral vowels of Igasi can co-occur with following nasals in this position.

- (8) VN-CV nouns
 - a. ēñfī "soil/earth"
 - b. ɔñgò "stick"
 - c. ēñtē "guinea fowl"
 - d. āñgà "crab"

- e. òñdù "load"
- f. ūñdō "work"
- g. ìñtō "cherry"

A point to note from the outlined structures is that, contrary to the view strongly held by Hyman (1972) and Williamson (1973:120), VN is not limited to a position before stops; it also freely occurs before fricatives in Igasi (8a; 9a-c).

- (9) VN clusters before fricatives
 - a. ēñfē "joke"
 - b. úñsō "good"
 - c. ùñsē "music/song"

The question of whether the nasal in a word-initial VN sequence is syllabic or not needs to be attended to. It is taken as non-syllabic because there is no evidence that it is capable of bearing a tone of its own. By this is meant that the nasal cannot bear a tone that is different from that of the preceding V; its tone is always the same with that on the V in every item available for this research. This suggests that it actually lacks tone, but being a sonorant, it assimilates the tonal feature of the adjacent V once they are co-articulated. This is different from the syllabic nasal in some other environments in the language. In /ɔñsō "drumming" for instance, we see the ŋ bearing a different tone from the preceding V (See also examples 6a-b; 7a). Also, whereas the ŋ in /ɔñsō "drumming" and examples (6a-b; 7a) is in a different syllable from the preceding V, that in (8a-g; 9a-c) is in the same syllable with the preceding V and as such it is the vowel which is the most sonorous element as well as peak of the syllable that takes the tone.

Nasalisation in Igasi

Nasalised vowels are generally of two types: those that are predictable from their phonetic environments and those that are not (Rolle 2013:227). While (1a-e) contain nasalised vowels that are not predictable from their phonetic environments, we show in (10a-e) that with the exemption of the close-mid vowels /e/ and /o/, vowels in Igasi can also be contextually nasalised.

- (10) Phonetic nasalisation of vowels after nasal consonants
 - a. ìñgīdžē "nickname"
 - b. ìñī "faeces"
 - c. ìmñ "palm wine"
 - d. ñādzē "dubious"
 - e. ñē "sweet"

More on Nouns with Initial VN Sequence

A pattern of alternation is observable among the nouns having initial VN sequence, especially where vowels /i/ and /u/ are involved. Available data show alternation between the more basic VN, a lone N which is syllabic, and a nasalised vowel \tilde{V} (11a-g).

(11) VN~N~ \tilde{V} alternation in Igasi

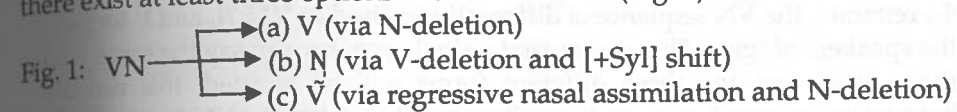
- a. $\text{ĩṅgā} \sim \text{ṅgā} \sim \text{ĩgā}$ "basket"
- b. $\text{íṅgà} \sim \text{ṅgà} \sim \text{ĩgà}$ "nail"
- c. $\text{ìṅtò} \sim \text{ṅtò} \sim \text{ĩtò}$ "cherry"
- d. $\text{ùṅsē} \sim \text{ṅsē} \sim \text{ũsē}$ "song"
- e. $\text{úńtí} \sim \text{ńtí} \sim \text{ũtí}$ "king"
- f. $\text{ũṁmwānhè} \sim \text{ṁmwānhè} \sim \text{ũwānhè}$ "chick"

Going by the high number of nouns having the VN sequence as prefixes in Igasi, it can be inferred that the language indeed has this complex prefix type. It can be thought further that this sequence is being simplified when a high vowel is involved. It is then the simplified form that appears as either N or \tilde{V} . Justifying the simplification of such sound sequences is not difficult. Sound change is naturally driven by the quest for ease of articulation, which, in this case, is an obvious motivation. A second justification can be drawn from the structures found in the neighbouring languages, especially Yoruba. Except in extremely rare examples like $\text{ĩṅkā} \sim \text{ṅkā} \sim \text{ĩkā}$ "something," one will not find this VN sequence in Yoruba nouns. Since Yoruba is the language of the immediate community (LIC) and in fact the first language of many Igasi speakers, one can safely deduce that the simplification is partly a result of their exposure to Yoruba having simpler structures.

In that case, it can be said that as Igasi simplifies this complex sequence in the noun prefix position, it is developing nasalised vowels in its place. But the implication of this is that Igasi is developing word-initial nasalised vowels, an idea that is wildly divergent from what is obtained in the literature. The bulk of the discussion on nasalised vowels has revolved around the word-final position being the environment for the process, although reference is frequently made to the syllable-final position being the specific environment (Hyman 1972; Atoyebi 2009). Specifically, it appears to be the general assumption that nasalised vowels cannot occur in word-initial position (Atoyebi, 2009:132). This might have been informed by the fact that syllable-initial consonant-clusters are marked (Hyman 1972:194)². Consequently, since nasalised vowels must necessarily derive from NV

clusters (in whatever order), they are not expected in the syllable-initial position.

How then is this VN simplification accomplished? To start with, there exist at least three options in this resolution (Fig. 1)



Apparently, Igasi does not choose option (a), although it may appear to be the easiest to accomplish. There are instances of option (b) whereby the V is elided and the N becomes the syllable peak. Option (c) involving regressive nasal assimilation followed by nasal deletion is also attested and is indeed the most common in normal, unguarded speech. This suggests that, irrespective of complexity, option (c) is the preferred direction for VN cluster resolution in Igasi.

It should also be noted that in many instances, it is difficult to tell whether what is perceived as N is not even a nasalised vowel. In trying to tell between these, one needs to observe whether the front-back dichotomy between the high vowels is perceptually reflected in what is perceived to be a syllabic nasal. The hypothesis here is that if the front-back dichotomy is indicated, then we are dealing with nasalised vowels, even if it is not clearly perceived so. It could also be checked whether there is indication of lip rounding where the vowel [u] is involved. Again, the presence of such an indication of lip rounding would be proof that the sound is a nasalised vowel, not a nasal consonant. A preliminary experiment testing these two hypotheses was conducted and the results show that both front-back dichotomy and indications of lip-rounding can be observed in the supposed instances of syllabic nasals. This suggests that even where it appears that a syllabic nasal is perceived, the sound is itself a form of nasalised vowel. We hope to carry out a more systematic experiment to be able to make a categorical statement on this.

Hombert (1986:360) claims that the commonest diachronic source of nasalised vowels is regressive assimilation whereby an oral vowel gets nasalised by a following nasal consonant before the nasal consonant gets deleted. This is consistent with the facts of Igasi, except that it is restricted to only the high vowels, and it occurs in word-initial position.

A possible support for VN as source of nasalised vowels is the fact that most languages having phonetic nasalisation of vowels after nasal consonants still keep the nasal consonants synchronically. It is often when a vowel is regressively nasalised by a following nasal consonant that the nasal consonant gets deleted, yielding what is synchronically regarded as

²We must point out that exemptions to this exist. Hombert (1986), for instance, reports that nasalized vowels are found in noun prefix position in Ibalí, a Bantu language.

contrastive nasalised vowels. This, at least, explains the facts of the evolving nasalised vowels in Igasi.

Alternations

To reiterate, the VN sequence is differently realised as VN, *ŋ*, and *Ṽ* forms by the speakers of Igasi. This means that a single speaker can say the same word three times and the three different forms will be attested; this can also happen across speakers such that where speaker A has the VN form, speaker B has the *ŋ*, and speaker C has the *Ṽ* form for the same word in the same context. More specifically, the *ŋ* or *Ṽ* are more frequently used in normal speech, but speakers switch to the VN form once they are required to repeat themselves, say, for the purpose of clarity. Salffner (2013:321) also makes a similar observation about nasalisation in Ikaan. In two repetitions of [àjĩ + à:dʒ] "my teeth" the speaker first gives [àjĩm à:dʒ], and [àjĩ:dʒ]. The singular form was rendered [òjĩ ɔ:dʒ] with no [m] insertion and no hiatus resolution as seen in the first two forms. Salffner then hints that "it is possible that the three patterns indicate a change in the language. Maybe a word such as "tooth"... is in the process of losing the final /m/." While Salffner refrained from making any categorical statement on the matter, we note that this observed change mirrors our observation for Igasi.

Further, the Igasi data on alternation presented so far largely form a replica of Hombert's (1986:364) data, and if Hombert's submission is to be followed, this alternation between the form with the nasal consonants and those without it in Igasi is clear evidence that the nasalisation process is still in progress.

A look at the nature of this sequence in Uro, another speech form of North-western Akoko that is mutually intelligible with Igasi confirms that the simplification process is not limited to only Igasi (Table 2). The Uro data in Table 2 are taken from Adewusi (2008). Although Adewusi transcribes the nasals as syllabic in many VN instances, this is doubtful because throughout her work, the nasals never bore tones different from the preceding vowels. That aside, her data also presents a blend of the three forms attested in Igasi: VN, *ŋ*, and *Ṽ*. It is informative that out of 21 items involving high vowels in the data, seven contain initial nasalised vowels. Since there is no field note on possible alternations, one can only take the present facts of Uro as support for the observed change in Igasi. Another work presenting comparative data on Igasi and eight other related speech forms of North-west Akoko is Olaogun (2016). But Olaogun's data on the languages are written orthographically, hence one is not able to tell whether 'in' and 'un' sequences are either nasalised vowels or vowel-nasal sequences. The work however

reveals very plainly that the different speech forms are actively simplifying the sequence using different methods³.

Table 2: Comparative data on alternations

s/n	Gloss	Igasi	Uro
1	Basket	ɪgā	íhǵá
2	Calabash	ɪŋkū	ɪŋkú
3	Charcoal	ínsì	ínsī
4	Child	ūwà	ǵmṵwā
5	Cock	ūwāēhē	ǵkwēhē
6	Cold	ñtū	ñtù
7	Day	ɪŋgē	íhǵē
8	Five	ɪtò	ñtò
9	Hair	ñfĩ	ɪsĩ
10	Husband	ñwā	ūrō
11	Iron	ērē	ūrē
12	King	ñtì	ūfĩ
13	Knife	ūfwē	ūfwē
14	Leopard	ūkù	ūkù
15	Navel	ñmkpɔ	íhmkpɔ
16	Neck	ūtʃē	ūtʃē
17	Nine	ɪgà	índà
18	Okra	ɪŋgù	ɪŋgù
19	Penis	ìndù	ìndù
20	River	ūsē	ñsē
21	Song	ùñsē/ñsē	ñsē

Conclusion

This article has reported that the Igasi vowel system is currently undergoing a process of change by which word-initial nasalised vowels are being developed. This change in progress affects only the high vowels /i/ and /u/ when they combine with nasal consonants at the initial position. Discussion on the evolution of nasalised vowels in Kwa languages has centred on word-final position. The discovery of a language in which word-initial nasalised vowels are attested therefore adds to Salffner's (2013) view that "research on nasal vowels in particular is only just beginning." This work is therefore a contribution to the findings along this line and it is hoped that further research works will be conducted to track the progress of the change in Igasi as well as uncover other processes in hitherto under-investigated African languages.

³Interested readers can see chapter 1 of Olaogun (2016) for the said comparative data.

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The Syllable Structure of Ikwere

Roseline Ihuoma C. Alerechi

Abstract

Sounds are combined in different ways in languages of the world to form different pronounceable units known as the syllable. While some of these pronounceable units are simple and clear, others are complex and ambiguous. Using a descriptive approach, the paper analyzes the syllable structure of Ikwere, an Igboid language of the West Benue-Congo family of the Niger-Congo phylum. Previous studies observe that Ikwere operates an open vowel system like most African languages particularly the Igboid related group, but the present work observes evidence of the CVC structure in the language and notes that it could be interpreted either as a CVN or CVC. It specifically states that the structures V, N, CV and CGV are the syllable types attested in Ikwere. Thus the paper observes that the language has both univalent (clear) and ambivalent (ambiguous) syllable structures and further provides interpretations to the actual phonemic status of the various ambiguous structures. It is expected that this paper will be relevant in stating generalizations about the distribution of allophonic features in the language.

Key words: Syllable structure, univalent syllable, ambivalent syllable, syllabic nasal, vowel sequences

1. Introduction

The Ikwere language is an Igboid language of the West Benue-Congo family of the Niger-Congo phylum (Williamson 1988, Williamson and Blench 2000). It is related to Etchie, Ekpeye, Ogbia spoken in Rivers state of Nigeria and Igbo spoken in Abia, Anambra, Ebonyi, Enugu, Imo, etc. states of Nigeria. Ikwere consists of twenty-four dialects spoken by the twenty-four communities located in four (Ikwerre, Emohua, ObioAkpok and part of Port Harcourt Local Governments Areas (LGAs)) out of the twenty-three LGAs of Rivers State, Nigeria. The twenty-four dialects whose names coincide with the names of the communities are Rumuekpne (Rmnp), Rundele (Rndl), Odeegnu (Odgn), Emowha (Emwh), Ogbakiri (Ogkr), Akpo, Obio, Alu, Igwuruta (Igwr), Omagwina (Omgw), Isiokpo (Iskp), Ibaa /Obeelee (Ib/ob), Ipo, Ozuaha (Ozha), Omuanwa (Omnw), Ubima (Ubma), Akpnabu (Akpb), Egbedna (Egbd), Omadeeme (Omdm), Elelee (Elle), Omudiogna (Omdg), Ubimini (Ubmni), Omerelu (Omrl), and Apnani (Apni).

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There are previous works on the syllable structure of Ikwere. Some of them are Worukwo (1983), Azunda (1987) and Alerechi (1987, 2007). In discussing the verbal system of the Ogbakiri dialect of Ikwere, Worukwo

(1983) outlines the phonological system of the dialect in the introductory part of the study. Among other things, he identifies V, CV and N as the syllable types of the language based on the Ogbakiri dialect. He also notes that a tone mark is usually placed on the peak (vowel or syllabic nasal) of every syllable in the language.

Similarly, in course of contrasting the affirmative and negative features of sentences in Ikwere based on the Igwuruta dialect and the English language, Azunda (1987:xiv) observes the V, CV and N syllable types in the language. She also notes that the vowel and the syllabic nasal are marked with a tone.

In the same vein, Alerechi (1987:x), carried out a contrastive study of sentence types in the Omuanwa dialect of Ikwere and English, with a view to identifying areas where errors are likely to occur and how to guard against them. In the introduction, she outlined the phonological system of the dialect and confirmed the syllable structure of Ikwere as comprising the V, CV and N, with a tone mark placed on every syllable peak of a word. Note that these works merely outlined the syllable structure of the language with no detailed analysis on the subject.

In a dialect survey of the phonological features of twenty-four dialects of Ikwere, Alerechi (2007) gives a more detailed analysis of the syllable structure of the language. Thus in addition to recognizing the V, CV and N syllable types, Alerechi (2007:106-110) identifies the CGV (Consonant-Glide-Vowel) structure in the language. She further identifies the affricates [tʃdʒ] and labialized consonants [kʷgʷhʷŋʷ] as doubtful sequences and recognizes them as single unit of sounds in Ikwere. The work demonstrates a more detailed analysis than Worukwo (1983), Azunda (1987) and Alerechi (1987) and it is not surprising as the focus of Alerechi (2007) is on phonology.

General observation from previous studies reveals that Ikwere does not record consonant or vowel cluster. However, certain words comprising ambivalent (ambiguous) segments or sequences in the language present structures that show otherwise. It is, therefore, part of the focus of this paper to give interpretations to such cases. Thus the present study does not only recognize the V, CV, N, CGV as syllable types in Ikwere, but also examines the syllable structure of nouns and verbs as representative samples of the structure of other word classes in the language; identifies evidence of CVC structure type, and *ai* sequence in Ikwere and gives a fairly comprehensive interpretation of the phonemic status of ambivalent cases in the language.

To accomplish the foregoing, the paper employs a descriptive approach, which is an approach that accounts for the primary linguistic data in such a way that agrees with the intuition of the native speakers of the

language (Alerechi and Kari 2018: 81). Descriptive linguistics studies language in terms of their internal structures with the fundamental concept that language is patterned (Gleason 1961: iii, Finch 2000: 8). Thus this study aims at giving a fairly comprehensive description of the syllable structure of Ikwere. It also uses trees to demonstrate a visual representation of a network of hierarchical relations of the syllable and the sounds of the language (Roca and Johnson 1999:238).

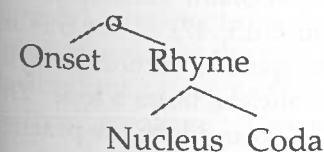
2. Literature Review

The section reviews generally the concept of syllable structure. It briefly examines the syllable structure of English, Ibibio and the related Igbo language such as Igbo, well as why it is important to study the syllable structure of a language

2.1 The Syllable

The syllable is the smallest pronounceable unit of an utterance. It is defined as 'a unit of pronunciation typically larger than a single sound and smaller than a word' (Crystal 1997, 373). This definition fails to recognize the fact that there are syllables that can stand as a word. Phonetically, syllables are described as consisting of a centre, which has little or no obstruction to the airflow and which sounds comparatively loud; before and after this centre, there will be greater obstruction to airflow and/or less loud sound (Roach 1997:67). Considering the syllable from a phonological perspective, it is a constituent consisting of the segments surrounding a vowel or vowel-like sound and it imposes organization on segments. In this sense, a syllable is known as a suprasegmental unit (Fromkin 2000, 587, O'Grady, Archibald and Katamba 2011, 78). In other words, a syllable comprises a sonorous element and its associated non-syllabic (less sonorous) segments (O'Grady, Archibald and Katamba 2011, 78). While the vowels, glides, liquids and nasals are sonorant sounds, the obstruents (stops, fricatives, and affricates) are not. Of the sonorous sounds, the vowels are the most sonorous, while the glides, liquids and nasals are correspondingly less sonorous. Internally, the syllable is divided into onset and a rhyme. The rhyme, in turn, is classified into the nucleus or the peak and a coda. See schema (1):

Schema 1:



The onset is frequently optional, but always a preferred member of the syllable. The coda is never obligatory: all languages possess syllables lacking codas (open syllables) in addition to possibly syllables with codas

(closed syllables) (Fromkin 2000, 589). This means that different languages have different syllable structure types with some similarities. English, for instance, records the following syllable structure types as drawn from (Roach 1997, 67):

- i. Single vowels (V) in isolation as in [a:] 'are', [ɔ:] 'or'
- ii. CV as in ba: 'bar', ki: 'key'
- iii. VC as in æm 'am', ɔ:t 'ought'
- iv. CVC as in rʌn 'run', sæt 'sat'

The foregoing examples in English constitute what is called monosyllable or monosyllabic words. They demonstrate that onset or coda may be optional in English, while the nucleus is obligatory. Other monosyllabic words in English constitute either complex onsets or codas. Examples are:

- | | | |
|-------------------|---------------|---------------|
| v. CCV as in | pleɪ 'play' | sta: 'star' |
| vi. CCCV as in | stru: 'strew' | skru: 'screw' |
| vii. CCVC as in | spɪn 'spin' | stɪk 'stick' |
| viii. CCVCC as in | stɒps 'stops' | bægz 'bags' |

These examples show that consonant clusters may occur in initial or final position of some words in English.

There are works on the syllable structure of Nigerian languages. A typical example is Urua (2000). In her treatment of the phonetic and phonological features of the Ibibio language, Urua (2000: 64) observes that Ibibio records V, N, CV and CVC syllable types. The nucleus of an Ibibio syllable may be a single short vowel (simple nucleus) or a long vowel (VV-branching nucleus) (Urua 2007, 64). There are no complex onsets or codas phonologically, but complex onsets may be realized phonetically (Urua 2007, 64).

In a related Igbo language such as Igbo, Emenanjo (2015:47) states that the syllable structure of a traditional monolingual native Igbo speaker constitutes: the vowels and syllabic nasal as the tone bearing units; the structure of the syllable as either Vowel (V) or Consonant-Vowel (CV); the syllable is open, and there are no consonant clusters in initial and final positions in most idiolects (Emenanjo 2015, 47). What this means is that a traditional monolingual native Igbo speaker records a syllable structure types of V or N and CV in which the nucleus bears a tone. Thus the syllable structure types observed in English, Ibibio and Igbo are practical examples of the fact that different languages have different syllable structure types though there may be areas of similarities.

2.2 Why Study the Syllable Structure of a Language?

The syllable is considered as a basic unit in phonological analysis. One of the reasons the syllable is treated as a unit of phonological structure is that it is a major ingredient of phonological generalizations used to demarcate morpheme edges and define the position and shape of affixes (Kager 1999, 91). It is relevant to stating generalizations about the distribution of allophonic features (O'Grady, Archibald and Katamba 2011, 85). The distribution of the aspirated voiceless stops and their unaspirated counterparts in English is a typical example. O'Grady, Archibald and Katamba (2011: 85) observe that while aspiration can be stated generally by referring to stress and syllable structure, unaspiration is stated with reference to the subsyllabic onset and coda units. Whereas the aspirated stops occur syllable initially in a stressed syllable, the unaspirated stops occur in a syllable onset preceded by 's' and in a coda as in [pʰi:k] 'peak', [spi:k] 'speak' and [kʰi:p] 'keep'. Thus it can be stated generally that English voiceless stops are aspirated if they occur in initial position in a stressed syllable. The foregoing implies that the syllable is important in stating phonological processes in a language. In the same vein, phonological rules which are the formal versions of phonological processes are made more simple and explicit if they refer to the syllable (Kenstowicz 1994, 250).

The importance of the syllable also lies in the fact that it is a unit of organization for a sequence of speech sounds; the heart of phonological representations upon which phonological system are organized (Katamba 1989). The syllable provides an anchor on which a number of segmental and suprasegmental phenomena hinge (Urua 2007, 63). Thus it is important to explore the syllable structure of a language in order to determine among other things the occurrence of segments in particular syllable position.

3. Methodology

The data used for the analysis of the syllable structure of Ikwere was drawn from the wordlist comprising over five hundred words collected by (Alerechi 2007) in a dialect survey of Ikwere. The Ikwere language consists of twenty-four dialects and the data for this work is based mainly on the Omuanwa dialect, with reference to some other dialects. The data were collected from 7 (5 male and 2 female) competent native speakers of Ikwere who fall within the age range of 35-50 years at the period of data collection. The data were elicited through direct interview, participant attentiveness and conversations with some native speakers. They are represented with phonetic representation. The data are analyzed using a descriptive approach; an approach that accounts for the primary linguistic data based on the native speakers' intuition of the language.

4. Phonological Structure of Ikwere Words

The syllable structure refers to the manner in which a vowel and consonant(s) may come together to form a syllable or a word (Oşisanwo 2012:96). Words are structured in such a way that the number of syllables in a word may range from one to more than four syllables, that is, from monosyllabic through disyllabic and trisyllabic to polysyllabic. Ikwere words comprise different word classes such as nouns, pronouns, verbs, adjectives, adverbs, conjunction, etc., but the nouns and the verbs are in the majority. However, this study examines the structure of Ikwere nouns and verbs for economy of presentation because they represent the syllable structure types of other word classes in the language.

4.1 The Nouns

The nouns in Ikwere consist of monosyllables, disyllables, trisyllables and polysyllables. While the disyllabic and the trisyllabic nouns are in the majority followed by the polysyllabic ones, the monosyllabic nouns are in the minority. Examples of different structure of nouns in Ikwere are treated in subsections 4.1.1 – 4.1.4.

4.1.1 Monosyllable Nouns

The Ikwere language rarely records monosyllabic nouns. So far, two nouns consisting of one syllable (monosyllabic) are attested in the language. They exhibit CV structure pattern and are marked with a high (H) tone. Examples are given in (1a)– (1b):

- 1a) dʒi 'yam'
b) ne 'person'

4.1.2 Disyllable Nouns

The majority of Ikwere nouns comprise two syllables known as disyllabic words. They exhibit the structures; CVCV, NCV, VCV, VCVC, CVCGV and VCGV. Examples are shown in the following:

CVCV Nouns

- 2a) mɔ́nɔ́ 'oil'
b) mádũ 'human being'
c) míɓní 'water'

The examples in (2) illustrate that the C of the initial syllables of the CVCV structure is always a nasal. The tone pattern of the examples reveal a high fall (HF), high low (HL) and high down stepped high (H↓H).

NCV Nouns

- | | | | |
|-----------|----------------|---------|------------------|
| 3a) míɓmá | 'beauty' | e) ɓɔɓɔ | 'darkness' |
| b) ɓɔɓɔ | 'husband' | f) ɓɔwɔ | 'palm wine tree' |
| c) ɓkɔ | 'sharpness' | g) ɓhɛ | 'thing' |
| d) ɓɔɓɔ | 'grass cutter' | | |

The examples in (3) demonstrate that the syllabic nasal of the NCV structure agrees in the same place of articulation with the following consonant. The examples further show such tone patterns as high down stepped high (H↓H), low high (LH), high high (HH), low low (LL), low fall (LF), high low (HL) and high fall (HF). It is observed that these tone patterns reflect the number of tone patterns of nouns in the dialect.

VCV Nouns

- | | | | |
|---------|-----------|---------|-----------------|
| 4a) ɔbɛ | 'pear' | e) áhwɔ | 'belly/stomach' |
| b) éɛ | 'cocoyam' | f) ɔl-ɪ | 'land/floor' |
| c) ɔɔ | 'head' | g) ɔrɔ | 'house' |
| d) ázɔ | 'back' | | |

The examples in (4) show that the nouns comprising the VCV structure also reflect seven tone patterns as in the NCV nouns. It should be noted that Ikwere has eight noun tone classes, however, the number of the tone classes for each dialect, ranges from four to eight (Yul-Ifode and Alerechi 2016:7).

VCVC Nouns

- | | |
|----------|----------------|
| 5a) idim | 'cocoyam meal' |
| b) ɔnim | 'tortoise' |

The examples in (5a-b) reflect a LL tone pattern of the VCVC nouns. The examples also demonstrate that the coda is the bilabial nasal [m]. Thus whenever a coda occurs in any syllable, it is usually the bilabial nasal. The examples demonstrate that the structure of VCVC is rare in the language.

CVCGV Nouns

- 6) díɓjǎ 'doctor'

Unlike in example (2) where the C of the initial CV syllable is [m], example (6) shows that it is the voiced alveolar plosive [d]. The CVCGV structure also is rare. Note that CGV syllable is always the final syllable whenever it is a constituent structure of a noun.

VCGV Nouns

- 7a) áhjá 'market'
 b) óhjá 'bush'
 c) úhjá 'red'
 d) úhjà 'craftiness'
 e) áswá 'saliva'
 f) ízwě 'gossip'

Notice that the C of the VCGV structure is either the glottal fricative [h] followed by the palatal (approximant) glide [j] or the voiced and voiceless alveolar fricatives [s] and [z] followed by the glide [w]. The examples also show that the VCGV nouns exhibit a high high (HH) and a high low (HL) tone patterns.

4.1.3 Trisyllable Nouns

The trisyllabic nouns (i.e., nouns comprising three syllables) are also many in the language. They exhibit such structures as NCVCV, VCVCV, CVNCV, VCVCV and CVCVCV. Examples are given in the following:

NCVCV nouns

- 8a) ntítà 'mosquito' d) ñgàdā 'chair'
 b) ñkí 'tá 'dog' e) ñwñwě 'wife'
 c) mǐpúró 'fruit'

The examples show that both identical and non-identical tones can combine to form tone patterns such as LLL, LH↓H, LHH, LLH, HLL in Ikwere.

VCVCV Nouns

- 9a) ábòrò 'calabash' c) éhǐgwě 'axe'
 b) éruurí 'soldier ant' d) òtító 'witness'

The examples in (9) demonstrate that the VCVCV nouns exhibit LLL, HLH, HLL and LHH tone patterns.

CVNCV Nouns

- 10) sām̃bì 'key'

Example (10) shows a HLL tone pattern and that the CVNCV noun is rare in the language.

VCVCV Nouns

- 11a) èsúswé 'boil'
 b) áhí hǎ 'omen'

The VCVCV nouns are few in number and the examples exhibit a LHH and HHH tone pattern.

CVCVCV Nouns

- 12) ñigidim 'the sound of a falling object'

The CVCVCV nouns are also rare and the example shows a LLL tone pattern. This may be represented in schema (2) to give a picture of the structure of a three-syllable noun.

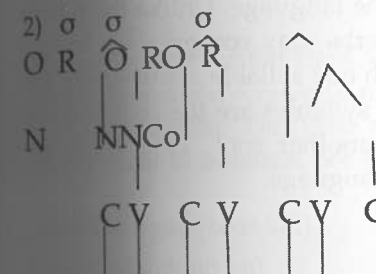


fig id im 'the sound of a falling object'

4.1.4 Polysyllabic Nouns

Polysyllabic Nouns are nouns containing more than three syllables. They are few in the language. Most of them comprise four syllables, while very few consist of five syllables. Those of four syllables exhibit the structures CVCVCVCV and VCVCVCV, while the five syllable ones show NCVCVCVCV structure. Consider the following examples in (13):

CVCVCVCV Nouns

- 13a) hwúruhwéré 'wind'
 b) ðákárará 'all'

The examples in (13) reflect a HHLH and a HHHH tone pattern. The nouns are reduplicative in nature.

VCVCVCV Nouns

- 14a) òtítííí 'darkness (night)'
 b) ígwérégwú 'play'
 c) úgwúígwú 'dew'
 d) òbòkóró 'reception hall'
 e) òvívívá 'apricot'

The examples in (14) show different types of tonal patterns such as LHHH, HLHF, HHHH, LLHH, and LHLH. There is also some sort of reduplication of some part of the word.

NCVCVCVCV Nouns

15) m̄bīnībīnī 'cane'

The tone pattern of the five syllable noun identified in the language is LLLHL. A close look at the word further shows reduplication, implying that most of the polysyllabic nouns are derived through reduplication.

4.2 The verbs

The verbs are structured in different ways in the language. Unlike the nouns that may consist of up to five syllables, the verbs may comprise up to two syllables. While the constituent of the ones with one syllable are basically the root, the constituents of those comprising two syllables are the root and -rV assertive/extensional suffix, or the root and another root. Thus there are monosyllabic verbs and disyllabic verbs in the language.

4.2.1 Monosyllabic verbs

The verb roots in Ikwere reflect two different structures in the imperative form. They are CV and CGV.

CV Verbs

The CV verbs exhibit tone patterns such as H, L and R in the language. Examples are given in (16):

16ai) rī	'eat'	bi) vò	'comb'	c) lě	'look'
ii) gũ	'sing'	ii) su	'pound'		
iii) sũ	'wash'	iii) h̄wũ	'blow'		
iv) ré	'sell'	iv) zà	'sweep'		

While the examples in (13ai-iv) show verbs that bear a high tone and (13bi-iv) demonstrate those that are marked with a low tone, the example in (13c) reflects a rising tone pattern. Note that the verbs that bear a low tone are more in the language, followed by those that take a high tone but the dialect has only one example of the verb that carries a rising tone. However, a good number of verbs that bear a rising tone are attested in some other dialects of Ikwere.

CGV Verbs

The verbs that manifest CGV structure in Ikwere are few in number. The CGV structure verbs exhibit a high (H) and a low (L) tone as demonstrated in (17a) and (17b), respectively.

17ai) h̄jā	'bathe'/'stone'	bi) p̄j̄	'sharpen'
ii) p̄jā	'flog'	ii) b̄jā	'come'
iii) swé	'grow'	iii) zwè	'rain(V)'

The examples in (17) show that the C of the CGV syllable type of verbs is either the glottal fricative [h], the voiced and voiceless alveolar fricatives or the voiced and voiceless bilabial plosives. Notice also that the CGV structure can be the only constituent of a verb unlike in nouns where it always follows another syllable.

4.2.2 Disyllabic Verbs

Disyllabic verbs exhibit CVCV and CVCVG structures.

CVCV Verbs

The verbs that exhibit the CVCV structure are complex and may consist of two independent roots or a root and the -rV assertive suffix, or a root and a verbal extension. The verb roots that combined with the assertive suffix rarely occur in isolation. See examples in (18):

18ai) kwũ-gbú (beat kill)	'beat'	bi)gwè-ré	'take'
ii) rī-d̄je (climb go)	'climb up'	ii) vù-rú	'carry'
iii) t̄jè-hwú (think loss)	'forget'	iii) rī-rī	'drink (liquid)'
ci) bā-jā	'enter towards the speaker'		
ii) zà-má	'sweep clean'		
iii) t̄r-r̄	'converse with interest'		

The examples in (18a) show a complex root comprising two roots, while those in (18b) and (18c) respectively demonstrate the verb consisting of the assertive suffix and extensional suffixes. From the examples, it is observed that the verbs exhibit such tone patterns as LH, HH and LF.

CVCVG Verb

19) lā-h̄jé 'return'

Example (19) seems to be the only case that is attested in the language and it has a low fall (LF) tone pattern.

4.3 Ikwere Syllable Structure

Considering the phonological structure of words in Ikwere, the syllable structure of Ikwere comprises the onset, which is optional, and the nucleus or peak, which is obligatory and occasionally a coda. It reveals the presence of the syllable types: V, N, CV, CVC and CGV in the language. They may be classified as simple (V, CV) and complex (N, CGV, CVC) syllable structures in the language. The simple ones are the clear univalent ones that are not doubtful, while the complex ones are those that are ambiguous and subject to

more than one interpretation. Thus the syllable structure of Ikwere may be classified as either univalent (clear) or ambivalent (doubtful) syllables.

4.3.1 Univalent Syllable Structure

Earlier works like (Worukwo1983, Azunda1987 and Alerechi 1987, 2007) recognize the V and CV as the basic univalent syllable structure types in Ikwere. The peak of every syllable in Ikwere bears a tone. Thus tone is the determinant factor for identifying a syllable in the language.

4.3.1.1 The V syllable

The V syllable type, which is also attested in Igbo and (Emenanjo 2015, 47) can stand as a word in Ikwere. This is typical with the second person singular pronoun /i/ and the third person singular pronoun /o/. See example in schema (3):

- 3) $\begin{array}{c} \sigma \\ \text{R} \\ | \\ \text{N} \\ | \\ \text{V} \\ | \\ \text{O} \end{array}$ '3rd person singular pronoun'

Examples (20) – (23) show the occurrence of the V syllable type in a sentence.

- 20) I riède
2SG eat cocoyam 'You ate cocoyam'
- 21) ilàórò
2SG go home 'You went home'
- 22) ò riède
3SG eat cocoyam 'S/He ate cocoyam'
- 23) òlaórò
3SGgo home 'S/He went home'

Examples (20) – (23) demonstrate that the minimum size of a word in the language is V. Notice also that the shape of both the second and third person singular pronoun is subject to the expanded and non-expanded feature of the vowel of the verb root. It is [i] 'second person singular' or [o] 'third person singular', if the vowel of the verb root is an expanded vowel

and [i] 'second person singular' or [o] 'third person singular', if the vowel of the verb root is non-expanded.

The V syllable type also occurs in word initial position. Note that each of the syllables is separated with a dot as demonstrated in examples (24a) – (24d):

- | | | | |
|-------------|-------------|-----------------|-------------|
| 24a) 'king' | b) 'in-law' | c) 'lightening' | d) 'broom' |
| /é.zè/ | /ɔʋ.gɔʌ/ | /à.mù.mà/ | /ɔ̃. zɪ.zà/ |
| V.CV | V.CVV. | CV.CV | V.CV.CV |

The V syllable type can be attached to the verb root in morpheme final position. This is evident with the allomorphs $\text{-}\dot{\text{e}}, \text{-}\dot{\text{a}}, \text{-}\dot{\text{o}}, \text{-}\dot{\text{ɔ}}$ used to mark negation in the language as in (25):

- 25a) ò rì dʒì
3SG eat yam 'S/He ate the yam'
- b) ò rì-è dʒì
3SG eat-NEGYam 'S/He does not eat yam'
- c) rì-è
CV-V 'Does not eat'

The examples in (24) demonstrate that the V syllable type can occur in word initial position, while (25b-c) show its occurrence in morpheme final position with the negative marker. From examples (20) – (25), it is observed that Ikwere has both the V syllable type and V word type.

4.3.1.2 The CV Syllable

Ikwere also records CV, the preferred syllable type in most languages of the world. It consists of a consonant and a vowel. Just as Emenanjo (1978:2) observes in Igbo, the slot of V in a CV structure is always a vowel and not syllabic nasal even though it is a tone bearing unit. The examples in (24) demonstrate that the CV structure occurs after a V syllable type and can also be followed by either a word boundary or another CV type.

In addition to the preceding examples in (24), the CV syllable can also occur alone as a word. In fact, the majority of the verb roots in the language are of the CV syllable type as shown in the examples in (26) and (27) in Omnw and Akpo, respectively:

26a) 'loose' b) 'draw (ear)' c) 'scratch' d) 'deny' e) 'sell'

Omnw /tò/ /dò/ /kò/ /gò/ /re/

CV CV CV CV CV

27a) 'loose' b) 'draw (ear)' c) 'scratch' d) 'deny'

Akpo /tǝ/ /dǝ/ /kǝ/ /gǝ/

CV CV CV CV

Notice that in the Akpo dialect of Ikwere as exemplified in (27a), (27b) and (27d), some short vowels carry a gliding tone, which makes them doubtful or suspicious in the language. They may be interpreted as long vowels, but as correctly pointed out in the Ikwere orthography (Donwa-Ifode and Ekwulo 1989), there is no phonemic long vowel in the language.

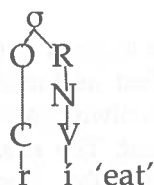
The CV syllable type rarely occurs in isolation as nouns. The only examples found in the language are the words that mean 'yam' and the lexical item 'person' used to mark singular human nouns in examples in (1) renamed here as (28):

28a) dǝí 'yam'

bi) né 'person' bii) nea rǝ 'a worker'

Note that [dǝ] in example (28a), is a doubtful segment as it is subject to more than one interpretation. The status of [dǝ], is however, discussed later in this paper under doubtful sequences. The schema in (4) illustrates the structure of the CV syllable type.

4)



4.3.2 Ambivalent Syllable Structure

In addition to the preceding examples of V and CV syllable types; there are some cases, which can be interpreted in the language as V or CV as well as doubtful sequences that may be interpreted in different ways. They include Consonant-Vowel-Consonant (CVC) structure, Consonant-Glide-Vowel (CGV) structure, syllabic nasal (N) and sequences of two consonants or vowels in the language. They are treated in the sub-sections that follow.

4.3.2.1 Consonant-Vowel-Consonant (CVC) Syllable

Ikwere does not record any word with the univalent CVC structure. The CVC syllable is rare in the language and it always occurs in word final position. The coda is usually the bilabial nasal [m]. Some of the examples in (5) and (12) are renamed here as (29):

29a) idim 'cocoyam meal'

b) ànim 'tortoise'

c) ògǝdim 'the sound of a falling object'

d) ákām 'thatches'

The CVC syllable is an ambivalent case in the sense that what seems to be a CVC syllable type may sometimes be realized as a CVN (i.e., the [m] bears a tone mark, which makes it a syllabic nasal). An investigation into the dialects of Ikwere reveals, for examples, that *ahǝm* 'sun' in the Omuanwa dialect is realized as *ahǝvǝn* in the Rumuekpne (Rmkp), Rundle (Rndl) and Odeegnu (Odgn) dialects of Ikwere and, *ákām* 'thatches' in Omuanwa is pronounced as *òkǝí* 'thatches' in Rmkp, Rndl and Akpo. Note that due to dialectal variation, the initial a- in *ákām* 'thatches' in Omuanwa alternates with ɔ- in *òkǝí* 'thatches' in initial position in Rmkp, Rndl and Akpo. Postulating the Rmkp, Rndl, Odgn and Akpo forms as the original, the word for 'sun' demonstrates a loss of the final vowel and the sonority of the voiced labiodental fricative [v] to a bilabial nasal [m]. Thus the tone on the final vowel survives and relinks to the bilabial nasal making it syllabic. Conversely, *ákām* 'thatches', a disyllabic word of V.CVC structure in Omuanwa is realized as *òkǝí* 'thatches', a trisyllabic word of V.CV.V in Rumuekpne, Rundle and Akpo. Unlike in the word for 'sun' where the tone survives, it is lost in the word for 'thatches'. See the interpretation of *ar* sequence in 4.3.2.4.3. The different scenario makes it difficult to determine whether the nasal [m] is syllabic or a consonant. There is therefore need for further investigation.

4.3.2.2 Consonant-Glide-Vowel (CGV) syllable

The language also has evidence of Consonant-Glide-Vowel (CGV) syllable as demonstrated in the phonological structure of Ikwere nouns and verbs. Orthographically, the CGV structure is written as CVV but transcribed as CGV. This implies that it is subject to more than one interpretation. Examples are given in (30) – (33):

30a) 'return'

lǝ.hǝ (go return)

CV.CGV

b) 'red'

ú.hǝ

V.CGV

c) 'craftiness'

ú.hǝ

V.CGV

- 31a) 'blind(v)' b) 'come' c) 'flog' d) 'failed' e) 'stone'/'bathe' f) 'market'
 Pjá bjá pjá hjá hjá á.hjá
 CGV CGV CGV CGV CGV V.CGV
- 32a) 'sharpen' b) 'pull out'/'pursue' c) 'suck'
 pjɔ́ hjɔ́ mjɔ́
 CGV CGV CGV
- 33a) 'boil (n)' b) 'swallow' c) 'rain(v)'
 /eʌ.suʋ.ʌweʋ/ /rweʋ/ zwe
 V.CV.CGV CGV CGV

The CGV structure is an ambivalent case, which may be interpreted as CCV as phonetically represented or CVV as, for instance, mjɔ́'suck', is represented orthographically as *miq* and *rwe* as *rue* 'swallow'. If it is interpreted as CCV or CVV, it respectively means an introduction of non-existing consonant or vowel cluster in the language. Thus it cannot be interpreted as such as Ikwere has no cases of consonant and vowel clusters.

The CGV structure cannot also be analyzed as either labialized consonant and vowel or palatalized consonant and vowel. This is because CGV syllable structure can be differentiated from the labialized consonants when they are reduplicated. Examples are represented in (34):

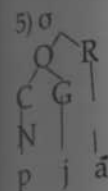
- 34a) 'coming' b) 'swallowing' c) 'talking'/'speaking' d) 'refusing'
 /ɔ́. bɪ.bjá/ /ò.rù.rwé/ /ò.kʷù.kʷú/ /ɔ́. gwù.gwá/
 V.CV.CGV V.CV.CGV V.CV.CV V.CV.CV

Examples (34a) and (34b) show that /bjá/ is realized as [bɪ], and /rwe/ as [rù], in the reduplicated form, whereas /kʷu/ and /gʷa/ are respectively realized as [kʷù] and [gʷú] in the reduplicated form. Thus, while [b] and [r] are separated from the glides [j] and [w], respectively, in (a) and (b), [k] and [g] are not separated from [w] in (c) and (d) in the reduplicated syllables.

We further demonstrate examples of contrast between the CGV syllable structures with the univalent CV syllable structure in (35):

- 35a) 'blind(v)' b) 'press (out)' c) 'swallow' d) 'dip' e) 'rain (v)' f) 'avoid'
 /Pjá/ /pɪ/ /rwè/ /rú/ /zwe/ /zè/
 CGV CV CGV CV CGV CV

This analysis shows that the CGV syllable type is phonemic in the language. Schema (5) gives a clear picture of the CGV syllable type in Ikwere.



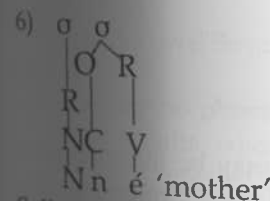
Schema (5) shows a complex onset as it comprises both a consonant (C) and a glide (G). It is noted that the CGV structure in Ikwere is attested and interpreted differently in Igbo. Thus the CGV structure in Ikwere is interpreted as CVV in Igbo as in /-bjá/ becoming [-bjá] 'come' in fast speech (Emenanjo, 2015, 50).

4.3.2.3 Syllabic Nasal (N)

A syllabic nasal is a nasal consonant, which acts as the center, or loudest part of a syllable (i.e., the peak) in the same way the vowel does (Yul-Ifode 2003, 587). A syllabic nasal functions as a vowel in Ikwere. It has a definite tone attached to it and, therefore, constitutes a syllable nucleus as vowels, giving the structure N. Thus, the V position of the syllable is filled by either a vowel or a syllabic nasal. The syllabic nasal /n/ has allophonic variants conditioned by a following consonant, which marks the onset of another syllable. Examples are demonstrated in (36) in Qmnw dialect:

- 36a) 'beauty' b) 'mother' c) 'sharpness' d) 'key'
 /mʋ.ɪmaʋ/ /nʋ.neʋ/ /ŋ.kɔ́/ /saʋ.mʌ.bi/
 N.CV N.CV N.CV CV.N.CV

Schema (6) gives a picture of the N syllable type in the language.



Syllabic nasal never occurs in final position. It is however observed that there are few exceptions, particularly words that have undergone certain phonological processes in the language. Evidence is seen in the word that means 'sun' as treated in section 4.3.2.1.

4.3.2.4 Doubtful sequences

The sequences such as the affricates and labialized segments represented with the diagraphs /tʃkʷgʷŋwɪh/ are some of the ambiguous or doubtful

sequences/segments in Ikwere because they are subject to more than one interpretation.

4.3.2.4.1 The Affricates /tʃ/ and /dʒ/

The affricates may be analyzed as:

- Allophones of stops or fricatives
- Single phonemes contrasting with stops
- A sequence of a stop and a fricative

The affricates cannot be analyzed as allophones of stops or fricatives because they contrast with stops and fricatives (i.e., their plain counterparts) in the language as shown in examples (37) – (38):

37a) 'peck' (b) 'swear' c) 'pound' d) 'buy' e) 'loose' f) 'drag' g) 'forbid' h) 'step on'
/tù/ /dù/ /sù/ /zù/ /tɔ/ /dɔ/ /sɔ/ /zɔ/

38a) 'drive (away)' b) 'ask' c) 'become ugly' d) 'seek'
/tʃù/ /dʒù/ /dʒɔ/ /tʃɔ/

Examples (37) – (38) demonstrate that the affricates contrast with their plain counterparts. They cannot also be analyzed as sequences (i.e. different units) as consonant clusters do not exist and there is no evidence of sequence of a stop and a fricative in the language. The affricates in Ikwere are interpreted as single phonemes as in the examples in (39). Thus instead of interpreting them as CC structure in Ikwere, they are analyzed as C structure in agreement with the univalent structure in the language.

39a) 'think' b) 'wear (bead)'
/tʃe/ /dʒe/
CV CV

4.3.2.4.2 The Cw Sequences

According to Yul-Ifode (2014:82), the Cw sequences may be interpreted as labialized consonants or sequences of a consonant and the approximant /w/ as in /kw gwɪwhw/. Thus in Ikwere, these sequences can be interpreted as:

- Allophones of their plain counterparts
- Phonemes in contrast with their plain counterparts or
- Sequences of two phonemes

If, for instance, [kw] is analyzed as an allophone of its plain counterparts, it will be a wrong interpretation because it does not occur in complementary distribution with its plain counterparts neither can it be substituted with its plain counterparts without creating a difference in

meaning. Similarly, it cannot be analyzed as a sequence of the phonemes /k/ and /w/, as doing so, will amount to an introduction of a consonant cluster, which does not exist in the language. It is, however, interpreted as a phoneme in contrast with its plain counterparts. Note that this interpretation applies to all the sequences listed above. Consider examples (40) – (41):

40a) /kʷà/	'clap'	41a) /kà/	'mark'
b) /gʷà/	'mix'	b) /gà/	'walk (about)'
c) /hʷà/	'squeeze'	c) /hà/	'pin'
d) /ŋʷà/	'take (from the soup)'	d) /ŋà/	'dry by fire'
e) /kʷù/	'beat'	e) /wà/	'cut (open)'
f) /gʷù/	'give(name)'	f) /wù/	'jump'
g) /hʷù/	'blow'		
h) /ŋʷù/	'die'		

To further prove that [kw] sequence is correctly interpreted as a unit, that is, a phoneme, observe that no constituent part of it is dropped in the process of reduplicating the verb root containing the sequence to derive gerunds as in (42):

42a) ò.kwù.kwù 'talking' c) ò.hwù.hwa 'squeezing'
b) ò.gwù.gwù 'refusing' d) ò.ŋwù.ŋwa 'picking (from...)'

Following the preceding analysis of the CW sequences in Ikwere, they are therefore interpreted as phonemes in contrast with their plain counterparts and are phonemically written as labialized consonants in the language as in (43):

43a) 'bush fowl'	b) 'character'	c) 'year'	d) 'monkey'
/à.kʷà/	/à.gʷà/	/à.hʷà/	/è.ŋʷè/
V.CV	V.CV	V.CV	V.CV

4.3.2.4.3 Vowel Sequences

There are no phonemic long vowels in Ikwere. However, a phonetic long vowel results when two vowels combine at a morpheme boundary or juncture. Note that the final vowel before the juncture is referred to as V1 and the initial vowel after the juncture is tagged V2 in this paper for easy reference. See examples in (44):

44a) isɪ#òrò → isóórò
'head' 'house' 'that end of a house'
b) àhʷà#isē → àhʷiisē
'year' 'five' 'five years'

- c) rí# é|lú → rjéé|lú
climbup 'climb up'
- d) úwo#údzidzi → úwúúdzidi
cloth black 'black cloth'

Examples (44a) – (44d) demonstrate that whenever V1 and V2 are juxtaposed in a construction, V1 in anticipation of V2 assimilates into V2. In (44a), for instance, the final [i] in *ísh* 'head' becomes the initial [ə] in *inóró* 'house' to yield *íshóró* 'that end of a house'. Notice that in addition to the phonetic long vowel, there is also evidence of glide formation [j] as in *rjéé|lú* 'climb up' before the identical vowel in (44c). The same process of assimilation, which results in phonetic long vowel, also applies to the vowel of the auxiliary verb and the prefix *è-/à-* attached to the verb root as shown in (45):

- 45a) i. /ò dè è-rí rí|rí/
3SG FUT PR-eat food
ii. /ò dèérí rí|rí/ 'S/He will eat'.
- b) i. /à dà à-á á|só/
1PL FUT PR-run run
ii. /à dàà-á á|só/ 'We shall run'

It is observed that these vowels at the juncture always assimilate in such a way that they are identical. There is also evidence of non-identical vowel sequence in the language as treated in the following sub-section.

The a₁ Sequence

The a₁ vowel sequence needs special mention as it is not a result of the juxtaposition of vowels at the juncture or boundary of two words and also not identical as in examples (46a) – (46b). Consider examples in (46):

- 46a) 'we' b) 'money'
/à.í/ /í.wá.í/
V.V V.CV.V

Having noted that vowel cluster does not exist in Ikwere, it therefore, means that the VV and V.CV.V structures in (46a) and (46b) require an interpretation. Note also that the language does not record any diphthong. Considering that synchronically in Ikwere, the first person plural pronoun may be expressed differently as *ájé* used in isolation or for emphasis; *ájé* in normal speech or *á* in fast speech, the author postulates that the word that means 'money' originally consisted of three syllables as

iní.wá.jé with V.CV.CV structure. Just as the pronoun *ájé* 'we' has reduced to *ájé* in normal speech by a loss of the palatal central approximant /j/ of the final syllable, there is also a deletion of /j/ in *iní.wá.jé* 'money' due to ease of articulation. Instead of *í.wá.jé* with V.CV.CV syllable structure, it is now *í.wá.á* with the syllable structure V.CV.V yielding a vowel cluster. Thus it is evident from the foregoing analysis that V(V) or CVV structure is a result of an ongoing process of deletion in the language. The stand of this paper is further strengthened by the word *á.wá.jé* 'money' in Ekpeye, a closely related neighbouring Igbooid language spoken in Ahoada East LGA and Ahoada West LGA of Rivers State of Nigeria. No doubt, the Ikwere form is cognate with the Ekpeye form. While the glide [j] has survived in Ekpeye, it is lost in Ikwere. Thus while the synchronic form of Ikwere presents a V-CV-V syllable structure that of Ekpeye is V-CV-CV. This shows that vowel cluster is evolving in Ikwere.

Based on the foregoing discussion, the syllable structure of Ikwere reflects V, N, CV and CGV syllable types. It is summarized with the symbols such as:

	T
	(C (G)) S where
C	= consonant e.g. /t/
G	= glide e.g. /w/ /j/
T	= tone e.g. /`/ or /'/
S	= vowel or syllabic nasal e.g. /o/ or /m̩/
CS	= consonant and vowel e.g. /ré/ 'sell'
CGS	= consonant, glide and vowel e.g. /swe/ 'grow'

4.4 Summary of Findings

Generally, Ikwere operates an open syllable structure system. This study, however, shows that a CVC structure is possible in the language. When this occurs, the coda is the bilabial nasal [m]. Occasionally, the [m] bears a tone mark implying that it is syllabic. Further observation into the language proves that it is actually a CV structure in the Rmkp, Rndl and Odgn dialects of Ikwere, which has been modified and reduced to an N structure in the Omuanwa dialect. A typical example is *aha|m'sun* 'sun' in Omuanwa, which is realized as *ahá|vé*, 'sun' in Rmkp, Rndl and Odgn dialects of Ikwere. The stand of this paper is that *vé|inahá|vé*, 'sun' of Rundele has been modified and reduced to *vé|m* in *ahá|m'sun* of Omuanwa. Thus the Omuanwa form which ends with a syllabic nasal is an innovation (the result of a diachronic phonological process in the language). There is also evidence of a reduction of a CV structure of Rmkp, Rndl and Odgnto a [m] (i.e., a C) in Omuanwa, whose tone did not survive in the dialect. This therefore requires further investigation to determine what the real situation is. What is however certain

is that changes are ongoing in the language. The implication of this is that after a long period of time, Ikwere may record many cases of syllabic nasal or CVC structure in word final position.

From the phonological structure of Ikwere words, it is obvious that the language has monosyllabic, disyllabic, trisyllabic and polysyllabic nouns, and monosyllabic and disyllabic verbs. The words exhibit different syllable types as V, N, CV and CGV. They combine differently with each other to form multisyllabic words. It is interesting to note that apart from the CV type which can consecutively replicate itself in a single word, the other syllable types cannot. The CV syllable type can occur independently and in all position of words (nouns and verbs) in the language, whereas the CGV type may occur alone as verbs and in final position of words (nouns). On the contrary, the V syllable type, though can be a word (2nd or 3rd person singular pronoun, which occurs in subject or object position), is also found in prefix or suffix position in words of the language. The N syllable type always occurs in initial position of words and occasionally in medial position except for the case of the word for 'sun' mentioned earlier.

There is no vowel cluster in Ikwere. The study, however, observed that vowel cluster may result at the boundary between two words, where the first word ends with a vowel and the second begins with another vowel. It is noted that vowel cluster is evolving in the language particularly with the *aɪ* sequence observed within the words that mean 'we' and 'money'. The paper observed that the *aɪ* sequence in *áí* 'we' or *íwáí* 'money' respectively originated from *ájí* 'we' or *íwájí* 'money', respectively. This analysis suggests a loss of the central approximant [j] in the two words, yielding a non-identical vowel cluster that does not exist in the language. While the deletion of [j] is ongoing as in 'we', it is complete in the word for 'money'. It is believed that if the disappearance of the original forms persists, giving way for the innovative forms to stabilize as part of the structure of the language, language change will be the result. By implication, this is one of ways in which language changes over a period of time.

Conclusion

It is attested in this paper that Ikwere records an open syllable structure with the V, N, CV and CGV syllable types as in most African languages particularly the Igboid related group such as Igbo (Emenanjo 2015:47). It presents the phonological structure of Ikwere nouns and verbs as representative samples of the structure of words in the language. From the structure of nouns, it is revealed that a CVC syllable type, in which the coda is always a bilabial nasal, is possible in the language. Its status is still questionable and subject to further investigation as the bilabial nasal is

sometimes realized as syllabic. While the univalent V and CV structures are recognized as the clear syllable types, the ambivalent cases such as N and CGV also have been interpreted as syllable types of the language. The recognition of CGV structure as a syllable type in Ikwere is different from its interpretation in Igbo. Using the word that means 'come' in Igbo, Emenanjo (2015:50) recognizes /-bɪa/ as the phonemic form, which is realized as [-bja] 'come' in fast speech. This indicates that Igbo records the Ikwere CGV structure as CVV. Sequences of consonants such as the affricates [tʃdʒ] and the labialized consonants [kʷgʷhʷŋʷ] that present some form of clusters are analyzed and interpreted as single phonemic units. On the other hand, the paper suggests that the *aɪ* vowel sequence resulted from a loss of the central approximant [j] between two syllables, yielding a non-identical vowel cluster that does not exist in the language. Thus *íwáí* 'money', for example, is derived from *íwájí* 'money'. Similarly, identical vowel sequence found at the juncture or boundary of two word, which presents a phonetic long vowel is a result of vowel assimilation in speech. The identical vowel so produced is further reduced to a single vowel by deletion in fast speech, thereby, altering the syllable structure of words in the language. These demonstrate that vowel cluster is evolving in the language particularly with the *aɪ* sequence as well as syllable reduction in fast speech in the language. It is believed that this study will not only provide an insight into the combination of sounds in the Ikwere, but will also form the basis of a comparative study of the syllable structure of Ikwere and related and non-related languages.

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Babanki Verbal Extensions

Pius W. Akumbu

Abstract
Verbal extensions occur in Grassfields Bantu languages and their presence and identity have been established in a good number of the languages including Babanki (Akumbu & Chibaka 2012), a central Ring Grassfields Bantu language of Northwest Cameroon. Hyman (2013) contains a presentation and reconstruction of Proto-Bantoid verbal extensions with a significant reference to Babanki. However, there has been no focus on the morphophonological processes (vowel deletion and fricative strengthening and weakening) caused by the addition of extensions in this language. The extensions themselves are toneless and only receive tone from the verb root. This paper accounts for the changes using classical Generative Phonology and concludes that true word final consonants in this language are only nasals and the voiceless velar stop, and that the voiceless fricatives [f] and [s] are exceptional cases that verbal extensions seek to regulate.

1. Introduction

The aim of this paper is to discuss the morphophonological processes that the addition of verbal extensions causes on Babanki verb roots¹. Verbal extensions occur in Grassfields Bantu languages and their presence and identity have been established in a number of the languages including Kom (Hyman 2013), Bafut (Mfonyam 1982, Tamanji & Mba 2003, Tamanji 2009), Mankon (Leroy 1982), Limbum (Fransen 1995), Isu (Kiessling 2004), Meta? (Ngum 2004), and Babanki (Akumbu and Chibaka 2012). Hyman (2013) contains an extensive discussion of Babanki as well as a presentation and reconstruction of Proto-Bantoid verbal extensions. In Babanki, adding extensions to verb roots can cause several morphophonological changes on the verb, namely, vowel deletion, [f] strengthening and [s] weakening. While vowel deletion occurs after the glottal stop, root-final [f] strengthening, and [s] weakening occur when a CV extension is added. The extensions themselves are toneless and only receive tone from the verb root. This paper accounts for the changes using classical Generative Phonology and concludes that true word final consonants in Babanki are only nasals and the glottal

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1. Introduction

The aim of this paper is to discuss the morphophonological processes that the addition of verbal extensions causes on Babanki verb roots¹. Verbal extensions occur in Grassfields Bantu languages and their presence and identity have been established in a number of the languages including Kom (Hyman 2013), Bafut (Mfonyam 1982, Tamanji & Mba 2003, Tamanji 2009), Mankon (Leroy 1982), Limbum (Fransen 1995), Isu (Kiessling 2004), Meta? (Ngum 2004), and Babanki (Akumbu and Chibaka 2012). Hyman (2013) contains an extensive discussion of Babanki as well as a presentation and reconstruction of Proto-Bantoid verbal extensions. In Babanki, adding extensions to verb roots can cause several morphophonological changes on the verb, namely, vowel deletion, [f] strengthening and [s] weakening. While vowel deletion occurs after the glottal stop, root-final [f] strengthening, and [s] weakening occur when a CV extension is added. The extensions themselves are toneless and only receive tone from the verb root. This paper accounts for the changes using classical Generative Phonology and concludes that true word final consonants in Babanki are only nasals and the glottal

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stop, and that [f] and [s] are exceptional cases that verbal extensions seek to regulate. In the second section, I provide an overview of the phonology and morphology of Babanki, indicating the sounds that can occupy the final position of roots in the language, the verb roots and extensions they can take as well as the two-tone groups of the language. In §3, I discuss the effects that extensions can have on the verb roots and then provide a conclusion to the study in §4.

2. Overview of Babanki morphophonology

2.1 Phonology

As analyzed in Akumbu (2016), Babanki uses 25 phonemic consonants (Table 1)², 8 vowel phonemes (Table 2) and two level tones: H(igh) and L(ow).

Table 1: Consonant Phonemes

	Bilabial	Labiodental	Alveolar	Postalveolar	Palatal	Velar
Stops	b		t, d			k, g
Nasals	m		n		ny	ŋ
Fricatives		f, v	s, z	sh, zh		gh
Affricates		pf, bv	ts, dz	ch, j		
Liquids			l			
Approximants	w			y		

Table 2: Vowel Phonemes

	Front	Central	Back
Close	i	iu	u
Close-Mid	E		o
Open-Mid		ə	
Open		a	

The segments combine into the CV, CGV, CVC and CGVC syllable structures, where G stands for glide.

2.2 Root-final Sounds

Vowels and consonants can occupy the final position of Babanki verb roots. Of the eight phonemic vowels of the language, only /a/ does not occur in a CV root (1a). The six consonants that occur at the end of verb roots in the

² The IPA counterparts for the following orthographic symbols used in this paper are given in square brackets: ny[n], sh[ʃ], zh[ʒ], gh[ɣ], ch[tʃ], j[dʒ], y[j].

language are three nasals /m, n, ŋ/, two voiceless fricatives /f, s/, and the voiceless velar stop /k/ realized as [ʔ].

- (1) a. shí 'take'
 nú 'defecate'
 fɪ 'exit'
 chù 'soak'
 shá 'slice'
 chò 'pass'
- b. zím 'wither'
 tén 'push'
 kán 'fry'
 chɪf 'advise'
 bis 'scatter'
 kúʔ 'rise'

3. The Verb

3.1 Verb Roots

Only one-syllable roots are attested in Babanki except when there is verbal reduplication (Akumbu & Chibaka 2012, Akumbu 2015). The verb roots that appear to have two syllables always have a CV ending, which can be interpreted as an extension. Nevertheless, there are formal extensions that occur with roots that otherwise do not occur alone. Examples of the one-syllable roots and the lexicalized CV(C)-CV are given below.

One-syllable	Two-syllable (with formal extensions)
(2) sanj 'dry'	gitə 'add'
Chò 'pass'	bàŋlə 'dodge'
Vì 'come'	shisə 'remove'
búm 'hunt'	tóŋtə 'sift'
fəŋ 'fall'	fáʔtə 'hurry up'
kwen 'enter'	bɪʔsə 'ignore'

The one-syllable roots can either have a CV or CVC structure whereas those with two syllables have a CV(C)CV structure. The first consonant can either be palatalized or labialized. It can also be seen in the data in (2) that the second of the two-syllable roots is always of the CV type, and that the V is always schwa. There are a good number of such roots that

cannot stand alone without the second CV syllable also called 'formal extension'.

3.2 Extensions

The majority of what looks like two-syllable verbs results from the addition of a verbal suffix or extension³ to the root. At least five kinds of extensions are commonly found on verb roots, as illustrated below (cf. Hyman 2013 for additional discussion):

(3) -sə	-kə	-tə	-lə	-mə
vī-sə 'bring near'	bvikə 'fail repeatedly'	myə-tə 'complete'	kə-lə 'scrape many times'	kwə-mə 'think together'
kum-sə 'touch'	tən-kə 'fly'	bə-tə 'scrape'	dən-lə 'spread'	sū-mə 'insist continually'
shisə 'remove'	chə-kə 'pass repeatedly'	būm-tə 'meet someone'	sī-lə 'caress many times'	chə-mə 'pass many times'
kwən-sə 'send inside'	fən-kə 'fall repeatedly'	bə-tə 'arrange'	kən-lə 'fry in part'	pfo-mə 'return'
bən-sə 'make dance'	kə-kə 'turn around'	tə-tə 'select'	tə-lə 'insult many times'	fən-mə 'gather lots of things'
bwom-sə 'praise'	bwi-kə 'give birth a lot'	nyit-tə 'run hurriedly'	fə-lə 'pin many times'	sə-mə 'melt'

The extensions appear in (3) with the same tones as the preceding verb roots and the most straightforward analysis is that extensions are toneless and only receive tone from the verb root and the inflectional morphology. Thus, in the progressive aspect, the extensions bear the progressive low tone while in the imperative mood, they bear the imperative high tone (see §4.4 for the imperative).

3.3 Lexical tones

As seen in the following minimal pairs, verb roots fall into two tone classes, L and H (Akumbu 2015).

³Verbal extensions in Babanki fall short of what is typical of Narrow Bantu in that some of the extensions in the latter have no correspondences in Babanki, e.g. 'applicative', 'passive', 'middle' (impositive). Most of these functions, where present at all, are based on combinations of autonomous lexical items. The common extensions are morphemes for 'attenuative', 'intensity', and 'repetitive', with different forms for the latter based on whether the verb is transitive or not.

L tone verbs	H tone verbs
(4)fu? 'bubble'	fú? 'tune'
dəm 'grunt'	dám 'play'
fəs 'break'	fás 'threaten'
zhwi 'pant'	zhwí 'kill'
mò 'narrate'	mó 'deny'
shisə 'remove'	bósə 'melt'
myətə 'complete'	bínsə 'lure to sleep'

As already mentioned, if the verb is bisyllabic, both syllables will be LL or HH.

4. Extensions and Verb Phonology

Adding a CV extension to a verb root can cause several morphophonological changes on the verb, namely vowel deletion after the glottal stop (CV?V→CV?), strengthening of /f/ (CVf→CVb) and weakening of /s/ (CVs→CVy).

4.1 Vowel Deletion

As stated earlier, there are two-syllable stems in the language whose second syllable begins with a glottal stop, followed by a vowel identical to that of the first syllable. When extensions are added to such roots, the vowel of the second syllable is deleted consistently:⁴

(5) mǎ?ǎ 'throw'	mǎ?-lǎ 'throw repeatedly'
tǎ?ǎ 'become stiff'	tǎ?-lǎ 'become stiff in parts/bits'
byè?è 'carry'	byè?-tǎ 'carry in bits/carry lots of things'
shǐ?ǐ 'descend'	shǐ?-tǎ 'descend a bit'
myǎ?ǎ 'blink'	myǎ?-mǎ 'blink repeatedly'
byǐ?ǐ 'fold'	byǐ?-tǎ 'fold several times'

One may argue that the glottal stop is not allowed verb finally and that it requires the echo-vowel, that is, that the vowel is inserted after a glottal stop if it is final. However, there are numerous instances where the glottal stop occurs in final position but does not require the insertion of an echo-vowel:⁵

⁴In a Babanki Filemaker Pro™ database of 2,005 lexical entries (Akumbu 2008), 14 verbs have been found with an echo-vowel after the glottal stop.

⁵There are 86 CV? roots in the database of 2,005 lexical entries.

(6) sɛʔ	'provoke'	sɛʔ-lə	'provoke several times'
gháʔ	'hold'	gháʔ-tá	'hold repeatedly'
bèʔ	'snatch'	bèʔ-lə	'snatch repeatedly'
kúʔ	'climb'	kúʔ-sə	'raise'
kwaʔ	'break'	kwaʔ-mə	'break'
bùʔ	'pour'	bùʔ-tə	'pour a bit'

The data in (6) show that the glottal stop is capable of occupying final position and that the process in (5) is actually that of deletion of the echo-vowel when extensions are added. The echo vowel might be a reduced extension and cannot co-occur with another extension. Forms in the imperative further confirm the claim and illustrate instances of vowel insertion:

(7) a. Infinitive	Imperative	Imperative with Extension
əkù'm 'to touch	'kù'mə 'touch	kù'mlə 'touch many times'
ədzaŋ 'to call	dzaŋə 'call	dzaŋtə 'call repeatedly'
əbwín 'to return	bwinə 'return	'bwínsə 'send back'

b. əbèʔ 'to snatch	bèʔ	é'snatch 'bèʔlə	'snatch many times'
əkwaʔ 'to break		kwaʔə 'break	kwaʔmə 'get broken'
əbùʔ 'to pour		bùʔú 'pour	bùʔtə 'pour a bit'

c. əmàʔə 'to throw	'màʔə 'throw	màʔlə 'throw in bits'
əbyèʔə 'to carry	byèʔə 'carry	byèʔtə 'carry a bit'
əmyəʔə 'to blink	myəʔə 'blink	myəʔmə 'blink many times'

The forms in (7a) have a nasal coda and a schwa is inserted in the imperative to bear the high imperative tone (see §4.4). In (7b) where the roots end in the glottal stop, the root vowel spreads to the final position to bear the imperative tone. However, in (7c) which contains the echo-vowel (underlyingly), that vowel bears the imperative tone, confirming that the echo-vowel is actually deleted when an extension is attached. The deletion process in (5) can therefore be captured by the following rule:

(8) Vowel Deletion

$$V \rightarrow \emptyset / VC_ + CV$$

According to the rule, a vowel is deleted when preceded by a VC and followed by a CV at a morpheme boundary as illustrated in the following derivation.

(9)	UR/ məʔə-lə	byíʔí-tə	shíʔí/
Tone assignment	məʔə-lə	byíʔí-tə	—
Vowel Deletion	məʔ-lə	byíʔ-tə	—
	PR[məʔlə	byíʔtə	shíʔí]

4.2[f] Strengthening

When extensions are added to verb roots that end in [f], the voiceless labiodental fricative changes to [b]:

(10)	káf	'beckon'	kàb-tə	'beckon several times'
	fáf	'reduce'	fàb-tə	'reduce a bit'
	byíʔf	'get bad'	byíʔb-sə	'destroy'
	laf	'dress up'	lab-sə	'dress someone up'
	tsíʔf	'push'	tsíʔb-lə	'push someone around'
	líʔf	'hurry'	líʔb-lə	'hurry'
	záf	'ache'	zàb-kə	'feel pain'
	chóf	'shout'	chób-kə	'pick a quarrel'
	gúʔf	'pull'	gúb-mə	'argue'
	kwóf	'snatch'	kwób-mə	'snatch several times or by several people'

The data show that the change in the root consonant is caused by the addition of the extensions. It can be argued, though, that the change is rather from [b] to [f] in final position. However, several other contexts show the occurrence of the fricative providing evidence that /b/ occurs at the end of a syllable when an extension is added:

(11) Infinitive	Imperative.	Progressive	Derived Noun
áfáf 'to reduce	fáfə 'reduce	fáfə 'reducing	kənfáf 'reduction'
ə'chóf 'to shout	chóf 'quarrel	chófə 'quarreling	kə'chóf 'quarreling'

The occurrence of [f] is widespread and that of [b] is limited to the context where a consonant cluster results from the addition of an extension. It is seen that [f] occurs initially, intervocalically, finally, but not pre-consonantly. The same is found with formal extensions where [b] is required instead of [f]:

(12)	lobtə	'deceive'
	təbtə	'solidify'
	təbkə	'struggle'
	nyəblə	'maltreat'

The change from [f] to [b] can be captured by the following rule.

(13) [f] strengthening

/f/ → [b] / __+C

The rule states that the voiceless labiodental fricative becomes the voiced bilabial plosive when followed by a consonant at morpheme boundary. The data in (10) are therefore derived as follows:

(14)	UR/	láf-sə	gùf-mə	láf/
Tone assignment		láf-sə	gùf-mə	—
f strengthening		láb-sə	gùb-mə	—
	PR [láb-sə	gùbmə	láf]

It happens that [f] strengthening does not apply across words. If the C is in the next word, then the fricative survives:

(15)	égùfwì?	'to pull someone'
	əkáf-wúndŋ	'beckon a friend'
	əbyɪfnántŋ	'become too bad'

The data in (15) indicate that the process occurs only within stems specifically due to the addition of an extension.

4.3[s] Weakening

If the verb root final consonant is [s], it changes to [y] when an extension is added to the verb:

(16) a.	kás	'twist (face)'	káy-tə	'twist (face) again and again'
	bis	'scatter'	biy-tə	'scatter several times'
	bàs	'cut open'	bay-lə	'cut open in several places'
	zàs	'loosen'	zàylə	'loosen several times'
	sàs	'scatter'	sàykə	'scatter into several pieces'
	fwòs	'fart'	fwòykə	'fart repeatedly'
b.	tàs	'surround'	tàsə	'surround'
	kàs	'twist (face)'	kàsə	'twist one's face again and again'
	bis	'scatter'	bisə	'collapse'
	bàs	'break'	bàsə	'break up'

The data in (16a) illustrate that when extensions that begin with [m, l, k] are combined with roots that end in [s], it changes to [y]. The forms in (16b) show that if the [-sə] extension is added to such roots, [s] weakening does not apply but one of the alveolar fricatives is deleted, that is, deletion by

identity takes place: ss → s. It must be the case that the deletion precedes [s] weakening. Again, it can be argued that the change is rather from [y] to [s] in final position but this is dismissed by the fact that [y] occurs only before a consonant whereas [s] occurs in several other contexts:

(17) Infinitive	Imperative	Progressive	Derived Noun
əbìs 'to scatter'	bìsə 'scatter'	bìsə 'scattering'	kəmbìs 'scattering'
əkàs 'to twist'	kàs 'twist'	kàsə 'twisting'	kəŋkàs 'twisting'

The rule in (19) captures the change from [s] to [y].

(18) [s] Weakening

/s/ → [y] / __+C

According to the rule, the voiceless alveolar fricative becomes the palatal glide when followed by a consonant at morpheme boundary. If C occurs in the next word then [s] Weakening does not apply:

(19)	əbàskəmbò	'to tear a bag'
	əkàs tàəkə?	'to twist only the face'
	əfwòsnántŋ	'fart too much'

This means that the process takes place only within a stem that results from the addition of an extension as illustrated in the following derivation.

(20)	UR /	tàs-mə	bis-tə	sàs-kə	tàs-sə/
Tone assignment		tàs-mə	bis-tə	sàs-kə	tàs-sə
s deletion or fusion		tay-mə	biy-tə	sà-y-kə	tà-sə
s weakening		tay-mə	biy-tə	sà-y-kə	tà-sə
	PR[taymə	biytə	sàykə	tà-sə]

It should be mentioned that the tendency is for [s] to assimilate the features of the following extension consonant and result to consonant gemination. Consider the alternative way of producing the forms in (16a) shown in (21a).

(21)a.	kàs	'twist (face)'	kàttə	'twist (face) again and again'
	bis	'scatter'	bittə	'scatter several times'
	bàs	'cut open'	ballə	'cut open in several places'
	zàs	'loosen'	zallə	'loosen several times'
	sàs	'scatter'	sàkkə	'scatter into several pieces'
	fwòs	'fart'	fwòkkə	'fart repeatedly'
b.	tàs	'surround'	tàymə	'mix up'
	bis	'scatter'	biymə	'collapse'
	bàs	'break'	baymə	'break up'

The data in (21b) show that the only context where [y] alone can occur is when the following consonant is [m] (*támmá, etc.). Elsewhere, [s] is capable of assimilating the features of the following consonants resulting to consonant gemination. Therefore, [s] assimilates to a lingual consonant, not a labial one.

4.4 Imperative Tone and Extensions

The imperative is marked in Babanki by a floating high tone. When the root of one-syllable verbs has a low tone, a schwa is inserted (i.e. suffixed) as in (22a) to bear the imperative tone (Akumbu 2015). This might happen in order to avoid a rise on a single vowel because contour tones are rare in Babanki:

- (22) a. bās 'cut!' bāsə 'cut up!'
 guf 'pull!' gufə 'argue!'
 b. byɪf 'get bad!' byɪf 'destroy!'
 laf 'dress up!' laf 'dress someone up!'
 fwos 'stir!' fwos 'stir continually!'

When extensions are added to imperative constructions, they consistently take a high tone irrespective of whether the verb root is L (23a) or H (23b).

- (23) a. káf 'beckon!' káb-tə 'beckon several times!'
 fáf 'reduce!' fáb-tə 'reduce a bit!'
 sàs 'scatter!' sáy-kə 'scatter into several pieces!'
 fwos 'fart!' fwòy-kə 'fart repeatedly!'
 bìs 'scatter!' bìy-mə 'collapse!'
 b. byɪf 'get bad!' byɪb-sə 'destroy!'
 laf 'dress up!' lab-sə 'dress someone up!'
 tsɪf 'push!' tsɪb-lə 'push someone around!'
 lɪf 'hurry!' lɪb-lə 'hurry!'
 tás 'surround!' táy-mə 'mix up!'

It has been noted earlier that extensions are toneless in the language and receive a tone by spreading from the verb root as soon as they are attached. If, however, the construction is in the imperative mood, the floating high imperative tone is introduced as shown in the following derivation.

- (24) UR /káf-tə fwos-kə tás-mə/
 Imperative tone assignment káf-tə fwos-kə tás-mə
 f strengthening káb-tə
 s weakening — fwòy-kə táy-mə
 PR [kàbtə fwòykə táymə]

5. Conclusion

The discussion in this paper has centered around the morphonological processes that the addition of verbal extensions cause on Babanki verb roots. It has been demonstrated that adding extensions to verb roots can lead to either post-glottal vowel deletion, [f] strengthening, or [s] weakening. [f] strengthening and [s] weakening occur in similar contexts and in each case a fricative is realized as a more or less homorganic stop or approximant. There is therefore a constraint in Babanki that prohibits the occurrence of fricatives before consonants in a cluster. It has been shown that the process occurs only within stems, specifically due to the addition of an extension. It remains unclear, though, why the change from [s] rather goes to the approximant whereas the alveolar stop is available in the language. This irregularity explains, in part, the tendency by some speakers to move towards consonant gemination when [s] assimilates to lingual consonants. In addition, it has been explained in this paper that the extensions are toneless and only receive tone by rightward spread from the verb root.

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Phonological Explication of Anaañ Tongue Twisters¹

Itoro Michael

Abstract
Tongue twisters is a type of spoken (or sung) word game that can be used for entertainment. It is an aspect of Anaañ verbal art that had been neglected completely by researchers. This research paper centres on the analysis of Anaañ tongue twisters, with the aim of showing the various neighbourhood effects of sounds when produced repeatedly and in fast speech. Data for analysis was culled from an on-going research work on Anaañ folklore. In other words, this paper applied data from folklore (an aspect of verbal art), for phonological description of speech performance in Anaañ. From the phonological point of view, tongue twisters is said to be a phrase that is difficult to articulate properly. This research work adopted Cascading Activation and Discrete Activation theories for analysis. Cascading Activation theory views tongue twisters as errors that arise at the level of phonological planning, while Discrete Activation theory claims that tongue twisters is triggered at the articulatory implementation level. Analysis shows that tongue twisters could induce different kinds of alternate segments in fast and repeated speech. In this case, vowels could be replaced with consonants and vice versa. This alternation could occur as a result of the interaction between segments that occur at word boundary. Switching from one segment to the other across word boundary therefore triggered segment deletion, segment shortening, metathesis, assimilation, segment replacement, and a restructuring of the syllable structure. Segment alternation can also result in moving from meaningful to meaningless words/phrases or sentences. This paper is therefore, a building block for the understanding of the use of speech slips in Anaañ as well as African folklore.

1. Introduction

Anaañ refers to a linguistic group of settlers in the South-Eastern region of Nigeria. The language had existed in its oral form for centuries. The approval of the Anaañ orthography (Michael & Obot, 2007) is quite recent. Based on this, Anaañ has a wider range of oral records than the written one, especially on the aspects of indigenous literature, culture and tradition. The dominance of the oral version of the language and culture therefore gives prominence to oral literature and oration. This makes the Anaañ people to have a high sense of value to oral tradition and oration. As observed by Messenger (1962), the name 'Anaañ', means those who can speak well. This is why the Anaañs are known as great orators (Michael, 2014). Eloquence in speech is measured by the ability to use words wisely and clearly to convince the listeners. This involves the application of proverbs, wise sayings and various other rhetorical devices. Sometimes a speaker may have a rich set of vocabulary in

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his mental lexicon, but lacks the performance ability for good expression owing to factors like aphasia, impairment, speech pathology, tongue hiccup etc. These therefore lead to poor articulation of sounds. Some others could have the problem of stage fright or shyness, while others are chronic stutterers. In such case, word play can be introduced to those living with these problems as a constant articulatory exercise in order to arrest these situations. Okpewho (1982) identifies three forms of word play to include puns, riddles and tongue twisters. Our focus in this research work is on tongue twisters.

Verbal play or spoken word play involves the production of similar sounds rapidly without tripping over the tongue. It assists speakers to communicate clearly and fluently without stuttering. It involves the memorization of vocabulary as a form of amusement (Levelt 1989). This aspect of memorizing could be combined with speaking to develop the ability of saying words correctly. Existing scholarship on word play shows that people delight in playing with words and on words for various reasons some of which are as listed:

- i. to solve spoonerisms, problem caused by tongue hiccup (Blunken 1998 & Nickels 1995);
- ii. to improve articulation of sounds (Rapp & Goldrick 2000, and Bard et al 2000), and used as an effective strategy to increase students speaking fluency;
- iii. to serve as speech therapy for students that have pathology or impairment problems (Marin et al 1996, Nikels 1995, Best 1994, Hanson et al 1991 & Goldrick 2005)
- iv. to assist the brain to connect tongue movement to sounds (Blunken 1998 & Whilshire 1999);
- v. as a practical way for pronunciation (Levitt & Healy 1985, Levelt 1989);
- vi. used by actors and by foreign language learners to improve their accents (Dell & O'Seaghdha 1991);
- vii. used to improve enunciation and elocution for light-hearted linguistics fun and games (Messenger, 1962);
- viii. offers an interesting way in word reproduction, and supports speech therapists to open windows into the speech planning process in the brain (Goldrick, 2005).

Researchers observe specific changes in the connectivity at the brain region that caused some people to stutter when they speak (Best 1994, Blunken 1998, Goldrick 2005, Wilshire 1999, Dell 1994, Rapp & Goldrick 2000, Levelt 1989, Martin et al 1996, & Bard et al 2000). Therefore, some chronic stutterers can use tongue twisters to train themselves on how to speak or sing song lyrics without stammering. For shy students, they feel confidence by using tongue twisters, which in turn influence them to say words faster and

correctly. It constitutes diction/articulatory exercises which help children learn how to speak.

From the phonological point of view, tongue twisters is said to be a phrase that is designed to be difficult to articulate properly. It can also be used as a type of spoken (or sung) word game. Some of the time, tongue twisters produces humorous results in the course of mispronunciation. Okpewho (1982) observes that tongue twisters are a kind of spoken word play that are joyful and challenging to read and are also seen as very good method for children's language development. They have similar sounds that are pronounced rapidly without tripping over the tongue. Non-native speakers could induce different kinds of double onset with different kinds of tongue twisters (Levitt & Healy 1985, Vitevitch 2002). Tongue twisters are used to find ghost double onset (Sadat et al 1994, Sevald & Dell 1994), where the tongue tries to produce both /g/ and /h/ in a word like 'feghe', but only one sound, /h/ is heard.

This paper therefore centres on the phonological changes in Anaañ tongue twisters, with the main aim of building a bridge between folklore and linguistics. In other words, this paper makes use of data from folklore (an aspect of verbal art), for phonological description of speech performance in Anaañ.

The objectives of this paper therefore are to:

- i. Present the various alternate pronunciations of tongue twisters in fast and repeated speech;
- ii. describe the contexts and the environments where the alternations occur;
- iii. describe the different sound changes/alteration in the data;
- iv. analyse the various processes produced by these changes and the effects of these processes on the segments, using the cascading activation model approach (Goldrick et al 2006).

1.2 Relevant Scholarship on Tongue twisters

Tongue twisters is an aspect of African verbal art, where children as well as adults can express their excitement in the use of words. It is the exclusive genre of verbal word play performed by human voices, and centred on the flexibility of verbal interaction. It is said to function as light-hearted entertainment by way of a quick-witted play on verbal words and sounds (Okpewho 1982). There is a remarkable difference between tongue twisters and pun. Pun is a play on words, while tongue twisters is a play on sounds. In this case, the syllables and segments in words are subjected to different forms of sound change to produce different meanings. The main target as observed by Okpewho is on 'who can rattle off the words with the greatest

speed and accuracy'. Consider the following line recorded among the Yorubas to repeat certain tricky sentences at high speed (Okpewho 1982);

1. Iyan mu ire, iyan ro ire ru

(When there is famine, the cricket is fat, when the famine is over, the cricket is lean).

The fun lies in the interplay between 'Iyan mu ire' in one hand and 'iyan ro ire ru' on the other hand. The repetition of this line in fast speed can appeal to be so intense, in a way that performers can, at times indulge in certain 'nonsense' words. At the same time, when performers forget what to say, they can indulge in word play or other forms of sounds, in order to fill in the gap, while planning on what to say in the next line to entertain their audience. This is not possible in written text because a text is planned and well organized with structural and stylistic patterns. Therefore, tongue twisters is an exclusive genre of oral performance, although the performance could be reduced to writing.

The verbal aspect of tongue twisters is implicit to the sounds rather than the words or letters (Shattuk-Hufnagel 1992, Harley 1984, Jacobs et al 2015 & Stremberger 1990). The sounds that are produced in the course of interaction, how these sounds are produced and how they are perceived and interpreted by listeners, are very appealing in the context of the genre of tongue twisters. For instance, the speaker may have the intention to say one thing, but ended up pronouncing a different thing completely, thereby creating a different impression on the ears of the listeners. In order to avoid this, the speaker creates certain devices or styles to ensure a steady flow of his presentation to gain the attention of his listeners.

Tongue twisters is also described as errors that occur in the course of mispronunciation of certain tokens by speakers rather than a source of performance and entertainment following Goldstein et al (2007), Stremberger (1990), Postma (2000). The errors as observed by various researchers are triggered by inadequate planning of speech events or inability to grasp the targeted sounds correctly (Mackay 1992, Dell 1994, 1980 and Frisch & Wright 2002). (Dell & Rapka (1992), Garry & Dell (2012), Jou & Harris (1992), Dell & Reich (1981), however added that since tongue twisters are more of a phonological activity, the errors, should not be attributed to the tongue. Errors emitted at this level should be seen as phonological twisters rather than that of 'the tongue'.

For researchers like Garry & Dell (2012) Nancy (1960), Jou & Harris (1992) Mackey (1992) and Goldrick et al (2016) tongue twisters should be attributed to the mental state of the speaker rather than phonetic or phonological reality. The speaker might be targeting /giv/ for instance, but ended up producing /kiv/. In this situation, he may not even realize that he had replaced voiced with voicelessness in his pronunciation. This is an

assertion of Anderson (1960), Levelt (1989), Madiment et al (2013) and Oppenheim, (2013) views, that, in the interpretation of sounds, the psychological state of the speaker and even that of the hearer should be taken into consideration; because the speaker's intention could have something different from the listeners' impression. In this paper, tongue twisters is seen as a form of verbal word play used by children and adults (especially, learners of the language) for pronunciation of certain sounds at different environments/contexts.

2. Theoretical Approach

The theories of discrete and cascading activation proposed by Jescheniak & Schneifers (1998) and adopted by Goldrick & Blumstein (2006) are adapted for the analysis of Anaañ tongue twisters in this paper. Cascading activation theory views tongue twisters as errors that arise at the level of phonological planning, while discrete activation theory claims that tongue twisters are triggered by the articulatory implementation level. These theories therefore assert that tongue twisters induce phonological errors (Whilshire 1999, Dell & Reich 1981). The errors become pronounced when repeated. The repetition centres on sequences of words or syllables at a fast rate. This is illustrated with the following English lines;

2

- a. 'The seething sea sufficeth and thus
The seething sea sufficeth us'
- b. Betty Botter bought a bit of butter
The butter Betty Botter bought was a bit bitter
And made her batter better
But a bit of better butter makes better batter
So Betty Botter bought a bit of better butter
Making Betty Botter's bitter batter better.

There is a repetition of the letters 'th' /ð/ in (a). The letter at the same time alternates with 's',/s/ thereby making the tongue to alternate between the dental fricative and the alveolar fricative.

In the second example, the token involves a repetition of [b] & [t] in a sequence. The syllables as well as the words are also repeated as seen in 'betty, botter, butter, better, bit/bit-ter'. The representations have two or more sequences of sounds that lead to a repositioning of the tongue between segment with another. The effect of this is the wholesome substitution of a Bailey (2000), observe that the substitution could be partial or wholesome. In 'sop & shop', the phonetic alteration involves partial tripping of the body or tip of the tongue movement resulting in the phonetic distortion between [s] & [ʃ]. This distortion leads to overlap along any phonetic dimension,

especially, in fast and repeated speech. This form of error is seen as phonological rather than phonetics. This view echoes in Frisch & Wright (2002) as a combination of articulatory/acoustic variations of speech. Goldstein et al (2007) contribute this to a problem of divided attention or lack of concentration, while Albert (2000) views it from the point of view of pre-articulatory event. It should however be observed that, there are no clear-cut differences between the point of phonetic articulation and phonological processing during articulation.

As observed by (Dell & Rapka (1992), Garry & Dell (2012), Dell & Reich (1981), tongue twisters events are the offshoot of abstract phonological units. The same abstract phonological unit could play a role in the overt articulation of spoken words following Stremberger (1990). Contrary to this assumption, (Dell & Rapka 1992) and Albert (2000) argue that tongue twisters produce errors at the level of phonological planning, rather than being triggered by the articulatory movements at the phonetic level.

Tongue twisters manifests as a form of phonetic distortion in speech production. (Goldrick & Blumstein 2006) use the articulatory/acoustic features of sounds to argue that the misproduction of a word like 'keff' for 'geff' should be treated as a form of phonetic distortion order rather than a canonically produced token. The differences in the words could be accounted for, as a contrast in the articulatory feature of [voicing/voicelessness]. According to Goldrick (2005), the articulatory/acoustic property of voicing in /kef/, when produced as slips is often different from those manifested in the phonetic representation of the real word /gef/. In this case, the error is more active than the target. He therefore concludes that the articulatory level processes are insensitive to the internal operation of phonological planning processes. In other words, articulatory processes often receive the same input regardless of whether the intended phonological representation was appropriately selected or not.

From the point of view of cascading activation theory, errors in tongue twisters are said to have nothing to do with the tongue movement, rather they should be accurately described as phonological twisters. In this research paper, tongue twisters are seen as errors triggered at the level of phonological planning (cascading activation), which manifest at the level of actual speech production or articulatory implementation level (discrete activation).

3. Method

Data on tongue twisters were extracted from existing data on Anaañ folklore which is a part of an on-going research on aspects of Anaañ verbal arts. The

data was administered to thirty Anaañ native speakers, purposefully selected from the Abak dialect using the presentational models as shown.

1. They were given structured data on tongue twisters with alternating segments at the same phonetic environment to read. They repeated the same token with gradation speed.
2. The second one involved sentences/phrases that contained words with similar phonemes in the same phonetic environment. They read the token slowly, then repeated the tokens with increased speed.
3. The third one involved data with **repeated words**. The data at this stage were mixed to take care of tokens with irregular patterns.

The subjects read the data slowly, then repeated the whole phrase/sentence or parts of the phrase/sentence with increased and fast speed. The main purpose was to observe the changes that occur in the course of the articulation of these phrases/sentences. They were made to repeat the token with increased speed in order to capture the phonological effects created in the course of switching from one segment to another within a word or across word boundaries.

The responses were recorded using audio-video recorder. The three different steps above were used for each of the thirty respondents to make room for wider variations. This was later transcribed into writing. At this point, it was observed that fourteen respondents stopped halfway, while only six of them were able to produce all the tokens at the three different levels, although with diverse forms of slips. Based on this, our analysis was based on the activities of only six respondents.

3.1. Data Presentation

The data are classified as presented in (3.1 Anaañ). The presentation at this stage does not show any relative phonetic change. The data presented are classified according to the alternating segments and the phonetic environments. The English equivalence follows the tongue twisters in each case.

3. Tongue twisters with alternating segments in the same phonetic environments.

- i. Ákpón ísídákkáké íkpón ákpón, ákpónákpédákkaá ákpón, ákpón, ákpón ákpá.

A caretaker cannot abandon his ward, lest the ward will die.

- ii. A'káda nkáda íhínne úbók ké ékpád ákáda nkáda.

A crafty person cannot cheat another crafty man.

- iii. A'koókó nkókó ádiá ètok ètok, ábum ínua ké ntón ádiá s'íkón.

You earn as you work.

- iv. 'Akpók fàb ékpád akpáb, fàb fiǹnǹó.
The lizard slip, as you climb a giant tree.
 - v. A'kpòkò ékòd ákpókó ékòd ákíkò únèn.
A cock with a bald head.
4. Use of words with similar phonemes at the same phonetic environments.
- i. Mkpá!nuún Mkpá!nuún káppá dük ùfién káppá dük ùdóm.
Confusion, confusion, confusion.
 - ii. Mkpùtáatáppá táppá jóghó ékpáñ.
Touch anybody that comes your way.
 - iii. Mmótò mbákálá átò ajén mbákálá k'úsùñ mbákálá ágwòd.
White man's car hits white man's child on a white man's road and killed.
 - iv. Tùm diá-diá tùm díduk
As you go out, come back in safety.
5. Tokens with repeated words.
- i. Ámáámáná, áte' ámámáná, mímáámáná mímáaná mímáná.
Before Abraham I was.
 - ii. Étó nkáakád áttíppé nsúkáakád, nsúkáakád áttíppé íbòñ.
One thing leads to another.
 - iii. Íkòròsl áde Íkòròsl Íkòròsl íkànná Íkòròsl.
All motor cycles have the same quality.
 - iv. Mmótò mbákálá átò jén mbákálá k'úsùñ mbákálá ágwòd.
The white man's car hit a white man's child on a white man's road.
 - v. Ntaátá ntaátám, ntaátá útód.
I eat all forms of insects.
6. Repetition of words/segments at irregular pattern.
- i. Àbòm ùchàn úbòk ùfòk úkòd.
Breaking the wash hand basin of the in-law.
 - ii. Áfía áfòn áfòn áfòn áfiòñ.
White material is good for moonlight outfit.
 - iii. Ágwó ágwòk éwòk ísígwòkkò ñgwòk.
You cannot be talking (boasting) while swimming.
 - iv. Ákók á!tón ájùppó ákók á!tón, ákók á!tón ájùppó nsúkaràrà.
A man who hates his own brothers.
 - v. Amà ágwó ánam ágwó.
It is a friend that betrays his best friend.

- vi. Amáámá ákémá ñjá, ñjá ákémá lkwo.
Amaama loves Nya, Nya loves Ikwo.
- vii. Amáànèn ábòghò, ànéenèn ákéenè únèn.
When you are too rigid, you die in your rigid way.
- viii. Íchíp útùd úbiòm úfòk ànné.
The palm kernel in my grandmother's kitchen.
- ix. Íkò lkòt áfàñ átùdò ké íkòt áfàñ.
Do not tell it to a third party.
- x. Úkéed àjld ldià èdià úduá (èdià úduá èdià úduá èdià úduá).
We all eat yams from the market.

4. Analysis of the Data on Anaañ Tongue twisters

There is a presentation of more of the data used, with the English equivalence plus the phonetic forms of the repeated tokens at the appendix. The data on alternating segments are presented to show the diverse phonetic manifestations of the tongue twisters in a repeated and fast speech. This shall assist the readers to have a quicker and clearer view of the phonological alterations and the phonetic effects of these alterations in all the tokens.

The data in (section 3.1) do not show the phonetic manifestation of the tongue twisters when repeated and in fast speed. The variations shall be presented in the sub-section for analysis. The various phonological processes that occur in each of the sentences/phrases as the respondents kept repeating the sentences and in increased speed are the focus of our analysis. These cover cases of segment alteration, sound change, deletion, replacement, metathesis, reduplication, assimilation, and segment shortening etc. We shall provide detailed descriptions of these processes in (4.1).

4.1 Phonological Explication of Anaañ Tongue twisters

As mentioned earlier, tongue twisters involve a situation where the tongue is repositioned to produce strings of words with alternate or similar segments (Fromkin, 1971). In the course of production, certain segments are modified while some are replaced. The modifications cut across segments, tones as well as syllables as seen in Carrot et al (2010).

4.1.1 Vowel Alteration

When words with alternate vowels in the same phonetic environments are repeated in fast speed, the vowels could be altered in order to accommodate alternate vowels in adjacent words. This is illustrated with tongue twisters in (example7).

7a. Ágwó ágwòk égwòk ísígwòkkò ñgwòk 'You cannot be talking (boasting) while swimming'.

There is an alteration of the vowel /a/ word initially. In the process of producing the sequences in (7a), the sound of /a/ in the preceding words assimilates /e/ in /égwòk/ so that the word manifests as /ágwòk/. The sentence is hereby presented at both underlying and phonetic representations in (7b).

7b. /ágwó ágwòk égwòk ísígwòkkò ñgwòk/ →
[ágwó ágwòk ágwòk ísígwòkkò ñgwòk] /e/ → [a]

Vowel alteration here involves a change in the vowel feature or quality. The change is influenced by a form of segment spreading, where a vowel of a preceding or following word spreads within a sequence and displaces an inherent vowel in an adjacent word. This is illustrated with the data in (8)

8. Abòm uɸàn ubòk ufòk úkòd. 'Breaking the wash hand basin of the in-law'
/abòm uɸàn ubòk ufòk úkòd/ → [ābòm āɸàn ābòkāfòk úkòd]
[ūbòm ũɸàn ũɸàn ũɸàn úkòd]
[ābòm abòm ũɸàn ũɸàn úkòd]

The alteration affects the initial vowel. The alteration is either leftward or rightward driven. In the first line, there is a replacement of the initial segment of the following words with /a/ based on the influence of the segment in the first word, which starts with /a/. The same process applies on other lines in a leftward manner. Observe that the alteration does not affect vowel internal segments /ɔ, o/ because they all have the same natural phonetic class [+ROUND]. Let us consider examples where the alterations are not restricted to any phonetic environment.

9. /úkeèd àdʒlɪd lɪdɪà èdɪà úduá/ (èdɪà úduá èdɪà úduá èdɪà úduá). 'We all eat yams from the market'.

/úkeèd àdʒlɪd lɪdɪà èdɪà úduá/ [èdɪà úduá', úduá úduá, úduá úduá úduá]
[èdɪà èdɪà, údɪà údɪà údɪà, údɪà údɪà]
[èdɪà èdɪà, èdɪà èdɪà, èdɪà èdɪà]
[údɪà údɪà, údɪà údɪà, údɪà údɪà]

In these twisters, one could not make distinctions in meaning between one word and the next because of the alteration of the vowels or

subtle changes in pronunciation, which is triggered by the spreading of the vowels in leftward or rightward directions. The last and the initial pairs of segments in a sequence also affect the free flow of segment production. Comparatively, the initial segments tend to become modified to accommodate the final segments of the proceeding words, leading to the manifestation of the final vowel on the initial position of adjacent words, which in turn results in segment replacement.

4.1.2 Sound change/Segment replacement

Another process involves phonological sound change, (Vitevitch, 2002). This is triggered by the influence of phonological neighbourhood on speech production. Only four tokens are used for illustration in this section as shown in (10-13). Consider the data in (7), repeated here as (10).

10. Ágwó ágwòk égwòk ísígwòkkò ñgwòk. 'You cannot be talking (boasting) while swimming'.

i. /ágwó ágwòk égwòk ísígwòkkò ñgwòk/
ii. /ñgwòk ñgwòk ñgwòk ísínwòkkò ñgwòk/ [V] → [NASAL]
iii. /ñgwòk ñgwòk ñgwòk íkínwòkkò ñgwòk/ /s/ → [k]
iii. /ágwò ágwòkò ágwò ísígwòkkò ñgwòk/ /k/ → [Ø], [Ø] → [ɐ]

The vowel at the word initial position changes to a syllabic nasal in (ii), while /s/ changes to [k] in (iii).

At the same time, there is an insertion of /ɔ/ at the final position in (iii), after the weakening of /k/ which manifests as [ɐ]/k/ is replaced with the fricative [ɐ] in (iii), but /kk/ is not affected since there is no preceding phonetically similar segment that can trigger the change.

This shows that /gʷ/ is not closed enough to influence the sound effect of /kk/.

The insertion of /ɔ/ is triggered by the weakening of /k/. This shows that there is a rapid alternation between similar but distinct phonemes. Another tongue twisters with alternating segments is presented in (11), to show the effects of segment juxtaposition in fast speech.

11. /lmúk ékpé ákpòkkò úbòk lsòŋ/ 'A stunted person'.

This phrase manifests phonetically in three different ways:

i. /lmúk ékpé kpòkkò úbòk lsòŋ/ /a/ → [Ø]
ii. /émúk ékpéékpékkéebòk lsòŋ/ /i, u/ → [e], /ɔ/ → [e]
iii. /lmúk íkpé íkpikke íbòklsòŋ/ /e, a, u/ → [i], /ɔ/ → [i]

The data in (11) is a good example of changes involving vowel sounds. The data shows that /i/ is replaced with [e], while /ɔ/ is replaced

with [e] in (ii). In (iii), /e/ is replaced with [i], and /o/ is replaced with [i]. The rationale for the changes are for the purpose of ease of articulation, to maximize speed and preserve energy. The data in (10 & 11) are good illustrations of segment replacement involving vowels. In what follows, we shall draw examples from another data to reflect changes in sounds as they affect Anaañ consonants using the examples in (12).

12. Ákók á!tón ájùppó ákòk àtón, ákók á!tón ájùppó ñsúkàràrà.
'A man who hates his own brothers'

The example in (12) shows a repetition of the initial segment in all the words except the last one. There are cases of segment replacement in the course of producing each of these phrases in fast and repeated speech. This is illustrated in (13).

13.

- i. /ákòk á!tón ájùppó ákòk àtón, ákók á!tón ájùppó ñsúkàràrà/
ii. /ákòk á!tón ájùkkó ákòk àtón, ákók á!tón ájùkkó ñsúkàràrà/ /pp/ → [kk]
iii. /átòk á!tón ájùttó átòk àtón, átòk á!tón ájùttó ñsútàtàrà/
/k/ → [t], /pp/ → [tt], /r/ → [t]
iv. /akón á!tón ájùttó ákón àtón, ákón á!tón ájùttó ñtútàtàrà/
v. /o/ → [o], /k/ → [n], /s/ → [t]

In (ii), /pp/ in the third word is replaced with [kk]. In trying to move from one word to the other, there is a jump of the original segment into a following or preceding adjacent word, which triggers a change in the phonetic form of the words.

The tongue tries to move from /pp/ to the next consonant /k/, but one sound is displaced and replaced with a phonetically similar consonant to the right for ease of pronunciation and economy of energy/time. This replacement cuts across /pp, k, r, s/, which manifest as [kk, t, t, tt] respectively.

4.1.3 Assimilation

Assimilation is a process where segments are modified to accommodate the feature specifications of adjacent or distant segments (Fromkin 1971). It is a phenomenon where sounds look more alike in the course of pronunciation or analysis. Segments in words when produced in isolation are different from those produced in a stretch of speech. Sounds kept changing to accommodate features of adjacent segments. Let us consider the four examples in (14).

14. i. Mkpá!nuún Mkpá!nuún kàppá dük ùfién kàppá dük ùdóm.

'Confusion, confusion, confusion'.

- ii. Mkpùtātāppá tāppá jòhò èkpāñ. 'Touch anybody that comes your way'.

- iii. Mmótò mbàkalá átò jén mbàkalá k'úsùñmbàkalá ágwòd.

'White man's car hits white man's child on a white man's road and killed'.

- iv. /ákpòñ ísídàkkáké íkpòñ ákpòñ, ákpòñ ákpédàkká ákpòñ àkpòñ, ákpòñ ákpá/

'A namesake cannot be separated from his namesake, if a namesake is separated from his namesake, the namesake will die'.

The production of each of these examples in fast speed shows the manifestation of different forms of consonant assimilation at different positions of the words in a sequence as illustrated in (15-17)

15. /m̀kpá!nuún m̀kpá!nuún kàppádük ùfién kàppá dük ùdóm/

The phoneme /kp/ which occurs at the medial position of the words, interacts with the velar and bilabial stops in a sequence, so that the segments, when produced in repeated/fast speech manifest differently as presented in (ii-iv).

- i. m̀kpá!nuún m̀kpá!nuún kàkpá dük ùfién kàkpá dük ùdóm/
/pp/ → [kp]
ii. /m̀kpá!nuún M̀kpá!nuún kpàkká dük ùfién kpàkká dük ùdóm/
/pp/ → [kk]
iii. /m̀kpá!nuún M̀kpá!nuún kpàkpá dük ùfién kpàkpá dük ùdóm/
/k/ → [kp]

The initial segment /m/, in the first two words is not affected by this alteration. The changes affect the velar and the bilabial stop segments only. This is also the case with /m/ in the following data.

16.

- i. /m̀kpùtāatāppá tāppá d͡ʒòwò èkpāñ/
ii. /m̀kpùukpàakpàkpá kpàkpá d͡ʒòwò èkpāñ/ /t/, /pp/ → [kp]
iii. /m̀kpùtāatākká tāká d͡ʒòwò èkpāñ/ /pp/ → [kk]

The sounds /t, pp, / assimilate the distant consonant /kk, kp, / as shown:
/pp/ → [kk] ~ [kp]; /t/ → [kp]
Let us consider the example in (17).

17.

- i. /ákpòñ ísídàkkáké íkpòñ ákpòñ, ákpòñ ákpédàkká ákpòñ ákpòñ, ákpòñ ákpá/

The repetition of these sentences contributes to the assimilation of alternate phonemes in the same position. The segments that are highly affected are the alveolar and velar segments. /kp/, which occurs at the medial position of the first word, spreads to assimilate the second word at the same phonetic environment. This occurs in all the words, for ease of pronunciation as seen in 17(ii & iii)

- ii. /ákpòŋ íkpídàkkáké íkpòŋ ákpòŋ, ákpòŋ ákpédàkkà ákpòŋ ákpòŋ, ákpòŋ ákpá/
 iii. /ákpòŋ íkpíkàkkáképé íkpòŋ ákpòŋ, ákpòŋ ákpékpàkkà ákpòŋ ákpòŋ, ákpòŋ ákpá/ /s, d, k/ → [kp]
 /s/ → [kp]
 /d/ → [kp]
 /k/ → [kp]

Observe that since the word in the sequence all have similar initial segments, it blocks all forms of assimilation at this position. At the same time, where the medial segments in the word sequence all have the same phonetic sound, such sounds remain unaltered. This therefore confirms the assumption that alternate segments trigger assimilation faster than phonetically similar segments in all positions Sardat et al (1994). In what follows, we shall consider changes that occur in words with assonance.

4.1.4 Reduplication/Repetition

Repetition here involves the reduplication of segments across word boundary, thereby making the tongue to get jumbled up and leading to the doubling of the words in a sequence. This is illustrated with the data in (18-20).

18. i. /ámá ágwò ánáám ágwò/ 'It is a friend that betrays his best friend'.
 ii. /ámán ágwò ámán ágwò/
 iii. /ánám ágwò ánáám ágwò/
 iv. /ámá ágwò áamá ágwò/
 v. /ánán ágwò ánán ágwò/

Repetition in (18) does not trigger any change in the vowels at the word initial position, rather it affects only the nasal consonants, which manifests in a form of word play, where /n/ is replaced with [m] and vice versa so that /ánám/ → [ámán],

$C_1C_2 \rightarrow C_2C_1$
 /n/ → [m], /m/ → /n/

There is an interchange between /n/ & /m/, which in turn results in the change of the meaning of the sentence in (ii-v) as illustrated below:

/amá/ 'lover', becomes [ánám, anán, ánáam] 'meaningless'
 /ánám/ 'cause' becomes [ámán, ánán, áamá] 'meaningless'

The interchange gives room to word reduplication in (18 ii-v).

Anaañ is an agglutinating language that combines many word forms into a single word. In this case, speakers are constrained to how to produce what. All nouns begin with a vowel or syllabic nasal, while verbs take on syllabic prefix. This, in essence makes Anaañ have lexical items with word initial syllabic segments. Therefore, jumping from word final consonant to the vowel of a following word looks time consuming and causes confusion in illustrated with words in (examples 20-21), using the data in (19).

19. i. Afia áfòn áfòn áfòn áfiòn. 'White material is good for moonlight outfit'.
 ii. Ámáámáná, át' ámámáná, mímáámáná mímáánámámáná 'Before Abraham I was'.
 iii. Ámáánèn ábòhò, ánéénèn ákéénéùlén. 'When you are too rigid, you die in your rigid way'.
 iv. Íchíp útùd úbiòm úfòk ànné. 'The palm kernel in my grandmother's kitchen'.
 v. Íkòròsl ádè íkòròsl íkòròsl íkànná íkòròsl. 'All motor cycles have the same quality'.
 vi. Úkéèd àjld ldiàèdià úduá (èdià úduáèdià úduá èdià úduá). 'We all eat yams from the market'.

20.

- i. /afia áfòn áfòn áfòn áfiòn/
 ii. /afiòn áfiòn áfiòn áfiòn áfiòn/
 iii. /afòn áfòn áfòn áfòn áfòn/
 iv. /afòn áfòn áfònáfòn áfiòn/
 v. /afion áfiòn áfiòn áfiòn áfiòn/

In these twisters, one could not make a distinction in meaning between one word and the next because of the continuous repetition of words in the sequence. The subtle changes in pronunciation trigger reduplication in (ii-v). Alteration here therefore involves a high rate of error. Observe also that there is an aspect of vowel reduction, where the diphthong in /afia & áfiòn/ is reduced to pure vowel without any trigger. This is not the case in examples in (21 a - c).

21. a. i. /íkòròsl ádè íkòròsl; íkòròsl íkànná íkòròsl/
 ii. /íkòròsl íkòròsl íkòròsl íkòsi íkòròsl/

- b. i. /Ámá ànèn ábòwò, ànéenèn ákèenè Unén/
 ii. /Ámánèn ànéenèn ànéenèn Unén/
 c. i. /Ámàámàná, àt' àmámàná, mímàámàná mímàaná mímàná/
 ii. /Ámàámàná, amámámàná, mímàámàná mímàaná mímàná/

The data presented make use of a combination of repetition and rhyme. There is a rapid alternation between similar but distinct phonemes so that the distinct phonemes are dropped and replaced with similar phonemes in (ii). The twisters here rely on two or more sequences of sounds that require the repositioning of the tongue between sounds, then the same sounds are repeated in a different sequence.

One can therefore say that words with similar initial phonemes pose problem of pronunciation when there is a shift to adjacent words with alternating segments. The reader therefore tends to pronounce the similar words repeatedly and eliminate the non-similar sequences. As observed earlier, the repetitions produce results that are humorous, when they are mispronounced, while others simply rely on the confusion and the mistakes of the speaker for their amusement value.

4.1.5 Shortening/deletion

Word repetition triggers word shortening and segment deletion. For instance, /íkòròsì/ is shortened to /íkòsi/ in (23a). The forms /ade/ & /ikanna/ are deleted rather than being shortened. In the process of shortening the word, the penultimate syllable /ro/ gets deleted. The diphthongs /ia, iò/ in example (21 above) are shortened to pure vowels in (22 ii & iii).

- i. /afia áfiòŋ áfòn áfòŋ áfiòŋ/
 ii. /afòŋ áfòŋ áfòŋ áfòŋ áfòŋ/
 iii. /afòn áfòŋ áfòn áfòn áfiòŋ/
 /afia áfiòŋ/ → [áfòŋ áfòŋ].

23. i. /imúk ékpè ákpòkkó úbòk ìsòŋ/ 'a stunted person'.
 ii. /lmúk ékpè kpòkk úbòk ìsòŋ

Apart from syllables and words, initial and final segments always stand the risk of being deleted in the context of tongue twisters. In the examples in (23), the initial and final segments /a, & w/ in /ákpòkkó/ is deleted as represented here /lmúk ékpè kpòkk úbòk ìsòŋ/. This same process cuts across the data in (14 above), repeated here as (24).

24. Ágwó ágwòk éwòk ísíwòkkò ñgwòk. 'You cannot be talking (boasting) while swimming'.

/ágwó ágwòk égwòk ísígwòkkò ñgwòk/ →
 [ágwó ágwòk agwòk ísígwòkkò gwòk]
 [ágwòwò ágwòwòágwò ísígwòkkò ñgwòk]

The syllabic nasal is deleted and the slot is replaced with a vocalic segment so that we have

[ágwó ágwò agwòk ísígwòkkò agwòk].

In another instance, /k/ is deleted in [ágwòwò ágwòwòágwò ísígwòkkò ñgwòk].

This process cuts across almost all the data. What is worth knowing is that deletion here does not respect the conditioning factors as specified in the phonology of Anaañ (Udoh 1998).

4.1.6 Weight reduction

Segment deletion most of the time, results in weight reduction of the affected syllable in the word. In Anaañ, as well as other Lower Cross languages, a CVC or CVV syllable structure counts as a heavy unit, while V or CV structure counts as light syllable (Udoh 1998). Let us consider the example repeated as (25).

25. mīkpūtātāppá tāppá dzówò èkpán. 'Touch anybody that comes your way'.

- i. /mīkpūtātāppá tāppá dzówò èkpán/
 ii. /mīkpūukpāakpākpā kpākpā dzówò èkpán/ /t/, /pp/ → [kp]
 iii. /mīkpūtātākká tākka dzówò èkpán/ /pp/ → [kk]

There is the reduction of the weight unit of the fourth and sixth syllables, when the coda of the syllable is released to open the initial syllable in /tap/. /p/ is deleted without any replacement. This deletion follows the displacement of the following /p/, which forms a part of the following syllable. The second /p/ has to go since the two segments were true geminates, rather than being altered by any phonological or morphological process. True geminates must obey the principle of inalterability, which constrained the alteration of one part of the geminate by any phonological process. Therefore /pp/ is deleted and replaced with /kp/.

- iv. /mīkpū-tāa- tāap- pá tāap- pá/ →

[mīkpūu-kpāa- kpā- kpākpā-kpā]

N-CVV-CVV-CVC-CV CVC-CV → N-CVV-CVV-CV -

CV CV-CV

The weight unit of the penultimate syllable of the first word and the initial syllable of the following word have been reduced from a heavy [CVC] to a light [CV] syllable structure.

4.1.7 Tonal Rhythm

The rhythm of words in a sentence is determined by the tonal melody Carrot et al(2006). Tongue twisters actually evolve around segment interaction error (Hahn & Bailey 2005), where segments interchange by perseverating or anticipating another segment within a word or elsewhere. The error does not affect the tonal melody of the token.

26. Abòm ùhàn ubòk ufòk ukòd. (Breaking the wash hand basin of the in-law).

/abòm uʃàn ubók ufók ukòd/

/əbòm əʃàn əbók əfók ukòd/

/ʊbòm ʊʃàn ʊʃàn ʊʃàn ukòd/

/əbòm abòm ʊʃàn ʊʃàn ukòd/

Although there is an alteration of the segments in the sequence, the tonal structure remains unaltered because tone is a property of a syllable. This is to say that tone is used for the production of a syllable rather than a segment. Therefore, in as much as the syllable structure of the data is not altered, the tones will remain unaltered. In other words, when segments are altered, the tone remains unaltered. This confirms the assertion that tone has an autonomous feature of stability, where the deletion of a segment within a syllable may not affect the existence of the tone as represented in (22) repeated here as 27).

27.

i. /áfíà áfòṅ áfón áfòṅ áfíòṅ/ [LH, HL, HH, LL, HL]

ii. /áfíòṅ áfíòṅ áfíòṅ áfíòṅ áfíòṅ/ [LH, HL, HH, LL, HL]

iii. /áfòṅ áfòṅ áfón áfòṅ áfòṅ/ [LH, HL, HH, LL, HL]

iv. /áfón áfòṅ áfón áfòṅ áfíòṅ/ [LH, HL, HH, LL, HL]

v. /áfíòṅ áfíòṅ áfíòṅ áfíòṅ áfíòṅ/ [LH, HL, HH, LL, HL]

Despite the confusion or exchange of word/segment positions, the tonal melody remains unaltered. This therefore shows that tongue twisters are perfect instrument for the teaching/learning of tones. It should be noted that, the rhythm of the tone is created by the structure of the syllable. The rhythm is a combination of V-CV(C) (vowel, consonant-vowel) syllable

pattern. This is illustrated in (example 28), where [H] represents a high tone, [L] low tone, while [-] is a syllable boundary.

28. Akádá nkádá íhinné ubók ké èkpád akádá nkádá.
'A crafty person cannot cheat another crafty man'.

i. /à-ká-dáj-ká-dá í-ʃín-né ú-bók kéèkpád akádá nkádá/
V-CV-CV N-CV-CV V-CVC-CV V-CVC CV V-CVC V-CV-CV N-CV-CV

L H H H H H H H H L L L H H H H H
/à-ká-dáa - ń ká-dá- in -néú -úbók kéèkpád akádá nkádá/

ii. /akádá akádá íʃinné ubók kéèkpád akádá akádá/
L H H H H H H H H L L L L H H H H H

There is no monosyllabic word in (28), except for 'ke', which marks location. The locative marker does not exist independently in fast speech. The /e/ is always deleted, while the consonant moves to the following syllable to form a CV structure. The rhythm in each of the words is disyllabic, with a combination of two-three level tones. The number of the syllable determines the number of tones, since tone is said to be a property of the syllable.

4.1.8 Metathesis

Metathesis is a phonological process that involves the exchange of positions of segments within a word. There is a case of metathesis, which involves the restructuring of the segments within a word. Example,

29. /ètim itàm átámmá itim akétém ntém/ (rhyme)

/etim atamma itim aketem ntem / → [etim atamma itim aketem mten]
/ntem/ → [mten]
/1 2 3 4/ → [4 2 3 1]

The structure shows that there is a kind of exchange of positions in such a way that the initial segment shifts to the final position and vice versa. This process is very rare in Anaañ tongue twisters owing to the fact that Anaañ has restricted numbers of permissible segments at the coda position of the syllable or word final position. This makes most words end with a vowel. Such slips could also occur in the speech form of Anaañ learners of English in a word such as 'slippers'.

30. /slip-/ → [silp-]
/1 2 3 4/ → [1 3 2 4]

There is an interchange between /sli/ and /sil/. The segment /l/, which occurs after /s/, moves to the third position, while /i/ moves to the second position of the segment to produce 'silppers'.

From the analysis presented, it has been seen that, segment alteration occurs with increased speed in speech repetition. Although the alterations occur in form of slips, there is a high level of comprehension and communication by the interlocutors when dealing with tongue twisters.

The repetition effects in fast speech, always result in moving from meaningful to meaningless words/phrases or sentences. For instance, in the examples on the repeated forms in the data, meaning is lost in all the words owing to certain alterations. An observation of the data shows that it was difficult for participants to produce tokens with alternating segments in repeated and fast speech. This therefore resulted in various forms of sound change, slips, errors and confused segments.

Tongue twisters could induce different kinds of alternate segments, where vowels are replaced with consonants and vice versa. Switching from one segment to the other across word boundaries take more effort and time, and therefore triggers segment deletion, segment shortening, metathesis, assimilation, segment replacement, and a restructuring of the syllable structure. This, in essence shows that there is an interaction between segments that occur at word boundary in tongue twisting activities.

As observed earlier, tongue twisters effects manifest at phonetic and phonological levels in speech, leading to a form of slip in speech production. The quality of slips is influenced by the speed in the speech. The positions of the segments also affect pronunciation. Interaction between segments and word positions show that reversing the pairs is more confusable than repeating the whole phrase with the same order across pairs. This phenomenon is central to sounds rather than words. However, tongue twisters lines could be represented on print and electronic materials, for the purpose of documentation, to make it readable by a wider research community and preserve the genre from extinction.

5. Conclusion

In conclusion, tongue twisters evolve around segment arrangement, sounds repetition, adjacency, and the state of the mind of the speaker. The strange and unusual selection and arrangement of sounds in tongue twisters make it more entertaining because listeners make fun from the errors emitted in tongue twisters, whereas errors are not tolerated in normal speech.

When certain combinations of sounds are produced quickly, speakers tend to lose control of their articulators and jump from one sound to another. The production process requires planning on how to cascade from the mental/phonological planning stage to the actual articulation, which entails how to combine the articulators with the manner in which the speech producing mechanism operates. Therefore when certain confused sounds are arranged in a sequence, the speaker will have to adjust the articulators to accommodate the articulation of the sound in the sequence, which is time consuming, energy sapping and cumbersome. Speakers rather tend to adjust towards sounds that are produced with ease.

When the articulation process is repeated, speakers also try to avoid difficult sounds in the sequence and replace such difficult sounds with a simpler one. Therefore, when tokens are repeated, adjacent sounds become merged, changed, deleted or replaced in the course of speech production.

On the whole, this phenomenon does not occur on word list twisters but on sentence/phrase twisters. Tongue twisters processes involve cascading from planning process to actual articulation. One can therefore conclude that the phenomenon centres on wrapping of the articulators in speech production performance. An experimental analysis on the Anaañ tongue twisters should be carried out in subsequent research to unravel more information on the trigger and effects of tongue twisters. This paper serves as the basis for the understanding of the interface between language rhyme, game and linguistics.

End notes

¹This paper is a part of an on-going larger research on Anaañ folklore. The paper has three phases. The second and third phases are still at the preparatory stage. We are grateful to all contributors especially, the respondents who provided the data that were extracted and used for this work.

The word 'tongue twisters' is used in its singular form in this work. Therefore it takes a singular verb marker.

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Appendix

Data on Anaañ tongue twisters

Tongue twisters with alternating segments in the same phonetic environments

- i. Akpõñ isidakkaké ikpõñ akpõñ, akpõñ akpédakka akpõñ akpõñ akpõñ akpá.
A caretaker cannot abandon his ward, lest the ward will die.
- ii. Akadá nkadá ichinné ubók kéekpad akadá nkadá.
A crafty person cannot cheat another crafty man.
- iii. Akoókó nkókó adia etók etók, abum inua ké ntónadia s'ikpõñ.
You earn as you work.
- iv. Aakpók fap ékpád akpáb, fap fiõnnõ.
The lizard slip, as you climb a giant tree.
- v. Akpòkòèkòd akpòkò ékòd akíkò únén.
A cock with a bald head.

Use of words with similar phonemes in the same phonetic environments

- v. Mkpá!nuún Mkpá!nuún kappá duk ufién kappá duk udóm.
Confusion, confusion, confusion.
- vi. Mkpùtáatappá tappá yohóèkpán.

Touch anybody that comes your way.

- vii. Mmótò mbakalá átò jén mbakalá k'úsún mbakalá ágwòd.
White man's car hits white man's child on a white man's road and killed.
- viii. Tùm diáidia tùm díduk- As you go out, come back in safety.

Tokens with repeated words

- vi. Amáamáná, áte' amáamáná, mímáamáná mímáamáná mímáná.
Before Abraham I was.
- vii. Ètónkàakád áttippéñsúkàakád, ñsúkàakád áttippé íbón.
One thing leads to another.
- viii. Íkòròsl áde Íkòròsl Íkòròsl íkànná Íkòròsl.
All motor cycles have the same quality.
- ix. Mmótò mbakalá átò jén mbakalá k'úsún mbakalá ágwòd.
The white man's car hit a white man's child on a white man's road.
- x. Ntaatáñtáatám, ntaatáutód.
I eat all forms of insects.

Repetition of words/segments at irregular pattern

- xi. Abòm uchán ubók ufók ukót.
Breaking the wash hand basin of the in-law.
- xii. Afia afón afón afón afón.
White material is good for moonlight outfit.
- xiii. Ágwó ágwók éwók ísíwókkónígwók.
You cannot be talking (boasting) while swimming.
- xiv. Ákók á!tón ájuppó ákók átón, ákók á!tón ájuppónsúkàràrà.
A man who hates his own brothers.
- xv. Amá ágwó anám ágwó.
It is a friend that betrays his best friend.
- xvi. Amaamá akémánjá, njá akémákwò.
Amaama loves Nya, Nya loves Ikwo.
- xvii. Amañen abòhò, anéñen akéñéñén.
When you are too rigid, you die in your rigid way.
- xviii. Íchíp útùd ubiòm ufók ànné.
The palm kernel in my grandmother's kitchen.
- xix. Íkòlkòt áfàn átùdò ké íkòt áfàn.
Do not tell it to a third party.

- xx. Úkeèd àjld ldiàèdià úduà (èdià úduàèdià úduàèdià úduà).
We all eat yams from the market.

Phonological representation of selected pattern of repetitions

- xxi. Ágwó ágwòk éwòk ísíwòkkò ñgwòk →

- i. /ágwó ágwòk égwòk ísígwòkkò ñgwòk/ [unmarked]
- ii. /ñgwòk ñgwòk ñgwòk ísíñgwòkkò ñgwòk/ /a/ → [ŋ]
- iii. /ñgwòk ñgwòk ñgwòk íkíñgwòkkò ñgwòk/ /ísi/ → [íkí]
- iv. /ágwòk ágwòk ágwòk ísígwòkkò ágwòk/ /k, ŋ/ → [kò, ð]

- xxii. Ágwó ñkádá íchínné úbòk kéèkpàd àkádá ñkádá →

- i. /ágwó ñkádá ífínné úbòk kéèkpàd àkádá ñkádá/ [unmarked]
- ii. /ágwó àkádá íkínné úbòk kéèkpàd àkádá àkádá/ /t, b/ → [k], /ŋ/ → [a]
- iii. /ágwó ñtádá ítínné úbòk kéèkpàd àtádá ñtádá/ /t, k/ → [t]

- xxiii. Ákòk á!tón ájùppó àkòk àtón, àkòk á!tón ájùppó ñsúkàràrà →

- i. /ákòk á!tón ájùppó àkòk àtón, àkòk á!tón ájùppó ñsúkàràrà/ [unmarked]
- ii. /ákòk á!kón ájùkkó àkòk àkón, àkòk á!kón ájùkkó ñsúkàràrà/ /t, pp/ → [k, kk]
- iii. /átòk á!tón ájùttó àtòk àtón, àtòk á!tón ájùttó ñtúkatàrà/ /pp, k, s/ → [tt, t, s]

- xxiv. Àkoókó ñkòkkó àdià ètòk ètòk, àmùm ínùà ké ñtón àdià s'íkpon

- i. /àkoókó ñkòkkó àdià ètòk ètòk, àmùm únùà ké ñtón àdià siìkpon/ [unmarked]
- ii. /àkoókó kòkkó àdià atok atòk, ànin ínùà kekpon àdià kepon/ /ŋ/ → [Ø]
- iii. /àkoókó kòkkó àdià àtòk tòk, ànin ínùà te tòn, àdià te tòn/ /e/ → [a]

- xxv. Ákpòñ ísídàkkáké íkpòñ ákpòñ, ákpòñ ákpédàkkà ákpòñ ákpòñ, ákpòñ ákpà →

- i. /ákpòñ ísídàkkáké íkpòñ ákpòñ, ákpòñ ákpédàkkà ákpòñ ákpòñ, ákpòñ ákpà/

- ii. /ákpòñ íkpídàkkáké íkpòñ ákpòñ, ákpòñ ákpédàkkà ákpòñ ákpòñ, ákpòñ ákpà/
- iii. /ákpòñ íkpíkpàkkáképé íkpòñ ákpòñ, ákpòñ ákpékpàkkà ákpòñ ákpòñ, ákpòñ ákpà/ → /s, d, k/ → [kp]

- xxvi. Imúk ékpè ákpòkkò úbòk isòñ

- i. /Imúk ékpè kpòkkò úbòk isòñ/ /a/ → [Ø]
- ii. /Imúk ékpè kpekke ibòk isòñ/ /u/ → [i]
- iii. /emek ékpè kpekke ibòk isòñ/ /i/ → [e]

Yoruba Bare Nominals from a neo-Carlsonian Perspective

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Abstract

This paper, in honor of my valued colleague and long-time friend, Professor Akinbiyi Akinlabi, seeks to understand a corner of Yoruba grammar from the perspective of a theory of cross-linguistic variation within the tradition of formal semantics, also known as Montague grammar. The empirical phenomenon it focuses on is the semantics of nominal phrases with no overt determiner. The generalizations regarding the range of interpretations available to them come from Ajiboye (2005). These generalizations are analyzed within the neo-Carlsonian approach of Chierchia (1998) and Dayal (2004) and shown to have a principled explanation within this theory. The paper ends by noting the implications and consequences of this approach to Yoruba bare nominals. Among the issues touched upon is the use of covert type shifts instead of null determiners in the analysis of bare nominals in Yoruba and other such languages. Another issue is the relationship between the expression of number in the nominal system, the structural position of the bare NP, and indefinite readings. It also plays out some predictions of the neo-Carlsonian approach with regard to possible interpretations of bare nominals across languages. In some sense, then, this paper also contains suggestions for further work in this domain. Two articles that elaborate on the methodology used in this analysis are mentioned as possible resources for further work on the interpretation of bare nominals. I hope that modest though my foray into Yoruba linguistics may be, this new perspective may pique the interest of those more knowledgeable about Yoruba grammar and encourage further work on the semantics of Yoruba and other African languages.

1. Some Generalizations about Yoruba Bare Nominals

In a detailed study of Yoruba noun phrases, Ajiboye (2005) shows that bare NPs, noun phrases without overt determiners, can have a range of readings. In particular, they can have definite readings, they can have generic readings and they can have indefinite readings. Of course, each of these readings is only possible if the construction in which the noun phrase occurs and the

context in which the sentence is used can support the relevant reading. I give below one example for each of these readings.¹

Definite Reading:

1. a) I told my friend that a snake and a spider entered my house yesterday. He asked what I did to them and I said I killed the spider. He went further to ask about the snake then I said [1b].
- b) Èrù ú bà mí láti pa ejò.
Fear HTS catch 1sg to kill snake
'I was afraid to kill the snake.'

Ajiboye (2005: 146)

Generic Reading:

2. Aǵá máa-ní pa ebi sùn.
dog IMP seizes hunger sleep
'Dogs sleep without food.'

Ajiboye (2005: 157)

Indefinite Reading:

3. Aǵá pa ebi sùn.
dog seizes hunger sleep
'A dog slept without food.'

Ajiboye (2005: 157)

As interesting as the range of available readings is, it is also interesting to note that there are some readings that Yoruba bare nominals do not have. Of particular interest to us will be the fact that though they can have indefinite readings, they cannot have specific indefinite readings. As (4) shows, a determiner-like element is needed to obtain specificity:

4. Ó n wá [àga kan].
3sg Prog search chair spec
'He is looking for a certain chair that he sits on.'

Ajiboye (2005: 189)

Ajiboye translates *kan* as a specificity marker like *certain* but also notes that it is homophonous with the numeral 'one'. While this issue is interesting in its own right, I will not explore it further in this paper. The important point for us is the fact that a determiner is needed at all. One final point that is relevant is the fact that Yoruba bare nominals can be interpreted as singular or plural, at least in object position:

¹For the earlier work reported on here, I am indebted to many people who have responded to my ideas over the years. For what is new here, I thank Doug Pulleyblank for pointing me to Ajiboye (2005) and to my class at the African Linguistics School 3 in Ibadan (Nigeria) for helping me understand Yoruba nominals better. Finally, I am grateful to Jesse Law for feedback as well as for editorial help in getting this paper ready for publication. It goes without saying that all remaining inadequacies are my responsibility.

¹The example for the definite reading is from a footnote on pg. 146, which is minimally different from the one in the body of the text.

5. Moji rí [ejò] lónà oko.
 M. see snake on-path farm
 (i) 'Moji saw a snake on her way to farm.'
 (ii) 'Moji saw snakes on her way to farm.'

Ajiboye (2005: 224)

No doubt there is a lot more to be said about the data given above, but I am restricting myself to the facts reported in Ajiboye (2005) and setting aside other work on the topic. My goal in this paper is to provide a framework within which the generalizations listed above have a principled explanation. Section 2 introduces a theory of cross-linguistic variation, as presented in Dayal (2013).

2. The Neo-Carlsonian Theory of Cross-linguistic Variation

Chierchia (1998) put on the research agenda the goal of developing a theory of cross-linguistic variation in the domain of noun phrases. The response to this paper has transformed the empirical landscape, informing and deepening our understanding of the interpretive possibilities available across languages. This section presents the key ingredients of the theory.

The basic premise of the neo-Carlsonian position is that bare plurals refer to kinds, not only in the case of predicates that refer to the species as a whole but also in the case of object-level predication where ordinary individuals are required, as originally proposed in Carlson (1977). Their quantificational force, however, is governed by the same principles that Lewis (1975), Kamp (1981) and Heim (1982) demonstrated govern the quantificational force of regular indefinites.² In a generic statement, for example, a bare plural can have either (quasi) \forall force or \exists force, depending on whether it is interpreted in the restrictor or the nuclear scope. In an episodic statement, which does not have a tripartite logical structure, bare plurals are necessarily mapped into the nuclear scope and so have \exists force.

Chierchia takes this general approach a step further and proposes a cross-linguistic theory of noun phrase variation. Within the general perspective of flexible types (Partee 1986), he admits three basic operations for turning an NP with a predicative meaning (type $\langle e, t \rangle$) into an argument (type $\langle e \rangle$ or $\langle \langle e, t \rangle, t \rangle$), *nom*, *iota* and \exists :

6. a) *iota*: $\lambda P_t P_s$, if there exists a unique maximal entity in P ,
 Undefined otherwise.
 (Chierchia 1998: 346)
- b) *nom*⁽ⁿ⁾: For any property P and world/situation s ,
 $= \lambda s t P_s$, if $\lambda s t P_s$ is in K , undefined otherwise,
 where P_s is the extension of P in s and K is the set of kinds.
 (Chierchia 1998: 350-351)
- c) \exists : $\lambda P \lambda Q \exists x [P(x) \wedge Q(x)]$
 (Chierchia 1998: 359)

Of these, Chierchia considers the first two meaning preserving, in the sense that they map a predicate into an entity without introducing quantificational complexity. The first is *iota* which picks out the unique maximal entity in the extension of the predicate at the relevant situation, if there is one, and is undefined otherwise (Sharvy 1980). In English, this shift has a lexical exponent *the*, but in many languages it is a covert type shift. *Nom*, the kind forming operator of Chierchia (1984), is a function from indices to the maximal entity that is in the extension of the predicate at that index – that is, it yields the unique maximal entity that instantiates the kind at the index. *Nom* is defined to yield falsity rather than presupposition failure at indices where the extension of the predicate is empty. It is, however, a partial function because it is undefined for predicates that do not fit the concept of a kind: “not all individual concepts are going to be kinds. Only those that identify classes of objects with a sufficiently regular function and/or behaviour will qualify. Moreover, kinds...will generally have a plurality of instances (even though sometimes they may have just one or none). But something that is necessarily instantiated by just one individual (e.g., the individual concept or transworld line associated with Gennaro Chierchia) would *not* qualify as a kind” (Chierchia 1998: 350). The third type-shift \exists , from Partee (1986), not only turns a predicative expression into an argument, it also introduces \exists quantificational force. Since this yields an expression of the generalized quantifier type, it can interact scopally with other scopal expressions. Unlike the first two operations, \exists is a total function. In Chierchia's system, these possibilities are constrained by two principles specific to type shifts (7a,b).³

²Chierchia's stance on the ranking of covert type shifts has to be gleaned from two separate discussions. The distinction between languages with and without determiners leads him to rank *iota* and \exists at par (Chierchia 1998: 360-61). The distinction between English kind denoting and non-kind denoting bare plurals leads him to rank *nom* above \exists (Chierchia 1998: 374). The two positions are actually inconsistent, as pointed out in Dayal (1999, 2004). Some of the arguments from there are used to motivate the revision of (7a) in (18).

³Proponents of the ambiguity approach (Wilkinson 1991, Gerstner-Link and Krifka 1993, Kratzer 1995 and Diesing 1992, among others) take bare plurals to refer to kinds when they serve as arguments of kind-level predicates and to ordinary individuals when they serve as arguments of object-level predicates. The ambiguity approach and the neo-Carlsonian approach converge, however, on the need for a flexible mapping of noun phrases into the logical structure. For a comparison of the two approaches, see Krifka et al. (1995) and Dayal (2011a), in addition to the references mentioned here.

7. a) **Ranking:** $\text{nom} > \{\text{iota}, \exists\}$ to be revised (cf. 18)
 b) **Blocking Principle:** ('Type Shifting as Last Resort'): For any type shifting operation τ and any $X:*\tau(X)$ if there is a determiner D such that for any set X in its domain, $D(X) = \tau(X)$.
 (Chierchia 1998: 360)

Finally, there is the rule of DKP which mediates between a kind denoting term and a predicate of objects, a repair operation of sorts (8). It first takes the extension of the kind at an index, defined as in (9), converts it into a predicate of objects, and \exists binds into this predicate (8). Since this \exists is introduced at the point where the sort adjustment is required, it ensures obligatory narrow scope for its operand:

8. **Derived Kind Predication Rule (DKP):**
 If P applies to objects and k denotes a kind, then $P(k) = \exists x [\cup k(x) \wedge P(x)]$
 (Chierchia 1998: 364)
9. **PRED (\cup): $\cup k = \int \lambda x [x \leq k_s]$ if k_s is defined, $\lambda x[\text{FALSE}]$, otherwise where k_s is the plural individual that comprises all of the atomic members of the kind k .**
 (Chierchia 1998: 350)

With this much background, we can demonstrate how the theory captures the core facts related to bare plurals in two languages, English and Hindi. These two languages share the property of encoding number sensitivity in the nominal system while differing on the existence of determiners.⁴ Let us start with English, and consider bare plurals that are conceptually kinds:

10. a) Dogs have evolved from wolves.
 b) Typhoons arise in this part of the pacific.
 c) Dogs are barking.
11. a) $\text{evolve-from}(\cap \text{dogs}, \cap \text{wolves})$
 b) $\text{GEN } s \times [\cup \text{typhoons}(s)(x) \wedge C(s)] [\text{arise}(s)(x) \wedge (\text{in-this-part-of-the-P})(s)(x)]$

⁴ I am leaving out of this discussion an important aspect of Chierchia's proposal, the *Nominal Mapping Parameter*. Hindi and English have the same parameter setting [+arg, +pred], unlike Chinese which has the [+arg, -pred] setting and French which has [-arg, +pred] setting. These distinctions do not directly bear on the generalizations this paper focuses on. However, number specification in Yoruba nominals is quite complex and is critical in determining its status with respect to the *Nominal Mapping Parameter*. See section 4 for a very brief discussion of this issue.

- b') $\text{GEN } s \times [\text{this-part-of-the-P}(s)(x) \wedge C(s)] [\text{arise-in-}x(s)(\cap \text{typhoons})] = \text{DKP} \Rightarrow \text{GEN } s \times [\text{this-part-of-the-P}(s)(x) \wedge C(s)] \exists y [\cup \text{typhoons}(s)(y) \wedge \text{arise-in-}x(s)(y)]$
 c) $\exists [\text{are-barking}(s)(\cap \text{dogs})] = \text{DKP} \Rightarrow \exists x [\cup \text{dogs}(s)(x) \wedge \text{are-barking}(s)(x)]^5$

Since *evolve* is a kind level predicate, and the predicates *dogs* and *wolves* have the requisite intensionality, *nom* turns them into arguments which can be fed into the verb meaning directly. In the case of *arise*, which is an object-level predicate in a characterizing sentence, we have a tripartite structure and depending on what goes into the restrictor of the GEN operator, we get distinct truth conditions for the bare plural. (11b) uses PRED to shift the type of the bare plural from kind to predicate and generically bind it. It says of typhoons in general that they arise in this part of the Pacific. In (11b') the bare plural is mapped into the nuclear scope and serves as the argument of the verb *arise*. Since *arise* cannot hold of the kind, only of instantiations of the kind, DKP comes into play. (11b') says that it is generally true of all contextually relevant situations involving this part of the Pacific, situations in which the climactic conditions are conducive, that there are typhoons that arise. Similarly, in the case of the episodic statement in (10c), DKP negotiates the relationship between an object-level predicate and a kind level argument, as shown in (11c).

It is worth noting that the truth conditions associated with (11c) are the same as those of a corresponding statement with an overt indefinite. However, a difference shows up in scopal contexts. Take, for example, the negative statements in (12), under the LF where the bare plural/indefinite outscopes negation (see Dayal, 2011b for differences between narrow scope readings for kind terms and incorporation):

12. a) Dogs are not barking.
 b) Some dogs are not barking.
13. a) $[\text{dogs}_i [\text{not } [t_i \text{ are barking}]]]$
 b) $\lambda x_i [\text{not } [x_i \text{ are barking}]](\cap \text{dogs})$
 $\Rightarrow \neg \text{are-barking}(s)(\cap \text{dogs})$
 $= \text{DKP} \Rightarrow \neg \exists x [\cup \text{dogs}(s)(x) \wedge \text{are-barking}(s)(x)]$
14. a) $[\text{Some dogs}_i [\text{not } [t_i \text{ are barking}]]]$
 b) $[\text{some dogs}] (\lambda x_i [\text{not } [x_i \text{ are barking}]])$
 $\Rightarrow \lambda Q \exists x [\text{dogs}(s)(x) \wedge Q(x)] (\lambda x_i [\neg \text{are-barking}(s)(x_i)])$
 $\Rightarrow \exists x [\text{dogs}(s)(x) \wedge \neg \text{are-barking}(s)(x)]$

⁵ I assume that the situation variable in episodic statements is indexical, rather than existentially bound, though nothing of relevance to the issues discussed here rides on this.

Since the bare plural is individual denoting (type $\langle s, e \rangle$), it gets lowered into the argument position of the negative predicate. When DKP adjusts the mismatch between *barking* and \cap dogs, \exists enters into the derivation necessarily below negation. The regular indefinite, on the other hand, is a generalized quantifier, which means that it enters into an operator-variable relation with its trace and therefore can have scope over negation. Appealing to reference to kinds for bare plurals and to a generalized quantifier meaning for indefinites thus yields the radically different truth conditions observed in such cases.

Chierchia's basic system preserves the original insights of Carlson's account, accommodating for advances in our understanding of external sources of quantificational force for indefinites (see also Carlson 1989 on this). Briefly put, the key insight is that the semantic *type* of the bare plural ensures that it will always be interpreted closest to the verb, but its *sort* forces \exists to be introduced at the level of the mismatch, i.e. at V, below any other operator.

We now turn to those aspects of interpretation that are specific to Chierchia's system: namely the *blocking principle* and *ranking* (cf. 7). We start with the fact that bare plurals in English do not admit definite readings (15a), while those in Hindi do (15b):

15. a) Some children_i came in. Children_i sat down.
 b) kuch bacce_i andar aaye. bacce_i baiTh gaye.⁶
 Some children inside came children sit went
 'Some children came in. The children sat down.'

The explanation for this difference follows straightforwardly from *blocking*. Since *iota* is lexicalized in English, the definite plural must be used in this context and covert type shift for the bare plural via *iota* is ruled out. Since Hindi does not have a lexical determiner, the bare plural is free to shift via *iota*. This seems to be generally representative of languages with and without determiners and thus seems to be a welcome prediction of the theory.

The ranking of type shifts becomes important when we turn to English bare plurals that do not denote kinds. They differ from kind terms in allowing wide scope over negation:

16. a) Parts of this machine are not new.
 b) $\exists x$ [parts-of-this-machine(s)(x) \wedge \neg new(s)(x)]

Carlson (1977) notes that such bare plurals refer "to a FINITE set of things, things that must exist at a certain time in a given world" (*emphasis his*

- pg. 196). As such, they do not display the kind of intensionality associated with kind terms. For Chierchia, this means that such bare plurals are not in the domain of *nom*. Since *iota* is lexically blocked by *the*, the bare plural now shifts via the low-ranked \exists type shift and predictably displays the same scopal flexibility that characterizes regular indefinites (see Dayal 2013 for further discussion).⁷

As pointed out in Dayal (1999, 2004), the ranking proposed by Chierchia requires revision since it does not capture the facts that he wants to capture. For example, it is predicted by the ranking in (7a) that the definite reading of bare plurals in languages like Hindi would not be available because of the availability of the higher ranked *nom*. But the ground reality is that *nom* and *iota* do not compete – Hindi bare plurals are acceptable with kind level predicates, in addition to having definite readings.⁸ There is a further problem noted there with respect to the indefinite readings of bare plurals in languages without determiners. The scopal properties of such bare plurals are precisely those of English bare plurals – they obligatorily take narrowest scope. In other words, bare plurals can have definite readings or DKP-based narrow scope \exists readings, but they do not have the wide scope readings associated with \exists type shift:⁹

17. vahaaNbaccenahiiNhaiN¹⁰
 There children not be
 'There are no children there.' or 'The children are not there.'
 NOT 'Some children are not there.'

This point is worth emphasizing. The popular view that bare plurals in languages without determiners can be definite or indefinite is simply not supported empirically. What this means for the theory is that we do not want bare plurals in such languages to be able to access \exists type shift. This is accomplished by revising the ranking in the following way:

18. $\{nom, iota\} > \exists$ (Dayal 2004: 419)

⁷Chierchia argues that *some* is not a lexical exponent of \exists , unlike *a*, which is. Thus it does not block the application of \exists here. Bare singulars are ruled out because they are not in the domain of *nom*, and *iota* and \exists are lexically blocked. Crucial to the distinction between *some* and *a* is that only the latter lends itself to binding by a generic operator.

⁸The idea that Hindi bare nominals are ambiguous between kind terms and definites, not true indefinites, was first proposed in a joint paper (Porterfield and Srivastav 1988). The facts generalize beyond Hindi to other typologically unrelated languages such as Russian and Chinese. On the latter, see also Yang (2001).

⁹The two available readings may have different intonational contours and might need different contexts to make them salient. Neither intonation nor context can make available a wide scope \exists reading, a reading in which the predication only applies to some of the relevant individuals. An overt indefinite *kuch bacce* 'some kids' or *ek baccaa* 'one kid' would have to be used to convey the intended meaning.

¹⁰N indicates nasalization of the immediately preceding vowel.

⁶T is a retroflex voiceless stop, d is a dental stop, h following a stop indicates aspiration.

In this section, I have presented the details of Chierchia's system at work, in preparation for the discussion to follow. I now return to Yoruba and look at the generalizations noted in section 1 from the neo-Carlsonian perspective.

3. The Yoruba Generalizations Revisited

Ajiboye (2005) does not tell us whether Yoruba bare nominals are kind terms. However, given that it lacks determiners and nouns are number neutral, we can assume that they are acceptable as arguments of predicates that apply only to the species as a whole, such as *evolve* or *be extinct*. Making this simple assumption, we now proceed to show how each of the available readings would be derived and the unavailable reading ruled out.

On the present account, the bare NP has a property level meaning and can undergo either of the two higher ranked type shifts, *nom* or *iota*, since there is no overt determiner in the language and the bare nominal occurs in argument position. We first analyze the definite reading in (1). We have the derivation in (19) if *iota* is used:¹¹

19. [Èrù ùbà mílátì pa ejò]
 = $\lambda x \lambda y [\text{afraid-to-kill}(y)(x)] (\lambda z \text{snake}(z)) (I)$ *lexical meanings*
 = $\lambda y [\text{afraid-to-kill}(y)(I)] (\lambda z \text{snake}(z))$ *lambda conversion: subject term*
 = $\lambda y [\text{afraid-to-kill}(I)(y)] (\text{iota}(\lambda z \text{snake}(z)))$ *type repair: iota*
 = $\text{afraid-to-kill}(\text{snake})(I)$ *lambda conversion: object term*

The other two readings can be derived if the bare nominal undergoes the *nom* type shift, followed by either generic binding or DKP-based \exists binding. In both cases, the predicate applies not to the kind as a whole but to ordinary individuals. This requires the mediation of the operation *pred* which yields the set of instantiations of the kind at the relevant index. The generic reading in (2) is derived as shown below:

20. [Ajá [máa-ní pa ebisùn]]
 = $\lambda x [\text{sleep-without-food}(x)] (\lambda z \text{dogs}(z))$ *lexical meanings*
 = $\lambda x [\text{sleep-without-food}(x)] (\text{nom}(\lambda z \text{dogs}(z)))$ *type repair: nom*
 = $\lambda x [\text{sleep-without-food}(x)] (\cap \text{dogs})$ *lambda conversion*
 = $\text{sleep-without-food}(\cap \text{dogs})$

¹¹ Yang (2001) uses *nom* to derive the definite reading for Mandarin bare nouns. See Dayal (2011a) for discussion.

- = $\text{GEN } s \times [\cap \text{dog}(s)(x) \wedge C(s)] [\text{sleep-without-food}(s)(x)]$ *sort-adjustment*
via pred, followed by binding by GEN

The generic operator in (20) is contributed by a combination of the lexical properties of the predicate and the aspectual specification on the predicate. The indefinite reading in (3) comes about because it is an episodic statement, where the aspectual specification triggers the rule of DKP:

21. [Ajá [pa ebisùn]]
 = $\lambda x [\text{slept-without-food}(x)] (\lambda z \text{dogs}(z))$ *lexical meanings*
 = $\lambda x [\text{slept-without-food}(x)] (\text{nom}(\lambda z \text{dogs}(z)))$ *type repair: nom*
 = $\lambda x [\text{slept-without-food}(x)] (\cap \text{dogs})$ *lambda conversion*
 = $\text{slept-without-food}(\cap \text{dogs})$ *lambda conversion*
 = $\exists x [\cap \text{dogs}(x) \wedge \text{slept-without-food}(x)]$ *sort adjustment via pred*
and \exists binding via DKP

The formulas representing the generic and indefinite readings of Yoruba bare nominals in (20)-(21) closely mirror the formulas for these sentences given by Ajiboye (2005), but for the fact that bare NPs are treated as kind denoting. The difference lies in the fact that the neo-Carlsonian approach makes a prediction about non-specific vs. specific readings of bare nominals. Kind denoting terms can have indefinite readings, but such readings are necessarily narrow scope readings. The \exists -type shift that would have made wide scope readings possible does not come into play, being lower ranked than *iota* and *nom*. This explains the fact that in (4) an overt determiner-like expression *kan* is needed to derive specificity. The theory also explains why definite readings as well as narrow scope \exists are available for bare nominals in the language.

4. Some Further Issues

We have seen how some generalizations about the interpretations of Yoruba bare nominals can be explained when they are viewed through a neo-Carlsonian lens. In this last section, I will look at three issues that remain open.

I have analyzed the bare nominal as an NP which becomes an argument through covert type-shifting, rather than a DP with a null determiner as Ajiboye (2005) does. I believe the essentials of the neo-Carlsonian analysis can transfer over to approaches that posit null determiners but only if the principles of *blocking* and *ranking* are revised to make reference to null determiners, instead of covert type-shifts, as it currently does. For example, *blocking* would have to apply to the

interpretation of null vs. overt determiners and *ranking* would have to state that the lexical meanings of null determiners follow the hierarchy in (18). I leave it to the reader to decide if these modifications lead to a theory that is preferable to what we have sketched out in sections 2 and 3.

The second open issue pertains to the status of number specification in the bare nominal. The example in (5), showing that Yoruba nominals are number neutral has the bare nominal in direct object position. Dayal (2017 and forthcoming) emphasizes the need to study bare nominals in a range of argument positions before drawing conclusions. This is important because the direct object position lends itself readily to pseudo-incorporation and complex predicate formation and there may well be effects noted with direct objects that are not replicated in other positions. One might ask, of course, why this should be important. In determiner-less languages like Hindi or Turkish (see Sag forthcoming on the latter), singular terms are not as readily interpreted as indefinite as plural terms, except in direct object position. The reason for this is that there is a difference between singular kind terms and plural kind terms, such that DKP-based indefinite readings are not possible for the former (Dayal 2004).¹² If Yoruba bare nominals are like singular terms, they should not lend themselves to indefinite interpretation generally. But we see that the Yoruba subject bare nominal in (3) is translated as an indefinite. The explanation we have proposed relies on utilizing DKP so it is crucial to come to a determination about the status of the bare NP. If it turns out to be a singular term we must go back to the drawing board since *nom*, and therefore *DKP*, will not apply. If it is a plural term, on the other hand, the analysis given in section 3 can be maintained. I should also add that I have not ascertained that Yoruba bare nominals are in fact kind denoting terms. I have simply shown that taking them to be plural kind terms provides a simple and straightforward account of the observed facts. The discussion in Ajiboye (2005) makes it abundantly clear that number specification in Yoruba is fairly complex and if the ideas outlined in section 2 and 3 are to be pursued, some further work is needed.

Let us end with one final point. One clear advantage of the neo-Carlsonian approach to bare nominals is that it makes predictions about what we might expect to find in different languages. In the absence of this theory, for example, we may expect to find a language minimally different from Yoruba, say Yoruba', in which bare NPs have both non-specific and specific indefinite readings. Or we may find a third language, say Yoruba'', in which bare NPs have specific indefinite readings but not non-specific indefinite readings. I submit to you that the fact that we have Yoruba and not

¹² Singular kind terms in languages with determiners tend to be definite: *the dinosaur is extinct*. In languages without determiners the difference between singular and plural kind terms is somewhat harder to nail down.

Yoruba' or Yoruba'' is not an accident. The theory of cross-linguistic variation predicts that languages like Yoruba'' will not exist and that even languages like Yoruba' are quite unlikely. In order to get Yoruba' the language would have to lack any ranking but in order to get Yoruba'' the language would have to rank \exists above *nom*. This goes against the basis for the ranking of type-shifts discussed in section 2. A consequence of such a ranking would be that Yoruba'' could not use bare nominals for kind reference. Lacking definite determiners, it is unclear how reference to kinds would work in such a language, as natural languages seem to lack dedicated kind-referring determiners (see Dayal 2004). Yoruba'' would be the first language to either lack noun phrases that refer to kinds or the first language to have a special determiner for this purpose.

If the idea that we can make cross-linguistic predictions about the range of possible interpretations is appealing, I would hope that it would prompt further work on Yoruba and other languages that are under-studied from the perspective of formal semantics. Two short articles that might be helpful in this connection are Dayal (2017 and forthcoming) as they provide explicit diagnostics for deciding whether a language has articles corresponding to English *the* and *a* and for determining which readings bare NPs can have.

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Actual Clauses in Lubukusu

Ken Safir, Mark Baker & Justine Sikuku

Abstract
In this chapter* we show that the inventory of clause-types in Lubukusu (Bantu, Luyia) includes a clause type that, so far as we know, has not yet been described as present in any other language. Lubukusu has *actual clauses*, a morphologically distinctive form of subordinate clause which entails that the utterer is committed not only to the truth of the proposition described by the clause, but that the event or state described by the proposition cannot be unrealized at the moment of utterance. We argue that the actual clause is tenseless (distributionally and semantically) and that it is subjunctive-like insofar as it introduces sets of “accessible” possible worlds where the truth of the proposition can be evaluated, based on the predicate that introduces the actual clause as a complement. Actuals depart from subjunctives, however, insofar as the actual world of the speaker must always be one of the possible worlds accessible to the predicate’s attitude-holder, and since the proposition must be true in the speaker’s world to be well-formed, it is not hypothetical, but, in effect, anti-subjunctive. After we have established the fixity of actual clause meaning and shown the contrasting flexibility of interpretation for infinitives (verbs bearing a class 15 prefix), we show that the rigidity of the actual clause reveals an interesting interaction between the inventory of clause types in Lubukusu and the classes of predicates that select clauses as complements.

1.0 Some Basic Properties of Actual Clauses

The most striking feature of the actual clause is that it must be interpreted as making a statement about events or states known to be true by the utterer (UTT) at the time of utterance, and cannot describe any event or state that has not already happened or verifiable at the moment of speech. Except for a few contexts which we note and put aside, actual clauses are always embedded,

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so it is even more striking that, if the actual clause is a complement to a propositional attitude verb that does not normally commit UTT to any opinion about the truth of the verb complement clause, the use of the actual morphology entails the truth of the complement proposition. For example, in (1) the actual complement entails that the going did actually happen (an "actuality entailment") and so the negation of this entailed truth in the following clause is judged contradictory.

- 1a) Wekesa á-a-bólel-a Wafula a-a-cha
 Wekesa SM.c1-PST-tell-fv Wafula SM.c1-ACT-go-fv
 'Wekesa told Wafula to go (and Wafula did go)

- b)*Wekesa á-a-bólel-a Wafula a-a-cha ne kakhali
 Wekesa SM.c1-PST-tell-fv Wafula SM.c1-ACT-go-fv and though
 Wafula sé á-a-ch-á tá
 Wafula NEG SM.c1-PST-go-fv not
 'Wekesa told Wafula to go (and Wafula did go), but Wafula did not go.'

The actuality entailment does not originate in the matrix verb in these cases, as indicated by the acceptability of (2a,b), where the embedded verb is subjunctive or as a class 15 infinitive, respectively. For these two kinds of complements, even with the same matrix verb, there is no actuality entailment, hence no contradiction induced when it is asserted that the events described by these complements are known not to have happened.

- 2a) Wekesa á-a-bólel-a Wafula khú-ch-a (ne kakhali Wafula se
 Wekesa SM.c1-PST-tell-fv Wafula c15-go-fv (and though Wafula NEG
 á-a-ch-a tá)
 SM.c1-PST-go-fv not)
 'Wekesa told Wafula to go, but Wafula did not go.'

- b) Wekesa á-a-bólel-a Wafula á-ch-é (ne kakhali Wafula
 Wekesa SM.c1-PST-tell-fv Wafula SM.c1-go-SBJV (and though Wafula
 se á-a-ch-a tá)
 NEG SM.c1-PST-go-fv not)
 'Wekesa told Wafula he was allowed/had the possibility to go, but Wafula did not go.'

We take "assertion" to be a speech act that posits a proposition as true, and it appears that ACT clauses are never speech acts, since they are always embedded. We assume for the purposes of discussion that a proposition P is "entailed by a proposition P'" if whenever P' is true, then P is true by virtue of its relationship to P'. The entailment induced by ACT morphology is that if 'X ACT-eat the cake', then UTT believes that X ate the cake.

Actual clause morphology is distinctive in Lubukusu. It is realized in the same morphological space on inflected Lubukusu verbs where tense

morphemes normally occur (as in (3), details suppressed), that is, in the space between the subject marker (=SM) and the object marker (=OM), though it is not clear how many affixes can occur between SM and OM. The simple past and the actual are distinguished by both vowel length and tone. The former has an initial short vowel marked by high tone, while the latter has an initial long vowel with an unmarked tone. The chart in (4) provides a full paradigm first with class 1 morphology and then with class 9.

3) Template for verbs: SM-TNS-OM-ROOT-Extensions- (SBJV)-fv.

4) Tense and modality expression on Lubukusu verbs

	SM.c1-TNS-eat	SM.c9-TNS-eat	
Simple past:	álya	yálya	SM-a-Verb-a
Today past:	áliile,	eliile	SM-Verb-il-e
Recent past:	áaliíle,	yáliíle	SM-a-Verb-il-e
Perfective:	ààlya,	yààlya	SM-à-Verb-a
Actual:	aalya,	yaalya	SM-a-Verb-a
Subjunctive:	ályé,	élyé	SM-Verb-e
Infinitive:	khulya	khulya	c15-Verb-a

Indicative clauses in a past tense might appear to have interpretations similar to the actual clause interpretation, but they differ in crucial ways. The matrix indicative commits UTT to the truth of the proposition at the time of utterance, but these are assertions, not entailments, and such assertions can be about future or modally conditioned events, which is not permitted with actual clauses.

- 5a) Wafula á-a-li-á ka-ma-tore
 Wafula SM.c1-PST-fv c6-c6-banana
 'Wafula ate bananas'
 b) Wafula á-kha-li-e ka-ma-tore
 Wafula SM.c1-FUT-fv c6-c6-banana
 'Wafula will eat bananas.'
 c) Wafula [a-nyal-a] á-li-é ka-ma-tore
 Wafula SM.c1-would-fv SM.c1-eat-SBJV c6-c6-banana
 'Wafula would eat bananas.'

Example (5c) is acceptable with the subjunctive on the matrix verb 'eat', with or without the modal *anyala*. The interpretation will vary accordingly, however. Without *anyala*, (5c) expresses permission, and with *anyala* the sentence indicates possibility. The "permission" reading without the modal verb shows clearly that subjunctive morphology can mark matrix verbs.

Moreover, unlike indicatives, the actual is never possible as a matrix clause, unless it is in a particular cause-and-consequence construction.¹

¹ There is another use of ACT morphology that we do not explore here. In a football (soccer) match, for example, the commentator may say, "John takes the ball, he evades Peter and shoots". In this context, all the verbs have ACT morphology. We hope to address

- 6a)*Wafula a-a-li-a ka-ma-toore
 Wafula SM.c1-ACT-eat-fv c6-c6-banana
 'Wafula ate the bananas.'
 b) Wafula a-a-li-a ka-ma-toore ba-ba-aana b-a-lil-a
 Wafula SM.c1-ACT-eat-fv c6-c6-banana c2-c2-child SM.c1-ACT-cry-fv
 'Wafula ate the bananas, so the children cried.'
 'Because Wafula ate the bananas, the children cried.'

In the absence of the subordinating 'because' or 'so', however, it is possible that the proper translation is the second one, where the actual clause 'cause' is, in fact, subordinated. Under either translation, however, (6b) appears to be the only counterexample to the claim that actual clauses are always subordinated. See fn.2 for a possible account of the exception. Thus actual clauses are rigid in their commitment to the actuality entailment, are morphologically distinctive, and are (nearly) always subordinate.

2.0 More Interpretive Differences between Actual Clauses and Others

In one of the early papers that addressed questions of how clausal types are selected, Kiparsky and Kiparsky (1970) distinguished between factive and non-factive clausal complements. The clausal complement of *regret* is factive because the proposition the complement clause denotes is presupposed by the utterer to be true, while the complement of *believe* carries no such presupposition.

- 7a) Alice regrets that Wekesa married Mary.
 b) Alice believes that Wekesa married Mary.

If Alice regrets that Wekesa married Mary, then the speaker assumes that the he and the hearer accept it as a fact that Wekesa married Mary, but for (7b), the speaker is not committed to the assumption that Wekesa married Mary. The difference shows up under negation of the matrix verb in that the factive presupposition is preserved under negation.

- 8a) Alice does not regret that Wekesa married Mary
 b) Alice does not believe that Wekesa married Mary

Even though (8a) is negated, it is still the case that the speaker assumes that both he and the addressee accept it as a fact that Wekesa married Mary. The same semantic distinction is found in Lubukusu, as illustrated in (9) and (10) corresponding to (7) and (8), respectively. (Notice that the word for 'hope', *-subil-*, is the same as that for 'believe').

- 9a) Alice á-esóny-a bali Wekesa á-a-béy-a Maria
 Alice SM.c1-regret-fv that Wekesa SM.c1-PST-marry-fv Maria
 'Alice regrets that Wekesa married Mary.'
 b) Alice á-subil-a a-li Wekesa á-a-béy-a Maria

this usage in future work.

- Alice SM.c1-believe-fv c1-that Wekesa SM.c1-PST-marry-fv Maria
 'Alice believes that Wekesa married Mary.'
 10a) Alice sé á-esóny-a bali Wekesa á-a-béy-a
 Alice NEG SM.c1-regret-fv that Wekesa SM.c1-PST-marry-fv
 Maria tá
 Maria not
 'Alice does not regret that Wekesa married Mary.'
 b) Alice sé á-subil-a a-li Wekesa á-a-béy-a
 Alice NEG SM.c1-believe-fv c1-that Wekesa SM.c1-PST-marry-fv
 Maria tá
 Maria not
 'Alice does not believe that Wekesa married Mary.'
 The non-factive verb *-subil-*, however, can have an actual complement in Lubukusu (just as non-factive 'tell' can in (1)).
 11) Wekesa á-a-subil-a o-mw-aana wewe a-a-many-a Wele
 Wekesa SM.c1-PST-believe-fv c1.c1-child his SM.c1-ACT-know-fv God
 'Wekesa believed/ hoped for his child [know God] (and she did/does)'

Moreover, Lubukusu psych verbs, which take factive complements, do not permit the verb in their CP complement to bear actual morphology (for a suggestion as to why, see fn.3).

- 12a) *Maria á-isindukh-a bali a-a-khil-a ku-mu-inyawwe
 Mary SM.c1.PST-surprise-fv that SM.c1-ACT-win c3-c3-game
 'Mary was surprised that she ACT-won the game'
 b) *Maria á-isony-a bali a-a-khil-a ku-mu-inyawwe
 Mary SM.c1.PST-regret-fv that SM.c1-ACT-win c3-c3-game
 'Mary regretted that she ACT-won the game.'
 c) *Maria á-a-sangal-a bali a-a-khil-a ku-mu-inyawwe
 Mary SM.c1.PST-happy-fv that SM.c1-ACT-win c3-c3-game
 'Mary was happy that she ACT-won the game.'

Infinitival complements can be interpreted as factive or not, depending on the matrix verb.

- 13a) Maria á-isindukh-a khu-khil-a ku-mu-inyawwe
 Mary SM.c1.PST-surprise-fv c15-win c3-c3-game
 'Mary was surprised to have won the game.'
 b) Maria á-isony-a khu-khil-a ku-mu-inyawwe
 Mary SM.c1.PST-regret-fv c15-win c3-c3-game
 'Mary regretted to have won the game.'
 c) Maria á-a-sangal-a khu-khil-a ku-mu-inyawwe
 Mary SM.c1.PST-happy-fv c15-win c3-c3-game
 'Mary was happy to have won the game.'

All of (13a-c) presuppose that Mary won the game, in contrast to (2a), where the proposition that Wafula went is not presupposed. Verbs that permit actual clause complements in Lubukusu are those compatible with clausal complements that describe events that might not have taken place, but that could have taken place, such as those in (14).

- 14) Wekesa á-eny-a/á-a-pang-a/á-a-khak-a a-a-ch-a engo
 Wekesa SM.c1.PST-want/plan/try-fv SM.c1-ACT-go-fv home
 'Wekesa wanted/planned/tried to go, and he did.'

It seems that actual clauses, like subjunctive clauses, are indexed to the time of the matrix event. In as much as planning precedes action, for example, the clausal complement event must follow the main clause event, regardless of what tense is on the matrix verb, a point to which we will return below. However, if the matrix verbs in (14) are in the future tense, then actual complementation is unacceptable, even though c15 infinitive complements for these verbs are still possible.

- 15a) *Wafula á-khá-eny-e a-a-bey-a Maria
 Wafula SM.c1-FUT-want-fv SM.c1-ACT-marry-fv Mary
 b) Wafula á-khá-eny-e khu-bey-a Maria
 Wafula SM.c1-FUT-want-fv c15-marry-fv Mary
 'Wafula will want to marry Mary.'
- 16a) *Wafula á-khá-khak-e a-a-ly-a e-ng'eni
 Wafula SM.c1-FUT-try-fv SM.c1-ACT-eat-fv c9-fish
 b) Wafula á-khá-khak-e khu-ly-a e-ng'eni
 Wafula SM.c1-FUT-try-fv c15-eat-fv c9-fish
 'Wafula will try to eat the fish.'
- 17a) *Wafula á-khá-pang-e a-a-ly-a e-ng'eni
 Wafula SM.c1-FUT-plan-fv SM.c1-ACT-eat-fv c9-fish
 b) Wafula á-khá-pang-e khu-ly-a e-ng'eni
 Wafula SM.c1-FUT-try-fv c15-eat-fv c9-fish
 'Wafula will plan to eat the fish.'

Once the event described by the complement clause is indexed to take place after the present, the actual clause is not possible, because UTT can only verify events described by actual clauses on the basis of the 'actual' world, not any unrealized one. C15 infinitives, which lack the actuality entailment, are not restricted in this way.

3.0 Actuality Entailment

The interpretation required by actual clauses is similar to what Hacquard (2006) has described for French when past perfect is applied to the verbs *pouvoir* and *devoir* (see also Bhatt, 1999).

- 18a) Pour aller au zoo, Jane pouvait prendre le train.
 For go.INF to.the zoo, Jane be.able-PST.IMPV take.INF the train

- 'To go to the zoo, Jane could have taken the train.'
- b) Pour aller au zoo, Jane a pu prendre le train.
 For go.INF to.the zoo, Jane have.PST be.able.PCPL take.INF the train
 'To go to the zoo, Jane was able to take the train (and did).'

As Hacquard puts it, "The truth conditions of [(18a)] are equivalent to its English translation: there is a world among all accessible worlds in which Jane goes to the zoo where she took the train to get there. This is compatible with a scenario in which Jane did not take the train in reality (nor went to the zoo, for that matter). Things are different with [(18b)]: for the sentence to be true, Jane must have taken the train in the actual world. **Any continuation stating that she, in fact, did not take the train, will come out as a contradiction.**"

Hacquard proposes that the relation between modality and events is scopal, and that modality>event yields possible worlds, while event>modality yields the actual world. She still has to add that when the event (or aspect) scopes over the modal, there is still a world variable on the aspect that must default to the actual world. The leading idea, however, is that the actuality entailment arises when perfective aspect scopes over the modal.

Further particulars of the French construction that induces an actuality entailment do not match the Lubukusu actual clauses. First of all, the French effect can hold in matrix clauses, as in (18), whereas Lubukusu actual clauses cannot be matrix clauses. Although there is an interaction between particular verbs and perfective morphology in French (and in other languages where the actuality entailment is discussed, see Bhatt, 1999 and Homer, 2011, for example), actual morphology and the actuality entailment associated with it is distinctive to Lubukusu. The Lubukusu morphology does not lose its actuality entailment (and remain acceptable) depending on what verb it is associated with. For example, the past perfect yields the actuality entailment in French with matrix root modals but not with epistemic modals. The French construction is thus sensitive to particular verbs and particular modals. Moreover, contexts of belief do not affect the result in Lubukusu. Both 'believe' and matrix 'want' can have actual clause complements, though only the latter interacts with past perfect in Hacquard's story.

These distinctions between the modal-verb-dependent actuality entailments and Lubukusu actual clauses are challenging for the treatments of the modality-perfective interaction on which Hacquard's account is based. The actuality entailment of actual clauses appears to be independent of the matrix (selecting) verb, so an adaptation to Lubukusu of this interaction would require treating the single ACT morpheme as decomposing into modal and perfective parts, but the ACT morpheme in Lubukusu does not

distinguish between a perfective morpheme and a modal morpheme such that one could scope over the other. More basically, it is not the aspect of the selecting verb that matters in Lubukusu, but the world of UTT.

We will not attempt to fit our account into Hacquard's proposal, but we are guided by the intuition that the actuality entailment arises from an interaction with modality. We propose that ACT is indeed like a subjunctive with respect to the verb that selects for it, but with a twist. A matrix subjunctive clause which has the semantic force of 'might be' (e.g., *John might have eaten fish*) is judged as true just in case there is at least one possible world accessible to the speaker which has a past in which John has eaten fish, but there is no commitment to that world being the actual world. When a subjunctive is embedded, the possible worlds are delimited by the embedding predicate (e.g., 'want', 'plan', 'think') with respect to the reported subject of those predicates (not UTT, unless the reported subject is in the first person). A normal subjunctive complement just posits that there is a possible planned/wanted/believable world accessible to the reported subject in which the proposition it denotes could be true.² What ACT requires, however, is that UTT's world *u* must be one such world in which *P* is evaluated and *P* is true in *u*. So, for example, an ACT complement to 'want' will entail that the actual world is a world in which what *X* wanted is true.

19) Actual Clause Interpretation:

- If *P* is a proposition expressed by an actual clause *P*^{ACT}, then
- P* is true in at least one of the set of worlds accessible to the reported subject of the verb selecting *P*^{ACT},
 - UTT's world is in the set of accessible worlds and
 - P* is true in the utterer's world.

The first condition captures the intuition that the reported subject may, for example, have wanted for a state of affairs to hold, but had no certainty that it did or would hold. The second condition insures that UTT's world is within the set of possible worlds accessible to the subject of the predicate that takes the actual clause as a complement. This condition is not met when the matrix verb is in the future, for example, because UTT's world is indexed to UTT's present and UTT cannot directly observe future worlds.

² More technically, the set of "accessible" possible worlds for the reported subject in which *P* (the clausal complement) can be evaluated for truth are distinguished from the set of worlds by whatever conditions or relations (*R*) are imposed by the selecting predicate. In the literature, epistemic, deontic, and ability modals are distinguished by the nature of *R* introduced by the modal in question (e.g., *should* invokes worlds in which laws or normal courses of events hold, *could* invokes worlds in which an ability can be realized, etc.) We are treating *R* for Lubukusu ACT and SBJV as determined by the selecting predicate. These inflections do not specify *R* on their own, nor do they access the common ground. For a useful summary of the literature on modality, see Hacquard (2009).

The last condition insures that according to what UTT knows, the wanted state of affairs holds in UTT's world, the actual world according to UTT. On the basis of (19a), it is now clear why ACT clauses must be embedded. The accessibility relations required are two-fold; one involving accessibility for UTT, the other involving accessibility for a reported subject, and it is the latter relation that requires embedding.³ The 'anti-subjunctive' flavor of ACT arises from the way that existence in the actual world undermines the irrealis denotation of the subjunctive, while still preserving the possibility that for the reported subject, there could have been worlds other than the actual one in which *P* might have been true.⁴

Notice, however, that (19) depends on our description of what makes up the actual world, and one curious condition that ACT seems to place on that world, which one may think of as a set of eventualities (states and events) that propositions can describe, is that there are no negative eventualities in it (e.g., a state of not having eaten a fish, for example),

20) *Wekesa á-subil-a ali Wafula se a-a-ly-a
Wekesa SM.c1-believe-fv that Wafula NEG M.c1-ACT-eat-fv
e-ng'eni tac9-fish NEG

'Wekesa believes that Wafula did not eat a fish (and he did not).'

The translation in (20) can be 'saved' if the negated subordinate clause is changed to a *khu*-infinitive. The restriction that actual clauses cannot be negated does not follow from the inclusion of the actual world amongst the set of belief worlds in which negative statements are true, and so it is necessary to replace (19) with something like (21), which includes (21d).

21) Actual Clause Interpretation:

- If *P* is a proposition expressed by an actual clause *P*^{ACT}, then
- P* is true in at least one of the worlds accessible to the reported subject of the verb selecting *P*^{ACT}
 - UTT's world is one of the worlds accessible to the reported subject,
 - P* is true in UTT's world and
 - the eventuality described by *P* is in the set of eventualities that exist in the actual world.

³ From this perspective, the consequence clause construction in (6) would have to be interpreted like a conditional, in that the antecedent clause posits a hypothetical situation that introduces a set of possible worlds where the children are disappointed and then the *P*^{ACT} indicates that the actual world is one of those worlds where the antecedent is true. Therefore the consequent must also be true in the actual world. We have not determined whether or not such an account is sustainable.

⁴ The incompatibility of actual with factive complementation probably has to do with factive presupposition. Factive complements are presupposed by the speaker to be already accepted as true by the addressee, while actual clauses appear to presuppose the opposite, that is, the speaker presupposes actual clauses are informative to the addressee.

The need for (21d), or something like it, remains a curious, but very interesting puzzle.⁵

4.0 Actual Clauses Are Tenseless

The Lubukusu verbs *ény-* 'want', *pang-* 'plan', and *khak-* 'try' are not compatible with an indicative clause, but they are compatible with infinitive complements, subjunctive complements, and actual clause complements.

22) 'Wekesa wanted/ planned/ tried [X-go home]'

- a) Wekesa á-ény-á/á-a-páng-a/á-a-khák-a khu-ch-a engo (infinitive)
Wekesa SM.c1.PST-want-fv/plan-fv/try-fv c15-go-fv home
'Wekesa wanted/planned/tried to go home.'
- b) Wekesa á-ény-á/á-a-páng-a/á-a-kháka á-ch-é engo
Wekesa SM.c1.PST-want-fv/plan-fv/try-fv SM.c1-go-SBJV home
'Wekesa wanted/planned/tried to go home.'
- c) *Wekesa á-ény-á/páng-a/khák-a á-a-ch-a engo
Wekesa SM.c1.PST-want-fv/plan-fv/try-fv SM.c1-PST-go home
(simple past)
- d) Wekesa á-ény-á/páng-a/kháka a-a-ch-a engo
Wekesa SM.c1.PST-want-fv/plan-fv/try-fv SM.c1-ACT-go-fv home
'Wekesa wanted/planned/tried to go home.'

By contrast, the verbs *-khilw-* 'fail', *-lob-* 'refuse' and *-khingilil-* 'prevent' are only fully compatible with infinitives.

- 23a) Wekesa á-a-khilw-a/lób-a khu-ch-a engo (infinitive)
Wekesa SM.c1-PST-fail-fv/refuse-fv c15-go-fv home
'Wekesa failed/refused to go home.'
- b)??Wekesa á-a-khilw-a/lób-a á-ch-é engo (subjunctive)
Wekesa SM.c1-PST-fail-fv/refuse-fv SM.c1-go-SBJV home
'Wekesa failed/refused [go home].'
- c) *Wekesa á-a-khilw-a/lób-a á-a-ch-á engo (indicative)
Wekesa SM.c1-PST-fail-fv/refuse-fv SM.c1-PST-go-fv home
'Wekesa failed/refused [went home].'
- d) *Wekesa á-a-khilw-a/lób-a a-a-ch-a engo (actual)
Wekesa SM.c1-PST-fail-fv/refuse-fv SM.c1-ACT-go-fv home
'Wekesa failed/refused to go home.'

⁵ In i. the actual clause is acceptable in the scope of matrix negation,

i. Wekesa se-a-subil-a a-li Wafula a-a-siim-a e-ng'eni ta
Wekesa NEG-SM.c1-believe-fv c1-that Wafula SM.c1-ACT-like-fv c9-fish not
'Wekesa does not believe that Wafula likes fish – in fact, Wafula does like fish.'

Our analysis correctly predicts this interpretation. In this context, the set of belief worlds accessible to Wekesa are all worlds in which P of PACT is evaluated by Wekesa as false, but that set of worlds also includes the actual world, and in the actual world, the world of UTT, P is true, as evaluated by UTT. Since the matrix clause introduces a set of accessible possible worlds that does not exclude the actual world, the actual clause should be possible because UTT's evaluation of those worlds differs from Wekesa's evaluation.

- 24a) Wekesa á-a-khingilil-a Maria khu-ch-a engo (infinitive)
Wekesa SM.c1-PST-prevent-fv Mary c15-go-fv home
'Wekesa prevented Mary from going home.'
- b)??Wekesa á-a-khingilil-a Maria á-ch-é engo (subjunctive)
Wekesa SM.c1-PST-prevent-fv Mary SM.c1-go-SBJV home
'Wekesa prevented Mary [go home].'
- c) *Wekesa á-a-khingilil-a Maria á-a-ch-a engo (indicative)
Wekesa SM.c1-PST-prevent-fv Mary SM.c1-PST-go-fv home
'Wekesa prevented Mary she went home.'
- d) *Wekesa á-a-khingilil-a Maria a-a-ch-a engo (actual)
Wekesa SM.c1-PST-prevent-fv Mary SM.c1-ACT-go-fv home
'Wekesa prevented Mary she went home.'

The verbs in the complement clauses in (23a) and (24a) are bear the noun class 15 (c15) marker that is most typically identified as an 'infinitive' in Narrow Bantu languages. The complement clauses in (23b) and (24b) are subjunctive, which indicates, at the least, that the event it describes is unrealized with respect to the tense-indexed moment of the event described by the matrix (clausal complement-selecting) verb, but since these verbs seem to preclude worlds where the proposition they describe is true, subjunctives are not really acceptable. Actuals are rejected more forcefully, since these verbs assert that there are no worlds accessible to Wekesa where the complement proposition is true, hence the actual world could not both be accessible to Wekesa and a world in which the complement proposition is true for UTT (i.e., (21a) and (21c) cannot both be satisfied). As shown in (23c,d), neither of these verb types permits a true indicative clause (a clause that permits the full variety of tenses consistent with usual restrictions on sequence of tense), though as (25a,b) illustrate, the appearance of an actual clause following the matrix verb is possible, but as a consequent clause, not a complement (probably as in the manner of (6b)).

- 25a) Wekesa á-a-khilw-a/lób-a a-a-ch-a engo
Wekesa SM.c1-PST-fail-fv/refuse-fv SM.c1-ACT-go-fv home
'Wekesa failed/refused (something) and he went home (later).'
- b) Wekesa á-a-khingilil-a Maria a-a-ch-a engo
Wekesa SM.c1-PST-prevent-fv Mary SM.c1-ACT-go-fv home
'Wekesa prevented Mary (from doing something) and he (Wekesa) went home (later).'

The absence of indicatives as complements to certain verbs is especially notable because Lubukusu has three past tenses, but none of the past tenses is possible in the complement of a verb a with meaning like 'want', 'try' or 'prevent'.

- 26a) Wekesa *á-ény-á/*páng-a/?khak-a a-ch-il-e (immediate past)
Wekesa SM.c1.PST-want-fv/plan-fv/try-fv SM.c1-go-TNS-fv
'Wekesa wanted/planned/tried he went.'

- b) Wekesa *á-eny-á/*páng-a/*khak-a áá-ch-il-e (intermediate past)
 Wekesa SM.c1.PST-want-fv/plan-fv/try-fv SM.c1-go-TNS-fv
 'Wekesa wanted/planned/tried he went.'

Semantically, it appears that it is unnecessary to suppose that actual clauses are tensed at all, since evaluation in the actual world is sufficient to determine whether or not they are true, rather than any crucial indexation to events at a time relative to that of utterance. We take the defining property of 'tense' as indexing the time of an event directly or indirectly to the utterance time, and so a tense morpheme must play this role by definition. However, both subjunctive and actual can be thought of as addressing only the ordering of events, such that both must describe events relative to the event of the matrix predicate, typically after, but not necessarily so, as (27) illustrates.

- 27) Ne khu-á-b-a ba-ba-ana khu-á-eny-a
 when SM.1st.c2-PST-be-fv c2-c2-child SM.1st.c2-PST-want-fv

khu-li o-mu-aana w-a-efwe á-b-é
 c2.1st-that c1-c1-child SM.c1-ASS-PRON.c2.1st SM.c1-be-fv.SBJV
 o-mu-somi o-mu-layi, mala se á-a-b-á tá
 c1-c1-student c1-c1-good but NEG SM.c1-PST-be-fv not
 'When we were young, we wanted that our child be a good student, but she never was.'

In (27), the hypothetical event described by the subjunctive clause would have been situated in a time before the utterance time. We take the apparent indexing to utterance time for the actual to be a product of the requirement of ACT that the actual world be one of the desired worlds in which P of P^{ACT} is true. The actual world happens to index the time of speech.

Our position is consistent with arguments in the literature that subjunctive is not a tense (e.g., even in Italian, where it can bear tense morphology, see Giorgi and Pianesi, 1997), and our analysis of actual clauses treats the accessibility relations they bear to the reported subject to be identical to those of the subjunctive. In this sense, both the actual and the subjunctive are not really about times indexed to an event, but about worlds. This implies that, at least in Lubukusu, the requirement that a complement clause be tenseless does not choose between subjunctive and actual (or infinitive), all else being equal.

There are many cases, however, where a verb that takes a tenseless clause complement (subjunctive or c15 infinitive) does not permit an actual clause complement, which we otherwise might expect to be possible on strictly syntactic grounds. These are cases, however, where actual clause interpretation is blocked because the tense and/or lexical entailment of the

matrix verb does not permit a complement to describe a realized event (as in (23)-(24)). If these considerations suffice to eliminate the cases where other tenseless clauses are possible but actuals are not, then we conclude, on semantic and distributional grounds, that actual clauses are tenseless.

Perhaps the only fact that suggests ACT could actually be a tense is the fact that the ACT affix occupies a position in a morphological slot between SM and OM where tense otherwise appears (which is why actuals were at first hard to detect). However, the recent past in Lubukusu, *-ile*, is a suffix, so there is no tidy one-to-one correspondence between morphological position and semantic category in the Lubukusu verb. The subjunctive is also a suffix and not a tense (see the mention of Italian below), so an assumption that only tense affixes are in complementary distribution with each other is also not sustainable.

Though actual clauses are tenseless clauses, they are also notably different from c15 infinitives. Actual clauses and subjunctive clauses both co-occur with subject agreement (SM) and both subjunctive and actual clauses can appear with a complementizer that is also compatible with tensed clauses. Subjunctives permit the agreeing complementizer *ali* as illustrated in (30a,b) in the next section. Actuals normally appear without a complementizer, but sometimes they permit the non-agreeing complementizer *bali*, as illustrated in (28), though not the agreeing complementizer. (For discussion of complementizer agreement in Lubukusu with the subject of the clausal complement taking verb, see Diercks 2010 and 2013).

- 28) Wafula á-a-nyál-a bali/*a-li a-a-ch-a e-Harvard.
 Wafula SM.c1-PST-able-fv that/c1-that SM.c1-ACT-go-fv c23-Harvard
 'Wafula managed to go to Harvard.'

A larger discussion of the relations between clause type, verb type and complementizer possibilities is beyond the scope of this paper, but the distribution of complementizers and agreement appears to align subjunctive and actual with tensed clauses rather than c15 infinitives.

Subjunctives are marked for agreement in many languages, including those where the analysis of subjunctive (e.g., in Italian by Giorgi and Pianesi) is that they are tenseless (although their morphological realization can be conditioned by tense). Even in Italian, however, the complementizer that appears with subjunctive clauses is the same as the one with tensed clauses (*che*) and *che* cannot occur in infinitives. Thus these facts about Lubukusu subjunctives do not appear typologically too exceptional. If actual clauses are the 'anti-subjunctives' insofar as potential-actual opposition fills a particular semantic space, then it is perhaps not surprising that actual clauses share

structural properties with subjunctives, although we will not explore particular structural proposals for reasons of space.

Subjunctive and actual clauses are thus notably distinct from c15 infinitives (also with respect to control properties, not illustrated here). If structural parallelism with c15 infinitives is not an appropriate measure of tenselessness, however, then structural and morphological differences between subjunctives and actuals, on the one hand, and c15 infinitives, on the other, do refute the hypothesis that actuals and subjunctives are tenseless.

5.0 Consequences for Clausal Selection and Theories Thereof

The striking contrast between c15 infinitives, which are comfortable with more than one sort of interpretation, and actual clauses, which are completely rigid semantically, helps to reveal some boundary conditions on the theory of clausal complementation.⁶

For English, the problem has most typically been thought of as one of selection, where a given verb determines which sorts of complements it is compatible with, for example, the verb *state* selects an indicative complement and not an infinitive. This cannot be the whole story for Lubukusu, however. Consider the difference in interpretation between (29a) and (29b).

- 29a) Wekesa á-a-nyál-a khu-khw-ombakh-a enju, ne kakhali
 Wekesa SM.PST-able-fv c15-c15-build-fv house and thought
 se á-a-nyóol-a bu-bw-aangu tá
 NEG SM.c1-PST-find-fv c14-c14-chance not
 'Wekesa was able to build the house, but he never got the chance.'
- b) Wekesa á-a-nyál-a o-ombakh-a enju, (*ne kakhali
 Wekesa SM.PST-manage-fv SM.c1.ACT-build-fv house and though
 se á-a-nyóol-a bu-bw-aangu tá)
 NEG SM.c1-PST-find-fv c14-c14-chance not
 'Wekesa managed to build the house, *but he never got the chance.'

Lubukusu uses the same verb for the meanings 'be able' and 'manage', but the translation of the verb is altered, in effect, by what actual clause interpretation requires. Thus (29b) has the interpretation that Karttunen (1971) described in English as implicative, that is, the English verb *manage* entails that the event described by its complement infinitive has indeed taken place in the world of UTT. With respect to the contrast between (29a) and (29b), the result is that the verb meaning can be thought of as an ability modal that introduces a set of possible worlds in at least one of which

⁶ The relationship between predicates and the clausal complements is part of the Afranaph Sister Project, the Clausal Complementation and Selection Project, directed by Mark Baker and Ken Safir, out of which this inquiry into the nature of actual clauses has sprouted.

p is true (i.e., in which Wekesa accomplishes the task) and the PACT complement insures that the actual world is one such world.

The subjunctive/indicative contrast can also produce a shift in verb translation. The Lubukusu verb *-subil-* can mean 'hope' or 'believe', but the 'hope' reading must have the subjunctive complement.

- 30a) John ásubila ali Mary abe ne kamakoso
 John a-a-subil-a a-li Mary a-b-e ne ka-ma-koso
 John SM.c1-PST-believe-fv c1-that Mary SM.c1-be-SBJV with c6-c6-guilt
 'John hoped that Mary would be guilty.'
- b) John ásubila ali Mary ali ne kamakoso
 John a-a-subil-a a-li Mary a-a-l-I ne ka-ma-koso
 John SM.c1-PST-believe-fv c1-that Mary SM.c1-PST-be-fv with c6-c6-guilt
 'John believed/*hoped that Mary was guilty.'

The richer inventory of clause types in Lubukusu allows for the possibility that a single predicate can cover a wider semantic range than is possible for any single predicate (with respect to the same range of meanings) in a language like English, which, in this respect, has less variety in its array of clausal complements. These facts suggest that the investigation of the relation between clausal complements and the verbs that select them can be misled by translations that capture the correct sense in English, but disguise the consistency of interpretation of those verbs that receive distinct translations depending on their clausal complements.

6.0 Are Actual Clauses Typologically Rare?

So far as we can tell, there are no other kinds of clauses in known Bantu languages, or any other language family, that are quite like Lubukusu actual clauses, though we say this in the expectation that they will be discovered more broadly once researchers start looking for them. We have investigated some tangentially similar clause types in Bantu, such as the persistive (Nurse and Phillipson, 2006), which entails that a state or activity is still going on, but it is clear that this is not the meaning of the actual. If it were, (31) should sound like a contradiction, but it does not.

- 31) Wekesa a-eny-a a-a-kon-a khu-saa n-dala
 Wekesa SM.c1.PST-want-fv SM.c1.ACT-sleep-fv for-hour c9-one
 'Wekesa wanted to sleep for an hour and he did, but he is awake now.'

Nurse, Rose and Hewson (2010:1-2) discuss the distinctions between perfective/factative and perfect, but neither of these two categories quite works for the Lubukusu actual. They describe the factative (semantically like 'perfective') as follows

'Functionally, when used with non-stative or dynamic verbs, it typically represents past, complete, situations, but when used with stative verbs, it

represents current, non-past, incomplete, states, that is, presents or futures." As (31) shows, perfective on their description does correspond appropriately to actual. They treat the perfect as describing complete events for dynamic verbs and states continuing to the present for stative verbs. However, these aspects all appear to be possible in matrix clauses and they also suggest that some of them allow future tense (e.g., in Yoruba) which the actual does not permit. Moreover, Lubukusu has a clear instance of the perfect, distinct from the actual, and its distribution is limited to indicative clauses (matrix and subordinate).

Van der Wal (2012) reports on four varieties of 'situative' clauses in Makhuwa and these are like actuals insofar as they are always subordinated. However, they are unlike actual clauses in that they do not appear to have an actuality entailment, but rather serve to order the eventuality they describe with respect to the event described by some other verb. In this respect, van der Wal does not regard them as tensed, though the morphology shows up in the same morphological space as tense and aspect, another similarity to actual clauses. There are cases in Lubukusu in which the actual does seem to have something of a situative flavor, as in (32).

- 32) Wekesa a-a-saal-a o-mu-aana wewe khu-ch-a
 Wekesa SM.c1-PST-pray-fv c1-c1-child his c15-go-fv
 engelekha ta, ne o-wa Wekesa a-a-ch-a (engelekha)
 abroad NEG, and c1-of Wekesa SM.c1-ACT-go-fv (abroad)
 'Wekesa prayed (and) his child did not travel abroad, and Wekesa's child did travel (as a result of Wekesa praying/but Wekesa's prayers were insufficient)'

In this case, the actual can be understood as an outcome (even implausibly, as a result), and thereby has a reading of a subsequently ordered event, much as certain situative clauses have been reported to have. Unlike Lubukusu actuals, however, situatives are never complements in Makhuwa and do not appear to involve an actuality entailment (though van der Wal was not looking for such effects).⁷

Finally, it is possible to consider the actual as a form of evidential, especially because of the indexical effect of picking out the belief world of UTT. Evidentials, however, more typically indicate how something comes to be known, not simply that it is necessarily true. Lubukusu complementizers alternations can introduce implications of doubt on the part of UTT about the likely truth of a complement clause (see Diercks, 2010:288-291), but so far we don't see how this observation helps us to better understand actual clauses

⁷ For a recent attempt to characterize situatives, persistives and perfectives in Swati, see Nichols (2011).

7.0 Conclusion

We have established that the interpretation of an actual clause (PACT) is sensitive both to the selecting predicate and to UTT. The selecting predicate delimits a set of possible worlds (wanted worlds, belief worlds, ability worlds) in which the proposition P of PACT can be evaluated for truth (as a subjunctive would be) but in addition ACT requires that the world of UTT be one of the worlds in which P is evaluated as true (which undermines the signature 'irrealis' interpretation that subjunctives often have). The source of the delimitation of possible worlds is the matrix predicate and a limitation to that source appears to be why ACT clauses must be embedded. For these reasons, we have treated ACT as more like a modal than an aspect. Actual clauses are tenseless in that they do not directly index speech time, even though their interpretation is tied to the world of UTT, hence indirectly to speech time. Although ACT can appear to be aspect-like in that it entails that clauses with dynamic verbs describe events that are complete at the moment of utterance (whereas events expressed by stative verbs can be ongoing or not), this is rather due to a restriction to represent positive eventualities and the link to the word of the speaker, which is indexed to the present. The rigidity of ACT interpretation has been shown to impose itself on the interpretation of verbs it co-occurs with as a complement, raising questions about the nature of clausal selection. Although actual clauses have not been attested in other languages, the syntactic and interpretive mechanisms we have appealed to are not exotic, and so we expect ACT clauses, or clauses with essentially the same properties, will be found in other languages.

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Tense and Negation in Yoruba

Olúṣẹyẹ Adéṣolá

Abstract

The status of Negation in Universal Grammar has been controversial in spite of about five decades of contributions from generative grammarians (Fujita 1975, Pollock 1989, Chomsky 1989, Ouhalla 1990, Déprez and Pierce 1993, Ernst 1995, Awoyale 1995, Decahine 1995, Lona 2000, Harves 2002, Wiltschko 2002, Landau 2002, Kaiser 2006, Spencer 2008, Aboh 2010, Alqassas 2015, de Sousa 2015, and Albu 2017). Its status is even less clear in Yoruba where limited generative grammar work has been done on Negation. This chapter will focus on one of the questions plaguing negation in the literature – its relationship with Tense. Zanuttini (1996) claims that negation could only be present in a sentence if it has Tense as its complement while Dechaine (1995) notes that negation is actually in Tense in Yoruba. Zanuttini (1996:181) concludes (based on her comparative analysis of English and Romance languages (like Italian, Spanish, Catalan, Portuguese, Romanian, and Galician) that the negation phrase (NegP) is parasitic on the Tense phrase (TP) – if NegP, then TP. She adds that the NegP must be generated to the left of the TP to fulfill the selectional requirements of the head of the Neg P. This chapter would show that neither of the two claims is accurate for Yoruba. Yoruba negations are not parasitic on Tense because negation can occur in complementary distribution with Tense. This chapter also provides empirical evidence to show that negation is not in Tense in Yoruba. Other syntactic elements that are also in complementary distribution with the non-future tense marker are not in Tense. So, negation cannot be in Tense either. Also, negation markers do co-occur with the future tense marker in Yoruba. This indicates that Tense and Negation are able to head distinct terminal nodes. The chapter expands on the proposal sketched in Awoyale (1995) that negation heads its own NegP in Yoruba. In fact, Yoruba can project multiple NegPs with only one TP.

1. Introduction

Scholars have explored the occurrence of negation in a lot of human languages (Fujita 1975, Adewole 1991, Déprez and Pierce 1993, Ernst 1995, Lona 2000, Kim and Sag 2002, Landau 2002, and Fabunmi 2013). One of the main claims is that negation can project and head its own phrase – NegP as in (1) (Pollock 1989, Chomsky 1989, Ouhalla 1990, Awoyale 1995, and Wiltschko 2002).

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Tense and Negation in Yoruba

Olúṣèyè Adéṣolá

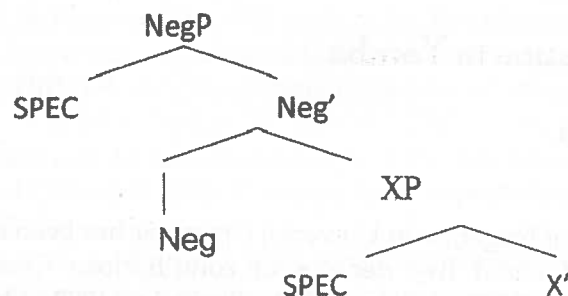
Abstract

The status of Negation in Universal Grammar has been controversial in spite of about five decades of contributions from generative grammarians (Fujita 1975, Pollock 1989, Chomsky 1989, Ouhalla 1990, Déprez and Pierce 1993, Ernst 1995, Awoyale 1995, Decahine 1995, Lona 2000, Harves 2002, Wiltschko 2002, Landau 2002, Kaiser 2006, Spencer 2008, Aboh 2010, Alqassas 2015, de Sousa 2015, and Albu 2017). Its status is even less clear in Yoruba where limited generative grammar work has been done on Negation. This chapter will focus on one of the questions plaguing negation in the literature – its relationship with Tense. Zanuttini (1996) claims that negation could only be present in a sentence if it has Tense as its complement while Dechaine (1995) notes that negation is actually in Tense in Yoruba. Zanuttini (1996:181) concludes (based on her comparative analysis of English and Romance languages (like Italian, Spanish, Catalan, Portuguese, Romanian, and Galician) that the negation phrase (NegP) is parasitic on the Tense phrase (TP) – if NegP, then TP. She adds that the NegP must be generated to the left of the TP to fulfill the selectional requirements of the head of the Neg P. This chapter would show that neither of the two claims is accurate for Yoruba. Yoruba negations are not parasitic on Tense because negation can occur in complementary distribution with Tense. This chapter also provides empirical evidence to show that negation is not in Tense in Yoruba. Other syntactic elements that are also in complementary distribution with the non-future tense marker are not in Tense. So, negation cannot be in Tense either. Also, negation markers do co-occur with the future tense marker in Yoruba. This indicates that Tense and Negation are able to head distinct terminal nodes. The chapter expands on the proposal sketched in Awoyale (1995) that negation heads its own NegP in Yoruba. In fact, Yoruba can project multiple NegPs with only one TP.

1. Introduction

Scholars have explored the occurrence of negation in a lot of human languages (Fujita 1975, Adewole 1991, Déprez and Pierce 1993, Ernst 1995, Lona 2000, Kim and Sag 2002, Landau 2002, and Fabunmi 2013). One of the main claims is that negation can project and head its own phrase – NegP as in (1) (Pollock 1989, Chomsky 1989, Ouhalla 1990, Awoyale 1995, and Wiltschko 2002).

1.



In this chapter, I assume that Yoruba negation markers fit the structure that is shown in (1). Yoruba negation markers can head the NegP. Thus, each of the Yoruba negation markers such as *kò*, and *má* can project a NegP. The variant of the imperative negation marker *má* which is *yéé* can also project a NegP. In the same way, each of the variants of the sentential negation marker *kò* such as *kií*, *kií ɕe*, and *kò ní* can also project a NegP. Even the nominal (constituent) negation marker *kọ* can project a NegP.

One of the fine details of the analysis in Zanuttini (1996:181) is that we can have a NegP only if we have a TP in a sentence – if NegP, then TP. She claims that the occurrence of the negation in NegP is dependent on the occurrence of Tense in the sentence. Therefore, NegP must have a TP as its complement. Therefore, the prediction would be that negation is parasitic on tense. As we will see below, this prediction is not borne out in Yoruba. Yoruba negation is not parasitic on tense. It can occur in a sentence whether tense is present in the sentence or not. In fact, the Yoruba negation can occur in complementary distribution with the Tense in certain contexts. It is perhaps their complementarity that leads Dechaine (1995) to propose that negation is in Tense in Yoruba. This chapter would show that neither of the two claims are accurate for Yoruba. Yoruba negations are not parasitic on Tense because negation can occur in complementary distribution with Tense. And, there are at least two reasons why we can conclude that negation is not in Tense in Yoruba. Other syntactic elements that are also in complementary distribution with the non-future tense marker are not in Tense. So, negation cannot be in Tense either. Also, negation markers do co-occur with the future tense marker in Yoruba. This indicates that Tense and Negation are able to head distinct terminal nodes in the language.

The chapter is organized as follow. Section one is the introduction. In section two, we will highlight the pattern of occurrence and the distribution of negation markers in Yoruba. Section three is on the interaction of Tense and Negation in Yoruba. We propose the structures for negation in Yoruba sentences in section four. Section five is the conclusion.

2. Negation Markers in Yoruba

In this section, we will look at the pattern of occurrence of negation markers in Yoruba. The most commonly used negation marker in Yoruba is the sentential negation *kò* (2a). Its form varies in the sentence depending on the verb, tense, and aspects in the sentence. It could show up as *kií* (2b), *kií ɕe* (2c), or *kò ní* (2d). Another negation marker that Yoruba uses is *má* (3a). It is imperative. Its variant in some dialects is *yéé* (3b). The constituent negation marker *kọ* can only occur with the specificational copular verb – *ni* as in (4). Negation markers are usually used when a sentence is false at a time *t*, which is before or equal to the local evaluation time. So, Yoruba negation markers occur to indicate that a proposition is not true. For example, for *Kò a* to be true, it must be the case that *a* is false at a time preceding the time at which the sentence in which *kò a* occurs is uttered. The same can be said of the imperative negation marker in the language – *má*. Similarly, we can infer the same for the variants of the negation marker *kò* including *kií*, *kií ɕe*, and *kò ní* (2).

- 2a. Adéwuyì *kò* lọ New York.
Adewuyi NEG go New York
'Adewuyi did not go to New York.'
- 2b. Adéwuyì *kií* lọ New York. (Habitual)
Adewuyi NEG go New York
'Adewuyi doesn't go to New York.'
- 2c. Adéwuyì *kií ɕe* akẹkọp (Predicational Copular)
Adewuyi NEG-BE student
'Adewuyi is not a student.'
- 2d. Adéwuyì *kò ní* lọ New York. (Future tense)
Adewuyi NEG-FUT go New York
'Adewuyi will not go to New York.'
- 3a. Má lọ New York. (Imperative)
NEG go New York
'Don't go to New York.'
- 3a' Yéé lọ New York (Imperative)
NEG go New York
'Stop going to New York.'
- 3b. Ẹ má lọ New York. (Imperative)
You (plural) NEG go New York

'Don't go to New York.' (Used for more than one person or for an elderly person)

- 4a. Bọwálé kọ ni ọba. (Specificational Copular)
Bowale NEG BE king
'Bowale is not the king.'
- 4b. New York kọ ni Adéwuyi lọ (Specificational Copular)
New York NEG BE Adewuiy go
'It wasn't New York that Adewuyi went.'

In each of the sentences in (2) and (3) except (2c), the proposition, going to New York is false. In (4a) there is a king, but Bowale isn't his name. And in (4b), Adewuyi went to some place but he did not go to New York. Next we highlight the distribution of negation markers in Yoruba.

2.1. The Distribution of Negation Markers in Yoruba

Zanuttini (1996) highlights the fact that negation markers could occur pre-verbal or post verbal. Negation is preverbal in many languages of the world. And, languages that have post-verbal negation also usually have preverbal negation. Yoruba negation markers always occur before the verb. So they are pre-verbal. Even when multiple negation markers are used as we would see later, they are all pre-verbal. This explains why the (b) examples are unacceptable.

- 5a. Olúkòràìwé
Olu NEG buy book
'Olu did not buy a book'
- 5b. *Olúràkòìwé
OlúbuyNEG book
- 6a. Má lọ New York
NEG go New York
'Don't go to New York.'
- 6b. *Lọ má New York.
Go NEG New York

Furthermore, unlike in languages like Passamaquoddy (Algonquian) as shown in Bruening (2001), Yoruba negation markers cannot occur at the left edge of the sentence. Unlike in Passamaquoddy, Yoruba negation markers cannot precede the subject NP. This is why the example in (7b) is unacceptable.

- 7a. Adéwuyi kò ra ìwé
Adewuyi NEG buy book
'Adewuyi did not buy a book.'
- 7b. *Kò Adéwuyi ra ìwé
NEG Adewuyi buy book

Furthermore, Yoruba negation cannot be preceded by another adverb. It always c-commands any adverb that co-occurs with it in a sentence. This is why (8b) is not acceptable.

- 8a. Olúkòtètèràìwéré
OlúNEGquick buy book his
'Olú did not buy his books on time'/'Olu did not buy his book quickly.'
- 8b. *Olútètèkòràìwé
Olu quick NEG buy book

Similarly, negation markers cannot be preceded by an aspectual marker in Yoruba. This is probably why (10) is unacceptable.

9. Adéwuyi kòtùràìwé
Adewuyi NEG ASP buy book
'Adewuyi has not bought a book'
10. *Adéwuyi tìkòràìwé
Adewuyi ASP NEG buy book

This suggests that there is a somewhat strict order among the elements that are encoded between the subject and the verb in Yoruba sentences. As we will see below, negation, modal verbs, aspects, and tense can occur between the subject and the verb in Yoruba. It is evident from what we have seen so far that negation precedes all the other possible syntactic elements that can occur between the subject and the verb.

Also, as in many languages of the world, Yoruba negation markers can also license the occurrence of a negative quantifier as in (11) (Aboh 2010). In the absence of a negation marker, the negative quantifier cannot occur in a sentence (12). Thus, we have the implication in (13).

- 11a. Olú kò rí ènìkankan
Olu NEG see no one
'Olu has not seen anyone'/'Olu saw no one'

- 11b. Ènikankan kò rí Olú.
no one NEGsee Olú
'No one saw Olú.'

12. *Olú rí ènikankan
Olu see no one

13. If negative quantifier, then negation marker.

Lastly, multiple negation markers can co-occur in a sentence. This is common in world languages. For example, in the Ewe language, when there are two negation markers in a sentence, Agbedor (1995:131) reports negative cancellation. Dechaine (1995) also notes the same effect for Yoruba where one negation would cancel out the other negation. We assume that this is essentially accurate with a caveat. If the sentential negation *kò* co-occurs with the imperative negation marker *má*, the negative effects in the sentence would be neutralized (15). However, if two variants of the sentential negation *kò* co-occur, they would only serve to emphasize the negative effects of the sentence (14a). Also, if the constituent negation marker *kò* co-occurs with the sentential negation marker *kò* as in the biclausal sentence in (14b), the negative effects are still retained and perhaps enhanced. Therefore, no negation cancellation would take place.

- 14a. Adéwuyì kò kǐjẹ ìrẹ̀sì. (Negation not cancelled)
Adewuyi NEG NEG-habitual eat rice
'Adewuyi doesn't usually eat rice.'

- 14b. Olúkònikò jẹun (Negation not cancelled)
Olú NEG be NEG eat
'It wasn't Olu who did not eat'

15. Adéwuyì kò lè má jẹ ìrẹ̀sì. (Negation cancelled)
Adewuyi NEG can NEG eat rice
'Adewuyi cannot do without eating rice.' / 'Adewuyi always eats rice.'

It appears that each negation cancelling context involves the occurrence of at least one modal verb. And, it also appears that negation cancellation involves the sentential negation *kò* and the imperative negation *má* in all cases. And, in all instances, *kò* must be the first negation marker in the sentence.

- (16a) Olú gbọ̀dọ̀ lè ẹ̀ ẹ̀ ẹ̀ yíí
Olu must can do work this
'Olu must be able to do this work'

- (16b) Olú kò gbọ̀dọ̀má lè ẹ̀ ẹ̀ ẹ̀ yíí
Olu NEG must NEG can do work this
'Olu must be able to do this work'

- (17a) Olú gbọ̀dọ̀ tǐjǐ
Olu must ASP wake
'Olu must have woken up'

- (17b.) Olú kògbọ̀dọ̀mátǐjǐ
Olu NEG must NEG ASP wake
'Olu must have woken up'

- (18a)¹ Olú gbọ̀dọ̀ tètèdè
Olu must quickly arrive
'Olu must arrive quickly'

- (18b.) Olú kò gbọ̀dọ̀ mátètèdè
Olu NEG must NEG quickly arrive
'Olu must arrive quickly'

One way to explain the possibility of multiple negation is to allude to the fact that there are usually two elements with verbal features in (16) to (18). In these cases, there are main verbs and modal verbs. If this multiple verbal element requirements were true, then we would expect multiple negation to be possible with serial verb constructions in the language. However, multiple negation is not attested in serial verb constructions in the language. For example, (19b) is not acceptable.

- 19a. Adéwuyì ga tó Àdió.
Adewuyi tall reach Adio
'Adewuyi is as tall as Adio.'

- 19b. *Adéwuyì kò ga má tó Àdió.
Adewuyi NEG tall NEG reach Adio

Therefore, we would probably need to appeal to other factors different from the occurrence of two words with verbal properties to fully account for the occurrence of multiple negation in Yoruba. For now, it suffices to say that Yoruba does not use multiple negation in serial verb constructions. It uses only one negation marker as in (20).

¹The possibility of (18b) suggests that *má* might not be adjoined to the VP (cf. Dechaine 1995).
An additional adverb, in this instance *tètè* 'quickly', can intervene between them.

20. Adéwuyi kò ga tó Àdió.
Adewuyi NEG tall reach Adio
'Adewuyi is not as tall as Adio.'

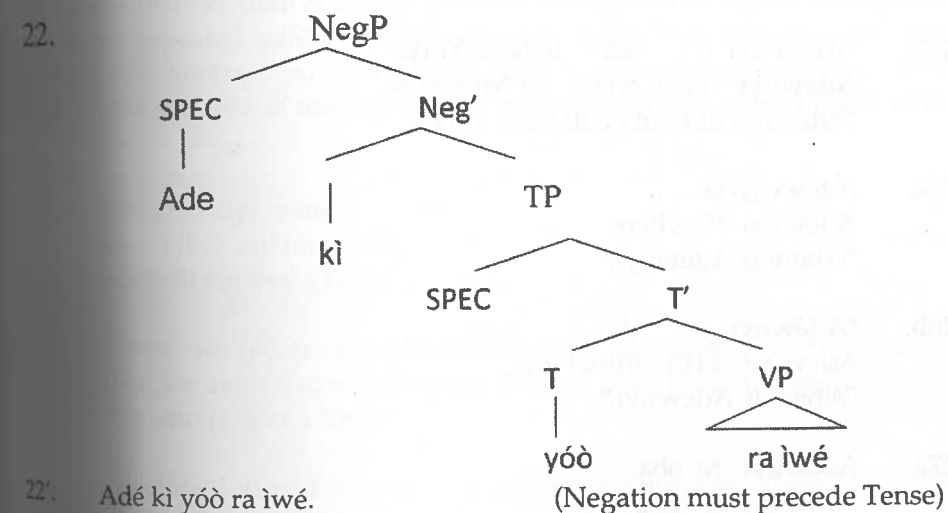
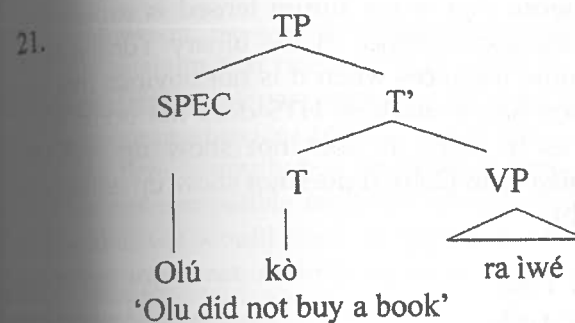
Next we turn to the possible structures for Negation in Yoruba.

3. The Structure of the NegP in Yoruba

Since Pollock (1989), it has been shown in the literature that negation can project a NegP. Some languages (like Berber and Turkish) realize negation in the head position, Neg^o while others (like German and Swedish) put negation in the Specifier position of the NegP (Ouhalla 1990:191). For Yoruba, we assume following Awoyale's (1995) work on functional categories that negation is a head. One possible argument that has been used to differentiate between when negation is a head and when it is a specifier in the literature is the ability of the head to merge with other syntactic elements (Aboh 2010). However, Yoruba is not rich in inflectional morphology like many other languages that were used to make the argument. One strand of related evidence that we can provide is in the fact that negation and the habitual marker seem to merge in the derivation of the habitual negation marker *kii*. Akinlabi (p.c. March 10, 2010) points it out to me that the word is derived from the sentential negation *kò/kì* and the habitual progressive marker *n*. The fact that the negation marker *kì* merges with the *í* that cliticizes with it to derive *kii* as in (21) could be used as an evident that negation is a head.

21. Adéwuyi kii lọ New York.
Adewuyi NEG-HAB go New York
'Adewuyi doesn't go to New York.'

There are two leading hypotheses on the structure of the negation phrase in Yoruba. The first proposal is due to Dechaine (1995) who claims partly based on the fact that the non-future tense cannot co-occur with the sentential negation *kò* that negation is in Tense in Yoruba (21). Thus, we would not need an independent NegP if this is correct. The second proposal is due to Awoyale (1995) who claims that negation can project its own phrase – NegP like other functional categories as in (22).



- 22'. Adé ki yóò ra iwé.
Ade NEG will buy book
'Ade will not buy a book'

- 22'' *Adéyóòkìraiwé.
Ade will NEG buy book

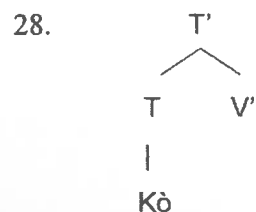
It appears that both of them could not be accurate at the same time. Perhaps a closer look at the complementarity of the non-future tense marking HTS and negation would shed some light on the issue. Yoruba has a two-tense system – future and non-future (Bamgbose 1990, Awoyale 1991, Dechaine 1995, Awobuluyi 1999, and Olumuyiwa 2013). The future tense is marked with *yóò*, *máa*, or *á* as in (23), while the non-future tense is marked with a high tone syllable (HTS) as in (24).

23. Adéwuyi máa/yóò/á lọ New York.
Adewuyi FUT go New York.
'Adewuyi will go to New York.'
24. Adéwuyi í lọ New York.
Adewuyi HTS go New York.
'Adewuyi went to New York.'

So, every Yoruba sentence that is not future tensed is expected to have an HTS as a non-futuretensed sentence in the binary Yoruba tense system. However, there are some instances when it is not obvious that this expectation is fulfilled. The non-future marking HTS does not occur when there is a negation marker as in (25b). It does not show up with the interrogative verbs like *dà* or *ńkọ* as in (26b). It does not show up either with the predicate head *ni* as in (27b).

- 25a. Adéwuyì kò lẹ New York.
Adewuyi NEG go New York.
'Adewuyi did not go to New York'
- 25b. *Adéwuyì í kò lẹ New York.
Adewuyi HTS NEG go New York.
'Adewuyi did not go to New York'
- 26a. Adéwuyì dà.
Adewuyi BE-where
'Where is Adewuyi?'
- 26b. *Adéwuyì í dà.
Adewuyi HTS BE-where
'Where is Adewuyi?'
- 27a. Adéwuyì ni ọba.
Adewuyi BE king
'Adewuyi is the king.'
- 27b. *Adéwuyì í ni ọba.
Adewuyi HTS BE king
'Adewuyi is the king.'

Thus, the (b) examples in (25) to (27) suggest that negation, interrogative verbs, and the predicate head cannot co-occur with the non-future tense marker in Yoruba. It is tempting to follow Dechaine (1995) to use the paradigm in (25) to argue that negation is in Tense in Yoruba. This would suggest following Dechaine (1995) that the structure in (28) is attested in Yoruba.

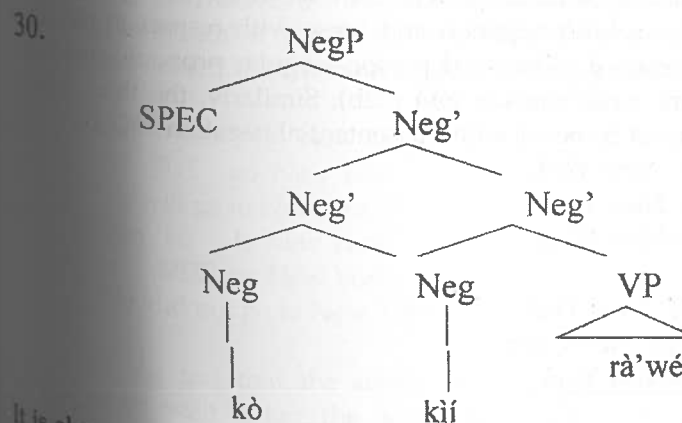


However, we would not take that route. For starters, it does not look plausible to claim that negation is in Tense in (25a) since we cannot extend the same claim to the paradigms in (26) and (27). So, interrogative verbs and the predicate head in (26) and (27) are not in Tense either. The claim that we will make here is simply that negation, interrogative verbs and the predicate head are not compatible with the non-future tense marker in Yoruba. This implies that we would need to appeal to other possibilities different from occupying the Tense node to account for the complementarity of syntactic elements like negation, interrogative verbs, and the predicate head *ni* with the non-future tense. Thus, in the absence of any other evidence, we would not assume that negation occurs in Tense in Yoruba. More so, the example in (22) above repeated below as (29) actually shows that future tense and negation can co-occur. So, there is no need to assume that negation is in Tense on the strength of the fact that the non-future tense cannot occur with negation.

29. Adé kiyódráiwé.
Ade NEG will buy book
'Ade will not buy a book'

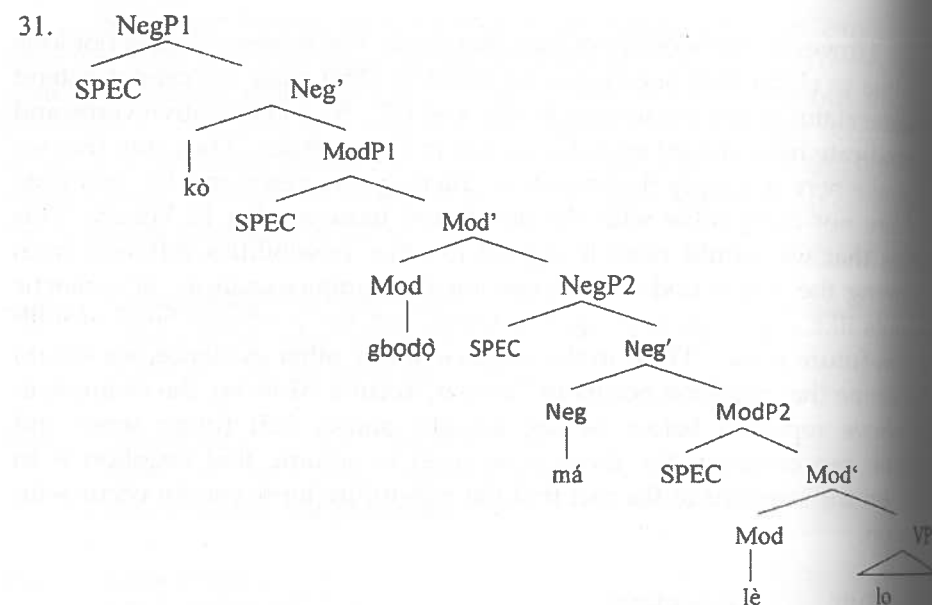
If these two pieces of evidence show that negation is not in Tense in Yoruba, then we can assume following Pollock (1989) and Chomsky (1989) that negation can project a NegP.

Therefore, I would assume in this chapter following Awoyale (1995) that Yoruba negation markers can project a NegP. It is indeed possible for the NegP to have two heads² as in example (14a) above. Its structure would look like (30).



It is also possible for a Yoruba Sentence to have multiple negation phrases. They must occur pre-verbally.

² See Baker (1989)'s Head Licensing Condition for more on doubly headed projections.



4. Negation and Tense

We have seen it in the preceding section that negation, aspects, modal verbs, and tense are all encoded between the subject and the verb. We have also seen it that the sentential negation *kò* must precede all the other syntactic elements that it co-occurs with between the subject and the verb. We have also seen it that the sentential negation always occurs in a fixed position. It must always precede the Tense in case of the future tense (22"). We leave the question of why the non-future tense marking HTS cannot co-occur with negation aside for now.

One important occurrence pattern that we need to highlight here points to a similarity in both negation and tense with respect to the third person singular pronoun, *ó*. The third person singular pronoun cannot co-occur with the future tense marker *yóò* (32b). Similarly, the third person singular pronoun cannot co-occur with the sentential negation *kò* (33b).

32a. *Ó máa lẹ New York.*
3s FUT go New York
'He will go to New York.'

32b. **Ó yóò lẹ New York.*
3s FUT go New York
'He will go to New York.'

32c. *Yóò lẹ New York*
FUT go New York.
'He will go to New York.'

33a. *O kò lẹ New York.*

You NEG go New York
'You did not go to New York.'

33b. **Ó kò lẹ New York*
3s NEG go New York

33c. *Kò lẹ New York*
NEG go New York
'He did not go to New York.'

Thus, the grammatical sentences in (32c) and (33c) do not have a subject. This is not to say that having a subject is incompatible with the sentential negation or the future tense marker. Sentences like (32a) and (33a) clearly show that the sentential negation and the future tense marker are both compatible with subject pronouns. Indeed, the ungrammatical examples in (32b) and (33b) would become grammatical if we change the [Number] feature of the pronoun. For instance, if we use the third person plural pronoun instead of third person singular pronoun, the examples would be grammatical as in (34) and (35).

34. *Wọn yóò lẹ New York.*
3pl. FUT go New York
'They will go to New York.'

35. *Wọn kò lẹ New York*
3pl. NEG go New York
'They did not go to New York.'

In the alternative, the ungrammatical examples in (32b) and (33b) can become grammatical if we change the subject third person singular *weak* pronoun to a subject third person singular *strong* pronoun as in (36) and (37).

36. *Òun yóò lẹ New York.* (Contrastive)

3s. FUT go New York
'He will go to New York.'

37. *Òun kò lẹ New York* (Contrastive)
3s. NEG go New York
'He did not go to New York.'

So, the fact that the subject third person singular weak pronoun cannot occur with either the sentential negation *kò* or the future tense marker *yóò* is a (little) mystery. It is perhaps related to why the non-future tense marker cannot co-occur with the sentential negation marker *kò* as we have seen it in a preceding section. The resolution of the mystery would potentially require further research.

It is important to note however, that the fact that the grammatical sentences in (32c) and (33c) do not have a subject is not excepted in Yoruba which according to Adesola (2005, 2010) has a strong Extended Projection Principle (EPP) requirement. And, to make it more complicated, those are not the only two contexts in which the subject requirement is not fulfilled in Yoruba.

The subject position is not filled in the third person singular with several aspectual markers in Yoruba. The subject position is null in the third person singular with the conditional marker *ibá* (38).

38. *Ìbá lẹ, bí Adé bá lẹ.*
COND go if Ade meet go
'He would have gone if Ade went.'

The subject position is not filled in the third person singular either when the habitual sentential negation is used (39).

39. *Kí jẹ ìrẹ̀sì*
NEG- HAB eat rice
'He doesn't eat rice.' ọọ

Thus, we have more candidates for the violation of the Extended Projection Principle (EPP). It has been suggested in the literature (Chomsky 1995 among many others) that certain functional heads – notably T – require a specifier (/subject). This is known as the EPP requirement. Put another way, EPP is the structural requirement that certain configurations should have a subject (Lasnik 2001). So, what do languages do to avoid violating this principle? They ensure compliance by either by raising an NP or by inserting an expletive pronoun in the subject position. Adesola (2010) notes that Yoruba uses both strategies. These are seen in how Yoruba uses the non-agreeing resumptive pronoun *ó* and in copy raising and expletive constructions. However, none of the two repair strategies is available to ensure EPP compliance in the contexts highlighted in (32) through (39). Resolving this issue would require further research. Perhaps the most straightforward way to resolve the puzzle is to assume that Tense is absent whenever the subject position is null. This approach has been used in the literature to account for the absence of subjects in imperative sentences (Branigan 1996, Platzack and Rosengren 1998). Another alternative is to assume that the D-Feature of T is weak in instances when EPP is violated in Yoruba (Rupp 2003:99). The third alternative is to assume that there is in fact an invisible pronoun namely a *pro* in the subject position in each case. We would not attempt to decide in favor of one or the other alternative in this chapter. However, the first two alternative are more appealing than the third alternative for empirical reasons. For example, it has been shown in Adesola (2010) that a null operator cannot satisfy the EPP requirements of T. This follows from how null operator movement works in the derivation of

questions and focus constructions in Yoruba (Adesola 2005, 2006). If this is correct, perhaps an invisible pronoun could satisfy the EPP requirements of T either. So, in those cases in (32) to (39), it is either the case that Tense is absent or the D-feature of T is weak if Tense is present in those contexts.

5. Conclusion

We have explored the pattern of occurrence of negation in Yoruba and its relationship with Tense. We show that syntactic elements like negation, interrogative verbs, and specificational copular *ni* cannot co-occur with the non-future tense marker. This could be because Tense is absent in the contexts. We also show that there are instances in which the future tense, conditional markers, and negation cannot license a third person singular pronoun in the subject position. We made three conclusions from the exploration. One, we note that Yoruba negation is not parasitic on Tense because they could actually be in complementary distribution in a sentence. We note further that the complementarity of the non-future tense marker and negation is not enough evidence to suggest that negation is in Tense in Yoruba. This conclusion was based on two reasons: the fact that negation can co-occur with the future tense marker and the fact that none of the other syntactic elements that are also in complementary distribution with the non-future tense marker can occur in Tense in Yoruba. The third conclusion that we made is that in the instance where the future tense and negation do not allow a subject because of the feature deficiencies of the subject third person singular weak pronoun we can assume that the EPP requirement is switched off. This we note could be because Tense is apparently absent in those instances or its D-feature is weak.

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The Yoruba Numeral System - Functions and Realities

Yiwola Awoyale

Abstr**act**
This paper focuses on the language of enumeration in Yoruba, in both the traditional and the newly-proposed decimal systems, not with the intention of justifying one above the other, given that the decimal system represents the sure future in the technological age, but essentially to unravel the creative resourcefulness of the Yoruba language in efficiently sustaining the two systems. We will examine the numerals in the two systems in certain identifiable contexts of functions and their associated forms. We will show what numeral formations are to be handled in the morphological component, and what to assign to the open syntax, of the language. In doing this, we have proposed adjustments that must be made to the decimal system of Longe (2009b) by streamlining and blending the /gbára/ concept, and by eliminating /ewá/ 'ten', as a digit/unit in the decimal computation. Expressing large and long numerals in prose is a daunting task for the morphology of the language, since this will impact learnability, pronunciation, and coherence, but despite such challenges, the Yoruba language has handled them pretty well. Only the future will tell for how long the language can keep the two systems.

Introduction

That the numerals across languages are used for enumeration, in some form or another, is a generally accepted fact. That the systems of enumeration across languages are, for some inexplicable reasons, of varying degrees of efficiency, simplicity and/or complexity, is also not in doubt. Each language, or each unit of languages, usually chooses, as in universal grammar, its systems or parameters, from the universal system of enumeration, for whatever functions that may be considered necessary and appropriate for their varying daily needs. Despite this freedom to choose individual parameters of enumeration however, there are exigencies that may compel such individual parameters to be modified and refined for the greater good. The language of enumeration belongs in the universal realm of mathematics so this places additional demands on whatever individual parameters a language may choose for its enumeration system. Therefore it is not enough for an enumeration system to appear to be efficient for the local needs of a language and a culture, rather it now must be measured against the benchmark of modern mathematical calculation, which is now controlled by both the human mind and machines. Thus the Yoruba language now has two competing systems of enumeration – traditional and decimal. Virtually all Yoruba scholars have recognized all along that the traditional system of enumeration is becoming inefficient for the needs of the contemporary

technological age, yet the solution has become very hard to find. A lot has been written on the Yoruba traditional system of enumeration (cf. Abiyamo (2013), Abraham, R.C. (1958), Armstrong, R.C. and A. Bamgbose (1965), Awoyale, Y. (2013), Delano, I.O. (1958), Ekundayo, S.A. (1977), Fabunmi, F. A. (n.d.), Johnson, Samuel (1897/1921/1966), Longe, O. (2009a), Mann, A. (1887), Rowlands, E.C. (1969), Ward, I.C. (1952), Zaslavsky, C. (1970), among many others). These efforts have concentrated on the status quo, despite its glaring limitations. On the other hand, Longe, O. (2009b), coming from the angle of computer science and mathematics, has provided a very powerful tool by presenting a full-blown description and analysis of the decimal system. His tool has taken us beyond our wildest imagination, but yet that is where we have always wanted to go. Its language may not appear fully coherent for now, but the attempt is bold and systematic. The metalanguage may appear cumbersome in prose, but it is learnable once one becomes familiar with the concepts of counting the decimal points/places forward, or of moving the decimal point to the right. The claims of reading off the surface decimal points/places, for whatever number, no matter how large, appear to be testable, provable, verifiable and comprehensible.

This paper will focus on the language of enumeration in the two systems, not with the intention of justifying one above the other, given that the decimal system represents the sure future in a technological age, but essentially to unravel the richness of the Yoruba language in maintaining the two systems. We will concentrate on the contexts of functions that these numbers are used in, and how these contexts of functions affect the mechanisms of forms of the numbers in the two systems, and help us to put some order into our analyses and perceptions of the numerals. We will divide the contexts of functions into two broad categories – macrostructure and microstructure – in order to gain clearly both a global view of these numerals as well as on the inner workings of the numbers within the spaces of the higher tenths/decades (cf. Mann (1887)), the higher hundredths or centuries, the higher two hundredths, and the higher thousandths/millennia. Going through the morphology, we will start with the macrostructure which controls the global view of the enumeration and then go on to the inner details in the microstructure. This will lead us to the open syntax to see how the language uses phrases and sentences to reduce enumeration to structural prose.

Macrostructure

The macrostructure gives us the global view of the system of enumeration. On the one hand of the macrostructure are the two mechanisms/strategies that drive the macrostructure: (1) the specific contexts of functions (i.e. free/independent cardinal, sequential cardinal, 'each' numeral, re-iterative numeral, quantitative ordinal, and positional/place ordinal), that the

numerals are engaged in; and, (2) the 'booster' numerals that drive up the numerals to higher and higher heights. On the other hand of the macrostructure are the loose operations of free multiplication, free subtraction, free division, and free addition, which are controlled by the open syntax of the language.

Specific Contexts of Functions

Seven contexts of functions (i.e. independent; sequential; quantitative; each; all-inclusion; re-iterative; positional/place) can be clearly identified for these numerals, and they cut across the system of enumeration. Each function has its unique forms for the specified contexts as shown in the following chart. We will illustrate these unique forms with the core numbers from 0 to 10, which can generalize to other higher numbers. Both the traditional and the decimal systems accept the numbers from zero (0) to ten (10) as the core.

Chart i: The Core

	Independ ent	Sequential	Quantitative	Each	All- Inclusion	Re-iteration	Positional/place
00	òdo	òdo	òdo	òdòdòdo	òdòdòdo	òdòdòdo	òdo
01	oókan	ení/iní	kan/méni	òkòòkan	òkan	òòkan	ìkínní; èkínní; kínní
02	eéjì	èjì	méjì	èjèèjì	méjèèjì	èèméjì	ìkéjì; èkéjì; kéjì
03	ẹ́ẹ́ta	ẹ́ta	mẹ́ta	ẹ́tẹ́ẹ́ta	mẹ́tẹ́ẹ́ta	ẹ́ẹ́mẹ́ta	ìkẹ́ta; èkẹ́ta; kẹ́ta
04	ẹ́ẹ́rin	ẹ́rin	mẹ́rin	ẹ́rẹ́ẹ́rin	mẹ́rẹ́ẹ́rin	ẹ́ẹ́mẹ́rin	ìkẹ́rin; èkẹ́rin; kẹ́rin
05	aárùn-ún	àrùn/ẹ́rùn	márùn-ún	àrààrùn	màrààrùn	ẹ́ẹ́márùn-ún	ìkárùn-ún; èkárùn-ún; kárùn-ún
06	ẹ́ẹ́fà	ẹ́fà	mẹ́fà	ẹ́fẹ́ẹ́fà	mẹ́fẹ́ẹ́fà	ẹ́ẹ́mẹ́fà	ìkẹ́fà; èkẹ́fà; kẹ́fà
07	eéje	èje	méje	èjèèje	méjèèje	èèméje	ìkéje; èkéje; kéje
08	ẹ́ẹ́jo	ẹ́jo	mẹ́jo	ẹ́jẹ́ẹ́jo	mẹ́jẹ́ẹ́jo	ẹ́ẹ́mẹ́jo	ìkéjo; èkéjo; kéjo
09	ẹ́ẹ́sàn-án	ẹ́sán	mẹ́sàn-án	ẹ́sẹ́ẹ́sán	mẹ́sẹ́ẹ́sán	ẹ́ẹ́mẹ́sàn-án	ìkẹ́sàn-án; èkẹ́sàn-án; kẹ́sàn-án
10	ẹ́ẹ́wàá	ẹ́wá	mẹ́wàá	ẹ́wẹ́ẹ́wá	mẹ́wẹ́ẹ́wá	ẹ́ẹ́mẹ́wàá	ìkẹ́wàá; èkẹ́wàá; kẹ́wàá

Word-Internal operations

As powerful and promising a computational tool as Longe (2009b) is, there are certain pronunciation and learnability challenges which the morphological formations will definitely pose. Certain adjustments will have to be made for the sake of consistency and systematicity to streamline the decimal system with the traditional system. Adesola (p.c.) has pointed out both the difficulty of interpreting /gbára/ in the decimal system as 'to the power/exponent of' a digit, and the crucial omission of /gbáròkan/ 'one decimal place' in the sequence of /gbàrèjì/, /gbàrẹ́ta/, /gbàrẹ́rin/, and so forth, in Longe (2009b). We think it will be safer to interpret /gbára/ simply as the number of digit/decimal positions after a numeral, counting from left

to right. Also, we suggest that, unlike in Longe (2009b), /ẹ́wá/ 'ten/10', should be removed as a single unit under the decimal system, such that we are left with just 1 to 9 in the decimal computation. This will enable us to be very strict and systematic in computing the figures, such that the initial digit will figure visually and prominently in the computation. Hopefully such steps will minimize the learnability and pronunciation challenges that one may assume during a first encounter with the decimal system as we will see further below. Because we take the sequential cardinals to represent the core of the Yoruba enumeration system, we will adopt it in this explication, rather than the independent cardinals. Doing that will make the rather lengthy pronunciation much smoother and comprehensive. For lack of space, we are going to cut the charts to the barest minimum and hope that our readers will interpret accordingly.

We regard the operations that produce forms such as sequential cardinals, free/independent cardinals, quantitative ordinals, 'each' numerals, all-inclusion numerals, re-iteration numerals, and the positional/place numerals, mentioned above, as word-internal, and these are controlled by the morphological component of the grammar of the language. Such word-internal operations are evident in the broad categories of functions below.

Sequential Cardinals

Morphologically, the sequential cardinals appear to be the core/base of both the traditional and the decimal number systems for three reasons. First, their words, that is, for [0] to [10], cannot be claimed to be derived from any source; second, they are bisyllabic, which is the minimum form; and third, both the traditional and the decimal systems retain them as the base. All the other instantiations of the Yoruba numerals are morphologically traceable to them in one form or another, as we shall soon show. The words for sequential numerals, except for the number 'one/1', are generally characterized by a low tone on their initial vowel. Because they function predominantly in sequential counting, the forms are generally context-sensitive. Whenever the sum total of entities needs to be established, the sequential cardinals come handy to use; and the order of the sequentials cannot be disrupted. They generally feed the quantitative numerals.

Chart ii: The Sequentials

	Traditional	Decimal (longe (2009b:10))	Sequential numeral
0	Òdo	Ófo	'zero/0'
1	ení/iní	ení/iní	'one/1'
2	Èjì	Èjì	'two/2'
3	ẹta	ẹta	'three/3'
4	ẹrin	ẹrin	'four/4'
5	Àrún	Àrún	'five/5'
6	ẹfà	ẹfà	'six/6'
7	Èje	Èje	'seven/7'
8	ẹjọ	ẹjọ	'eight/8'
9	ẹsán	ẹsán	'nine/9'
10	ẹwá	ẹwá	'ten/10'

We have chosen the examples of words for 20 to 30 below and elsewhere, in the two systems for illustrative purposes only, as in the chart below. Given that /gbàrọkan/ has lost its initial vowel, it ought to be written together with the preceding numeral in order to blend.

Traditional	Decimal	Revised decimal
	(Longe (2009b:15))	
10 ẹwá (10)	ẹwá (10)	ọkangbàrọkan
20 ogún (20)	20 ẹjìwá (20)	ẹjìgbàrọkan (20)
21 ọkànlélógún (1+20)	21 ẹjìwálékan (20+1)	ẹjìgbàrọkan-lékan (20+1)
22 ẹjìlélógún (2+20)	22 ẹjìwáléjì (2X10+2)	ẹjìgbàrọkan-léjì (20+2)
23 ẹtálélógún (3+20)	23 ẹjìwáléta (20+3)	ẹjìgbàrọkan-léta (20+3)
24 ẹrinlélógún (4+20)	24 ẹjìwálérin (20+4)	ẹjìgbàrọkan-lérin (20+4)
25 àrúndíngbọn (5-30)	25 ẹjìwálárún-ún (20+5)	ẹjìgbàrọkan-lárún-ún (20+5)
26 ẹrindínlógbọn (4-30)	26 ẹjìwáléfa (20+6)	ẹjìgbàrọkan-léfa (20+6)
27 ẹtádínlógbọn (3-30)	27 ẹjìwáléje (20+7)	ẹjìgbàrọkan-léje (20+7)
28 ẹjídínlógbọn (2-30)	28 ẹjìwáléjọ (20+8)	ẹjìgbàrọkan-léjọ (20+8)
29 ọkàndínlógbọn (1-30)	29 ẹjìwáléṣàń-án (20+9)	ẹjìgbàrọkan-léṣàń-án (20+9)
30 ọgbọn (30)	30 ẹtawá (10X3)	ẹtagbàrọkan (30)

Three digits will give us the following

210 igba	ẹjì gbàrẹ̀jì lẹ̀wàá	ẹjìgbàrẹ̀jì-lẹ̀kangbàrọkan (200+10)
221 ọkànlélógúnlénigba	ẹjì gbàrẹ̀jì ẹ̀jìwá lékan	ẹjìgbàrẹ̀jì-lẹ̀jìgbàrọkan-lékan (200+20+1)
232 ẹjìlélógbọnlénigba	ẹjì gbàrẹ̀jì ẹ̀tawá léjì	ẹjìgbàrẹ̀jì-lẹ̀tagbàrọkan-léjì (200+30+2)
243 ẹtálélógójìlénigba	ẹjì gbàrẹ̀jì ẹ̀rinwá létá	ẹjìgbàrẹ̀jì-lẹ̀ringbàrọkan-léta (200+40+3)
500 ẹ̀ẹ̀dẹ̀gbẹ̀ta (500)	àrún gbàrẹ̀jì	àrúgbàrẹ̀jì (500)

For four digits we have:

5210 ẹ̀ẹ̀bẹ̀rindínlógbọnlémẹ̀wàá	àrún gbàrẹ̀ta ẹ̀jì gbàrẹ̀jì lẹ̀wàá	àrúgbàrẹ̀ta-lẹ̀jìgbàrẹ̀jì-lẹ̀kangbàrọkan (5000+200+10)
6221 ẹ̀ẹ̀gbọ̀kànlélógbọnlẹ̀kànlélógún	ẹ̀fà gbàrẹ̀ta ẹ̀jì gbàrẹ̀jì ẹ̀jìwálékan	ẹ̀fagbàrẹ̀ta-lẹ̀jìgbàrẹ̀jì-lẹ̀jìgbàrọkan-lékan (6000+200+20+1)
7232 ẹ̀ẹ̀bẹ̀rindínlógójìlẹ̀jìlélógbọn	ẹ̀je gbàrẹ̀ta ẹ̀jì gbàrẹ̀jì ẹ̀tawá léjì	ẹ̀jegbàrẹ̀ta-lẹ̀jìgbàrẹ̀jì-lẹ̀tagbàrọkan-léjì (7000+200+30+2)
8243 ẹ̀ẹ̀gbọ̀kànlélógójìlẹ̀tálélógójì	ẹ̀jọ gbàrẹ̀ta ẹ̀jì gbàrẹ̀jì ẹ̀rinwá létá	ẹ̀jogbàrẹ̀ta-lẹ̀jìgbàrẹ̀jì-lẹ̀ringbàrọkan-léta (8000+200+40+3)
9500 ẹ̀ẹ̀dẹ̀gbẹ̀jìdínlẹ̀ááádọta	ẹ̀sán gbàrẹ̀ta àrún gbàrẹ̀jì	ẹ̀sángbàrẹ̀ta-lárún-úngbàrẹ̀jì (9000+500)

Independent/Free Cardinals

With the exception of /òdo/ 'zero', these independent cardinals are generally characterized by a mid-high tone sequence on their identical initial vowels. They are context-free; and the single-digit ones among them (òdo/0 - ẹ̀ṣàń-án/9), are regularly the obvious exclusive choice for reciting serial numbers, index numbers, telephone numbers, social security numbers, and all varieties of identification numbers. They are also used in free citation of simple addition, subtraction, division or multiplication of random numbers. We consider them to be cardinal in function despite the fact that their formation does seem to reflect some derivation of compounding. The mid-high tone sequence on the initial vowels has been rightly attributed (cf. Johnson, S. (1921:li), Abraham (1958:xxxii) to [owó] 'money', as in [owó-ọkan -> oókan]. In the chart below, where the interplay of both vowel assimilation and vowel harmony produces the variant forms of the initial vowels, we, again, list only the words for 0 to 10 for illustrative purposes, which can generalize to the words for higher numbers.

Chart iii: The Independent Numerals

Traditional	Decimal	Independent or free standing numeral
0 òdo (no change)	òdo (no change)	'zero/0'
1 oókan <owó-ọkan	oókan <owó-ọkan	'one/1'
2 eéjì <owó-ẹ̀jì	eéjì <owó-ẹ̀jì	'two/2'
3 ẹ́ẹ́ta <owó-ẹ̀ta	ẹ́ẹ́ta <owó-ẹ̀ta	'three/3'
4 ẹ́ẹ́rin <owó-ẹ̀rin	ẹ́ẹ́rin <owó-ẹ̀rin	'four/4'
5 aárún-ún <owó-àrún	aárún-ún <owó-àrún	'five/5'
6 ẹ́ẹ́fà <owó-ẹ̀fà	ẹ́ẹ́fà <owó-ẹ̀fà	'six/6'
7 eéje <owó-ẹ̀je	eéje <owó-ẹ̀je	'seven/7'
8 ẹ́ẹ́jọ <owó-ẹ̀jọ	ẹ́ẹ́jọ <owó-ẹ̀jọ	'eight/8'
9 ẹ́ẹ́sán-án <owó-ẹ̀sán	ẹ́ẹ́sán-án <owó-ẹ̀sán-án	'nine/9'
10 ẹ́ẹ́wáá <owó-ẹ̀wá	ẹ́ẹ́wáá <owó-ẹ̀wá	'ten/10'

Examples of words for 20 to 30 in the two systems are in the chart below:

Traditional	Decimal	Revised independent
20 ogún (no change)	eéjìwá <owó-2X10	eéjìgbàròkan (20)
21 ọ̀kànlélogún <owó-1+20	eéjìwá-lékan <owó-2X10+1	eéjìgbàròkan-lékan (20+1)
22 eéjìlélogún <owó-2+20	eéjìwá-léjì <owó-2X10+2	eéjìgbàròkan-léjì (20+2)
23 ẹ̀tálélogún <owó-3+20	eéjìwá-léta <owó-2X10+3	eéjìgbàròkan-léta (20+3)
24 ẹ̀rínlélogún <owó-4+20	eéjìwá-lérin <owó-2X10+4	eéjìgbàròkan-lérin (20+4)
25 ẹ̀dòlogbò <owó-5-30	eéjìwá-làrùn-ún <owó-2X10+5	eéjìgbàròkan-làrùn-ún (20+5)
26 ẹ̀rínḍínlogbò <owó-4-30	eéjìwá-lẹ̀fà <owó-2X10+6	eéjìgbàròkan-lẹ̀fà (20+6)
27 ẹ̀táḍínlogbò <owó-3-30	eéjìwá-léje <owó-2X10+7	eéjìgbàròkan-léje (20+7)
28 eéjìḍínlogbò <owó-2-30	eéjìwá-léjò <owó-2X10+8	eéjìgbàròkan-léjò (20+8)
29 ọ̀kàḍínlogbò <owó-1-30	eéjìwá-lẹ̀sàn-án <owó-2X10+9	eéjìgbàròkan-lẹ̀sàn-án (20+9)
30 ogbò (no change)	ẹ̀tawá <owó-3X10	ẹ̀tagbàròkan (30)

Quantitative Ordinals

These words are built on fossilized imperative structures to give the sum total of the sequential enumeration. The words can be context-sensitive. Where they function context-sensitively, this function can overlap with sequential enumeration, where /kan/ 'one' will be replaced with /méní/ 'one in counting'. Where they function non-context-sensitively, which seems to be their primary function, they simply indicate the sum total of entities of sequential enumeration. The quantitative numerals are generally characterized by an initial /m-/, which has been traced to either /mú/ 'take' (cf. Abraham (1958)) or /mọ́/ 'connect with' (Fabunmi (n.d.)). Morphologically, their fossilized imperative formation takes the form in sequential enumeration in (2.1.1.) as their stem. There is always a high tone on the initial /m-syllable/. Examples of words for 0 to 10, are in the chart below:

Chart iv: Quantitative Numerals

Quantitative	Sequential
00 òdò (no change) 'sum of 'zero/0'	òdò (no change) 'zero/0 in counting'
01 kan <ọ̀kan 'sum of 'one/1'	méní <mú-ení 'one/1 in counting'
02 méjì <mú-èjì 'sum of 'two/2'	méjì <mú-èjì 'two/2 in counting'
03 méta <mú-ẹ̀ta 'sum of 'three/3'	méta <mú-ẹ̀ta 'three/3 in counting'
04 mérin <mú-ẹ̀rin 'sum of 'four/4'	mérin <mú-ẹ̀rin 'four/4 in counting'
05 márùn-ún <mú-àrún 'sum of 'five/5'	márùn-ún <mú-àrún 'five/5 in counting'
06 mẹ̀fà <mú-ẹ̀fà 'sum of 'six/6'	mẹ̀fà <mú-ẹ̀fà 'six/6 in counting'
07 méje <mú-ẹ̀je 'sum of 'seven/7'	méje <mú-ẹ̀je 'seven/7 in counting'
08 méjò <mú-ẹ̀jò 'sum of 'eight/8'	mějò <mú-ẹ̀jò 'eight/8 in counting'
09 mẹ̀sàn-án <mú-ẹ̀sán 'sum of 'nine/9'	mẹ̀sàn-án <mú-ẹ̀sán 'nine/9 in counting'
10 mẹ̀wàá <mú-ẹ̀wá 'sum of 'ten/10'	mẹ̀wàá <mú-ẹ̀wá 'ten/10 in counting'

Examples of words for 20 to 30 in the two systems, are in the chart below:

Traditional	Decimal	Quant and seq
Quant & seq	Quant & Seq	Revised
20 ogún (no change)	méjìwá <mú-10X2	méjìgbàròkan (20)
21 mọ̀kànlélogún <mú-1+20	méjìwálékan <mú-10X2+1	méjìgbàròkan-lékan (20+1)
22 méjìlélogún <mú-2+20	méjìwáléjì <mú-10X2+2	méjìgbàròkan-léjì (20+2)
23 mètálélogún <mú-3+20	méjìwáléta <mú-10X2+3	méjìgbàròkan-léta (20+3)
24 mérinlélogún <mú-4+20	méjìwálérin <mú-10X2+4	méjìgbàròkan-lérin (20+4)
25 mẹ̀ḍḍlogbò <mú-5-30	méjìwálàrùn-ún <mú-10X2+5	méjìgbàròkan-làrùn-ún (20+5)
26 mérinḍínlogbò <mú-4-30	méjìwálẹ̀fà <mú-10X2+6	méjìgbàròkan-lẹ̀fà (20+6)
27 mètáḍínlogbò <mú-3-30	méjìwáléje <mú-10X2+7	méjìgbàròkan-léje (20+7)
28 méjìḍínlogbò <mú-2-30	méjìwáléjò <mú-10X2+8	méjìgbàròkan-léjò (20+8)
29 mọ̀kàḍínlogbò <mú-1-30	méjìwálẹ̀sàn-án <mú-10X2+9	méjìgbàròkan-lẹ̀sàn-án (20+9)
30 ogbò (no change)	mẹ̀tawá <mú-10X3	mẹ̀tagbàròkan (30)

'Each' Numerals

The formation of the words for the 'each' numerals appears to involve some reduplication of only the initial two syllables of the words for sequential enumeration, as the examples of 'each' numeral 'eleven/11', and 21 to 29, appear to show below. The words for these numerals display an unusual interplay of forward application of vowel assimilation and tone harmony, as well as vowel elision, across consonant segments in their morpho-phonemics.

Chart v: Each Numerals

Traditional and Decimal	Reduplicants	'Each' Token
00 Òdòdò	<òdò-òdò	'each zero/0 or in zeroes'
01 ọ̀kọ̀ọ̀kan	<ọ̀kan-ọ̀kan	'each one/1 entity or in ones'
02 Èjèèjì	<èjì-èjì	'each two/2 entities or in twos'
03 ẹ̀tẹ̀ẹ̀ta	<ẹ̀ta-ẹ̀ta	'each three/3 entities or in threes'
04 ẹ̀rìn-ẹ̀rin	<ẹ̀rin-ẹ̀rin	'each four/4 entities or in fours'
05 Àrààrún	<àrún-àrún	'each five/5 entities or in fives'
06 ẹ̀fẹ̀ẹ̀fà	<ẹ̀fà-ẹ̀fà	'each six/6 entities or in sixes'
07 Èjèèje	<èje-èje	'each seven/7 entities or in sevens'
08 ẹ̀jẹ̀ẹ̀jò	<ẹ̀jò-ẹ̀jò	'each eight/8 entities or in eights'
09 ẹ̀sẹ̀ẹ̀sán	<ẹ̀sán-ẹ̀sán	'each nine/9 entities or in nines'
10 ẹ̀wẹ̀ẹ̀wá	<ẹ̀wá-ẹ̀wá	'each ten/10 entities or in tens'
11 ọ̀kọ̀ọ̀kànlá	<ọ̀kàn-ọ̀kànlá	'each eleven/11 entities or in elevens'

Examples of words for 20 to 30 in the two systems are in the chart below:

	Traditional	Decimal	Revised Decimal	
20	ogoogún	èjèèjìwá	èjèèjìgbàròkan	(20)
21	òkòòkànlélogún	èjèèjìwálékan	èjèèjìgbàròkan-lékan	(20+1)
22	èjèèjìlélógún	èjèèjìwáléjì	èjèèjìgbàròkan-léjì	(20+2)
23	ètètètálélógún	èjèèjìwáléta	èjèèjìgbàròkan-léta	(20+3)
24	èrètèrinlélogún	èjèèjìwálérin	èjèèjìgbàròkan-lérin	(20+4)
25	àrààrùndíngbò	èjèèjìwálàrùn-ún	èjèèjìgbàròkan-làrùn-ún	(20+5)
26	èrètèrindínlógbò	èjèèjìwáléfà	èjèèjìgbàròkan-léfà	(20+6)
27	ètètètàdínlogbò	èjèèjìwáléje	èjèèjìgbàròkan-léje	(20+7)
28	èjèèjìdínlogbò	èjèèjìwáléjò	èjèèjìgbàròkan-léjò	(20+8)
29	òkòòkàndínlogbò	èjèèjìwálésàn-án	èjèèjìgbàròkan-lésàn-án	(20+9)
30	ogboogbò	ètètètawá	ètètètàgbàròkan	(30)

All-Inclusion

The all-inclusion numerals, with the exception of /òdo/ 'zero', can also be traced morphologically to the fossilized imperative forms in sequential enumeration, which here, again, serve as the stems. Forward application of both vowel and tone assimilation will explain the resultant forms in the chart below:

Chart vi: All-Inclusion Numerals

	Traditional and Decimal	Formation	All-Inclusive
0	Òdòdòdo	òdo-òdo	'all zero/0'
1	òkan, 7mókòòkan	òkan, 7<mú-òkan-òkan	'one/1'
2	Méjèèjì	<mú-èjì-èjì	'all two/2'
3	métètètà	<mú-èta-èta	'all three/3'
4	mérètèrin	<mú-èrin-èrin	'all four/4'
5	Màrààrùn	<mú-àrùn-àrùn	'all five/5'
6	méfèfèfà	<mú-èfà-èfà	'all six/6'
7	Méjèèje	<mú-èje-èje	'all seven/7'
8	méjèèjò	<mú-èjò-èjò	'all eight/8'
9	mésèèsán	<mú-èsán-èsán	'all nine/9'
10	méwèwá	<mú-èwá-èwá	'all ten/10'

Examples of words for 20 to 30 in the two systems are in the chart below:

	Traditional	Decimal	Revised decimal	
20	ogoogún	méjèèjìwá	méjèèjìgbàròkan	(20)
21	mókòòkànlélogún	méjèèjìwálékan	méjèèjìgbàròkan-lékan	(20+1)
22	méjèèjìlélógún	méjèèjìwáléjì	méjèèjìgbàròkan-léjì	(20+2)
23	métètètálélógún	méjèèjìwáléta	méjèèjìgbàròkan-léta	(20+3)
24	mérètèrinlélogún	méjèèjìwálérin	méjèèjìgbàròkan-lérin	(20+4)
25	màrààrùndíngbò	méjèèjìwálàrùn-ún	méjèèjìgbàròkan-làrùn-ún	(20+5)
26	mérètèrindínlógbò	méjèèjìwáléfà	méjèèjìgbàròkan-léfà	(20+6)
27	métètètàdínlogbò	méjèèjìwáléje	méjèèjìgbàròkan-léje	(20+7)
28	méjèèjìdínlogbò	méjèèjìwáléjò	méjèèjìgbàròkan-léjò	(20+8)
29	mókòòkàndínlogbò	méjèèjìwálésàn-án	méjèèjìgbàròkan-lésàn-án	(20+9)
30	ogboogbò	métètètawá	métètètàgbàròkan	(30)

Re-iteration

The words for re-iterative numerals are characterized by an initial double /èè-/ which has been claimed very rightly (cf. Johnson (1921:liii), Abraham (1958)), to come from /i-rin-/ 'walking, shuttling' after the application of vowel harmony. The /m-/ segment, with the exception of /èèkan/ 'once, one time/attempt or previous time', is the remnant of the fossilized quantitative numeral, which again involves the sequential numeral, as in the chart below:

Chart vii: Re-Iteration Numerals

	Traditional	Decimal (Same)	Re-Iterative
0	òdo (not participating)	Òdo	(non-participating)
1	èèkan <è-rin-òkan	èèkan <è-rin-òkan	'one time/attempt; previously'
2	èéméjì <è-rin-mú-èjì	èéméjì <è-rin-mú-èjì	'two times/attempts'
3	èéméta <è-rin-mú-èta	èéméta <è-rin-mú-èta	'three times/attempts'
4	èémérin <è-rin-mú-èrin	èémérin <è-rin-mú-èrin	'four times/attempts'
5	èémàrùn-ún <è-rin-mú-àrùn	èémàrùn-ún <è-rin-mú-àrùn	'five times/attempts'
6	èéméfà <è-rin-mú-èfà	èéméfà <è-rin-mú-èfà	'six times/attempts'
7	èéméje <è-rin-mú-èje	èéméje <è-rin-mú-èje	'seven times/attempts'
8	èéméjò <è-rin-mú-èjò	èéméjò <è-rin-mú-èjò	'eight times/attempts'
9	èémésàn-án <è-rin-mú-èsán	èémésàn-án <è-rin-mú-èsán	'nine times/attempts'
10	èéméwá <è-rin-mú-èwá	èéméwá <è-rin-mú-èwá	'ten times/attempts'

Examples of words for 20 to 30 in the two systems are in the chart below:

	Traditional	Decimal	Revised Decimal	
20	ìgbà ogún	ẹ̀mẹ̀jìwá	ẹ̀mẹ̀jìgbàrọ̀kan	20)
21	ẹ̀mẹ̀mọ̀kànlélogún	ẹ̀mẹ̀jìwálékan	ẹ̀mẹ̀jìgbàrọ̀kan-lékan	(20+1)
22	ẹ̀mẹ̀jìllélogún	ẹ̀mẹ̀jìwáléjì	ẹ̀mẹ̀jìgbàrọ̀kan-léjì	(20+2)
23	ẹ̀mẹ̀mẹ̀tálélogún	ẹ̀mẹ̀jìwálẹ̀ta	ẹ̀mẹ̀jìgbàrọ̀kan-lẹ̀ta	(20+3)
24	ẹ̀mẹ̀mẹ̀rínlélógún	ẹ̀mẹ̀jìwálẹ̀rin	ẹ̀mẹ̀jìgbàrọ̀kan-lẹ̀rin	(20+4)
25	ẹ̀mẹ̀márùn-úndíngbọ̀n	ẹ̀mẹ̀jìwálárùn-ún	ẹ̀mẹ̀jìgbàrọ̀kan-lárùn-ún	(20+5)
26	ẹ̀mẹ̀mẹ̀rínlínlógbọ̀n	ẹ̀mẹ̀jìwálẹ̀fà	ẹ̀mẹ̀jìgbàrọ̀kan-lẹ̀fà	(20+6)
27	ẹ̀mẹ̀mẹ̀tádínlógbọ̀n	ẹ̀mẹ̀jìwálẹ̀je	ẹ̀mẹ̀jìgbàrọ̀kan-lẹ̀je	(20+7)
28	ẹ̀mẹ̀mẹ̀jídínlógbọ̀n	ẹ̀mẹ̀jìwálẹ̀jo	ẹ̀mẹ̀jìgbàrọ̀kan-lẹ̀jo	(20+8)
29	ẹ̀mẹ̀mọ̀kàndínlógbọ̀n	ẹ̀mẹ̀jìwálẹ̀sàn-án	ẹ̀mẹ̀jìgbàrọ̀kan-lẹ̀sàn-án	(20+9)
30	ìgbà ogbọ̀n	ẹ̀mẹ̀tawá	ẹ̀mẹ̀tagbàrọ̀kan	(30)

Positional/Place Ordinals

The words for the positional/place numerals are generally context-sensitive and they can appear in structure in three variant forms. Given the regularity with which the initial /ì-/ can occur, as in the chart below, it may be safe to take it as the underlying form for the other two variants. And given that, the alternation between the initial /è-/ and /ẹ-/ can be explained by the application of vowel harmony. Syncopation, which is a regular process in Yoruba morphology can explain why the commonest /k-/ variant emerges, such that we can designate the positional/place numerals as the /k-series/ for convenience. The /k-/ comes from /kó/ 'grab, collect, pack off', which serves as a fossilized imperative root. And once again, the words for the sequential numerals serve as a key part of the stems for the formation of the positional/place numerals.

Chart viii: Positional/Place Numerals

Traditional	Decimal (Same)	Positional/Place
00 òdò (non-participating)	òdò (non-participating)	'zero' (neutral)
01 ìkínní; èkínní; kínní <ì-kó-ení	ìkínní; èkínní; kínní	'first'
02. ìkéjì; èkéjì; kejì <ì-kó-èjì	ìkéjì; èkéjì; kejì	'second'
03. ìkéta; èkéta; kẹta <ì-kó-ẹta	ìkéta; èkéta; kẹta	'third'
04 ìkérin; èkérin; kẹrin <ì-kó-ẹrin	ìkérin; èkérin; kẹrin	'fourth'
05. ìkárùn-ún; èkárùn-ún; kárùn-ún	ìkárùn-ún; èkárùn-ún; kárùn-ún	'fifth'
06. ìkéfà; èkéfà; kẹfà <ì-kó-ẹfà	ìkéfà; èkéfà; kẹfà	'sixth'
07. ìkéje; èkéje; kéje <ì-kó-ẹje	ìkéje; èkéje; kéje	'seventh'
08. ìkéjo; èkéjo; kéjo <ì-kó-ẹjo	ìkéjo; èkéjo; kéjo	'eighth'
09. ìkẹsàn-án; èkẹsàn-án; kẹsàn-án	ìkẹsàn-án; èkẹsàn-án; kẹsàn-án	'ninth'
10. ìkẹwàá; èkẹwàá; kẹwàá <ì-kó-ẹwà>	ìkẹwàá; èkẹwàá; kẹwàá	'tenth'

Examples of words for 20 to 30 in the two systems, are in the chart below:

	Traditional	Decimal	Revised Decimal	
20	ogún (no change)	ìkéjìwá [l-/è-/k-]	ìkéjìgbàrọ̀kan	(20th)
21	ìkọ̀kànlélogún [l-/è-/k-]	ìkéjìwálékan [l-/è-/k-]	ìkéjìgbàrọ̀kan-lékan	(20+1st)
22	ìkéjìllélogún [l-/è-/k-]	ìkéjìwáléjì [l-/è-/k-]	ìkéjìgbàrọ̀kan-léjì	(20+2nd)
23	ìkẹ̀tálélogún [l-/è-/k-]	ìkéjìwálẹ̀ta [l-/è-/k-]	ìkéjìgbàrọ̀kan-lẹ̀ta	(20+3rd)
24	ìké̀rínlélógún [l-/è-/k-]	ìkéjìwálẹ̀rin [l-/è-/k-]	ìkéjìgbàrọ̀kan-lẹ̀rin	(20+4th)
25	ìkárúndíngbọ̀n [l-/è-/k-]	ìkéjìwálárùn-ún [l-/è-/k-]	ìkéjìgbàrọ̀kan-lárùn-ún	(20+5th)
26	ìké̀rínlínlógbọ̀n [l-/è-/k-]	ìkéjìwálẹ̀fà [l-/è-/k-]	ìkéjìgbàrọ̀kan-lẹ̀fà	(20+6th)
27	ìkẹ̀tádínlógbọ̀n [l-/è-/k-]	ìkéjìwálẹ̀je [l-/è-/k-]	ìkéjìgbàrọ̀kan-lẹ̀je	(20+7th)
28	ìké̀jídínlógbọ̀n [l-/è-/k-]	ìkéjìwálẹ̀jo [l-/è-/k-]	ìkéjìgbàrọ̀kan-lẹ̀jo	(20+8th)
29	ìkọ̀kàndínlógbọ̀n [l-/è-/k-]	ìkéjìwálẹ̀sàn-án [l-/è-/k-]	ìkéjìgbàrọ̀kan-lẹ̀sàn-án	(20+9th)
30	ogbón (no change)	ìkẹ̀tawá [l-/è-/k-]	ìkẹ̀tagbàrọ̀kan	(30th)

Booster Numerals

We now come to the second part of the global view of the enumeration system. This concerns the role of what we refer to as the 'booster' numerals. On the decimal side, what we can consider as a booster numeral is the surface decimal point which can be expanded ad infinitum. On the traditional side, there are five booster numerals – 10, 20, 200, 1000, and 2000, in the enumeration system. These numerals, in addition to their own individual meanings, run up the other numbers, and like rockets, take them to greater heights.

As we will show under the microstructure, the numeral 10 demarcates across the board, the numerals into tens, which coincidentally marks the distance of a decade in time. Inexplicably in Yoruba though, numbers in time and space have been divided into tens, such that numbers up to infinities, are built upon layers upon layers of tens. Yoruba legend (cf. Longe (2009a)) would relate the numeral 10 to the number of our fingers or our toes. Primarily the numeral 10 controls the foundation of the core.

The word /ogún/ for the traditional booster numeral 20, controls the domain between 20 and 200. It takes over from numeral 10 and powers the enumeration system all the way through /ogórun-ún/, (the numeral 100 (century)), to /igba/, the numeral 200, as in the following multiples of 20, but the delimitation by /ẹwá/, 10, also runs through as an undercurrent:

Chart ix: Booster Numerals

Trad.	Decimal	Revised	Trad.	Decimal	Revised
20 ogún	èjìwá	jìgbàròkan	30 ogbò/àádóji	ètawá	ètagbàròkan
40 ogóji	èrinwá	ringbàròkan	50 àádóta	àrúnwá	àrúgbàròkan
60 ogóta	èfàwá	fàgbàròkan	70 àádòrin	èjewá	èjegbàròkan
80 ogórin	èjowá	jogbàròkan	90 àádòrùn-ún	èsánwá	èsángbàròkan
100 ogórun-ún	òkan gbàrèjì	kangbàrèjì	110 àádófà	òkan gbàrèjì	òkangbàrèjì
120 ogófa	èjìwá	lèjìgbàròkan		lèwàá	lòkangbàròkan
140 ogóje	òkan gbàrèjì	kangbàrèjì	130 àádóje	òkan gbàrèjì	òkangbàrèjì
	èrinwá	lèringbàròkan		ètawá	lèttagbàròkan
160 ogójo	òkan gbàrèjì	kangbàrèjì	150 àádójo	òkan gbàrèjì	òkangbàrèjì
	èfàwá	lèfàgbàròkan		àrúnwá	lárùn- úgbàròkan
180 ogósàn-án	òkan gbàrèjì	kangbàrèjì	170 àádósàn-án	òkan gbàrèjì	òkangbàrèjì
	èjowá	lèjogbàròkan		èjewá	lèjegbàròkan
200 ogówàá/ igba	èjì gbàrèjì	jìgbàrèjì	190 àádówàá	òkan gbàrèjì	òkangbàrèjì
				èsánwá	lèsàn- ángbàròkan

Traditional Booster Numeral 200 all the Way to the first Thousandth / Millennium

The boosting power of the traditional /igba/ 200 then takes over and powers the enumeration all the way to the first thousandth/millennium as in the chart below:

Chart x: Booster Numerals

Trad Multiples of 200	Decimal (Longe (2009b))		Trad Multiples of 200 minus 100	Decimal (Longe (2009))	
Trad.	Decimal	Revised	Trad.	Decimal	Revised
200 igba	èjì gbàrèjì	èjìgbàrèjì			
400 irinwó	èrin gbàrèjì	èringbàrèjì	300 oódúnrún	èta gbàrèjì	ètagbàrèjì
600 egbèta	èfà gbàrèjì	èfàgbàrèjì	500 èdéggbèta	àrún gbàrèjì	àrúgbàrèjì
800 egbèrin	èjo gbàrèjì	èjogbàrèjì	700 èdéggbèrin	èje gbàrèjì	èjegbàrèjì
1000 egbèrún	òkan gbàrèta	òkangbàrèta	900 èdéggbèrún	èsán gbàrèjì	èsángbàrèjì
1200 egbèfa	òkàn gbàrèta	lèjìgbàrèta	1100 èdéggbèfà	òkan gbàrèta	òkangbàrèta
	gbàrèjì	lèjìgbàrèjì		lòkan gbàrèjì	lòkangbàrèjì
1400 egbèje	òkan gbàrèta	lèrin gbàrèta	300 èdéggbèje	òkan gbàrèta	lèttagbàrèta
	gbàrèjì	lèringbàrèjì		gbàrèjì	lèttagbàrèjì
1600 egbèjo	òkan gbàrèta	lèfàgbàrèta	500 èdéggbèjo	òkan gbàrèta	òkangbàrèta
	gbàrèjì	lèfàgbàrèjì		lárùn-ún gbàrèjì	lárùn-ún- gbàrèjì
1800 egbèsán	òkan gbàrèta	òkangbàrèta	700 èdéggbèsàn-án	òkan gbàrèta	lèjeòkangbàrèta
	lèjogbàrèjì	lèjogbàrèjì		gbàrèjì	lèje-gbàrèjì
2000 egbèwá	èjì gbàrèta	èjìgbàrèta	900 èdéggbèwá	òkan gbàrèta	òkangbàrèta
/egbàá (2000)				lèsàn-án gbàrèjì	lèsàn-án- gbàrèjì

While the boosting energy of traditional /igba/ 'two hundred' powers the enumeration to traditional /egbàá/ 'one thousand/millennium',

the undercurrent of subtraction, like checks and balances, has now shifted from /èwá/ 'ten', to /ogórun-ún/ 'one hundred/century'.

Traditional Booster Numeral 2000 to the First Twenty Thousandth

The mechanism for this formation is a fossilized form of multiplication of /egbàá/ (as head/multiplier) 'two thousand' by a sequential numeral (multiplicand)

Chart xi: Booster Numerals

2000s			2000s minus 1000	
Trad	Decimal (2009b)	Longe	TRAD	Decimal (Longe (2009b))
2000	egbàá	èjì gbárèta		
4000	egbàaji	èrin gbárèta	3000	èdéggbàaji èta gbárèta
6000	egbàata	èfà gbárèta	5000	èdéggbààrún àrún gbárèta
8000	egbàarin	èjọ gbárèta	7000	èdéggbèrin èje gbárèta
10000	egbàarùn-ún	òkan gbàrèrin	9000	èdéggbààrún èsán gbárèta
12000	egbàafa	òkan gbàrèrin èjì 11000	èdéggbàafà	òkan gbàrèrin òkan gbárèta
		gbárèta		
14000	egbàaje	òkan gbàrèrin èrin 13000	èdéggbàaje	òkan gbàrèrin èta gbárèta
		gbárèta		
16000	egbàajo	òkan gbàrèrin èfà 15000	èdéggbàajo	òkan gbàrèrin àrún gbárèta
		gbárèta		
18000	egbàasàn-án	òkan gbàrèrin èjọ 17000	èdéggbàasán	òkan gbàrèrin èje gbárèta
		gbárèta		
20000	egbàawáá (òkè)	èjì gbàrèrin 19000	èdéggbàawá	òkan gbàrèrin èsán gbárèta

Again, while the boosting energy of traditional /egbàá/ 'two thousand', powers the enumeration to traditional /egbàawàá/ 'twenty thousand', the undercurrent of subtraction, like checks and balances, has now shifted from traditional /ogórun-ún/ 'one hundred/century', to traditional /egbèrún/ 'one thousand or millennium'. This marks the limit of the global regular morphology of the traditional enumeration system. The two words /apò/ 'bag' for the numeral /ogórun-ún/ 'one hundred', and /òkè/ 'straw sack', for the figure 'twenty thousand', though excellent candidates as booster numerals, are random; they do not regularize with the system. Nothing morphologically in the system leads up to them, and nothing leads up beyond them. They can only come in at the level of the phrase in the open syntax.

Traditional Booster Numerals in Functions

The chart below summarizes the traditional booster numerals in their functional domains.

Chart xii: Summary of Booster Numerals in Functions

Independent	Sequential	Quantitative	Each	All-Inclusion	Re-iteration	Positional /fractional
10 ẹwáá	ẹwá	mẹwáá	ẹwẹẹwá	mẹwẹẹwá	ẹẹmẹwáá	lkẹwáá; ẹkẹwáá; kẹwáá
20 ogún	ogún	Ogún	ogún kọọkan	ogoogún	iye lgbà ogún? ogoogún	ogún
100 ọgórùn-ún	ọgórùn-ún	Ogún	ọgórọ̀rún	ọgọọgórùn-ún	iye lgbà ọgórùn-ún ?ọgọọgórùn-ún	ọgórùn-ún
200 ọgówáá {igba}	ọgówáá {igba}	ọgówáá {igba}	ọgọọgówáá igbiigba	ọgọọgówáá igbiigba	iye lgbà igba ọgọọgówáá? igbiigba	ọgówáá {igba}
1000 ẹgbẹ̀rún	ẹgbẹ̀rún	ẹgbẹ̀rún	ẹgbẹẹgbẹ̀rún	ẹgbẹẹgbẹ̀rún	iye lgbà ẹgbẹ̀rún? ẹgbẹẹgbẹ̀rún	ẹgbẹ̀rún
2000 ẹgbáá	ẹgbáá	ẹgbáá	ẹgbẹẹgbáá {ẹgbáá kọ́ọkan}	ẹgbẹẹgbáá	ẹgbẹẹgbáá {iye lgbà ẹgbáá}	ẹgbẹẹgbáá

Microstructure

Under the microstructure we will be looking at both the traditional and decimal numerals vertically. For the decimal system, given that, according to Longe (2009b), the digital numbers cannot go beyond zero/0 and ten/10, the strategies for formation are very tight and very limited. There is no subtraction at all. There are extensive applications of multiplication and addition for figures beyond ten/10, based on their surface configuration, despite the fact that 10 consists of two digits with two decimal places. While we agree with Longe (2009b) to take 10 'ẹwá' as a base, but because 10 has two decimal places, we have eliminated it as a reckoning unit, to now give the following:

Chart xiii: Decimal Numerals

Traditional	Decimal (Longe (2009b))	Revised Decimal
10 ẹwá	ẹwá	ọkangbárọkan
11 ọkànlélógún (1+20)	ẹwálékan <ẹwá-lé-òkan	ọkangbárọkan-lékan (10+1)
12 ẹjilélogún (2+20)	ẹwáléjì <ẹwá-lé-ẹjì	ọkangbárọkan-léjì (10+2)
13 ẹtálélógún (3+20)	ẹwálétà <ẹwá-lé-ẹtá	ọkangbárọkan-létà (10+3)
14 ẹrinlélogún (4+20)	ẹwálérin <ẹwá-lé-òrin	ọkangbárọkan-lérin (10+4)
15 àrùndíngbọ̀n (5-30)	ẹwálárùn-ún <ẹwá-lé-àrùn	ọkangbárọkan-lárùn-ún (10+5)
16 ẹrindínlogbọ̀n (4-30)	ẹwáléfà <ẹwá-lé-ẹfà	ọkangbárọkan-léfà (10+6)
17 ẹtádínlogbọ̀n (3-30)	ẹwáléje <ẹwá-lé-ẹje	ọkangbárọkan-léje (10+7)
18 ẹjídínlogbọ̀n (2-30)	ẹwáléjọ <ẹwá-lé-ẹjọ	ọkangbárọkan-léjọ (10+8)
19 ọkàndínlogbọ̀n (1-30)	ẹwálésàn-án <ẹwá-lé-ẹsán	ọkangbárọkan-lésàn-án (10+9)
20 ogún (20)	ẹwájì (10X2)	ẹjìgbárọkan (20)

Accordingly, the next multiple of 10, will give the following

Traditional	Decimal (Longe (2009b))	Revised Decimal
10 ẹwá (10)	ẹwá (10)	ọkangbárọkan
20 ogún (20)	ẹjìwá (2X10)	ẹjìgbárọkan (20)
21 ọkànlélógún (1+20)	ẹjìwálékan (2X10+1)	ẹjìgbárọkan-lékan (20+1)
22 ẹjilélogún (2+20)	ẹjìwáléjì (2X10+2)	ẹjìgbárọkan-léjì (20+2)
23 ẹtálélógún (3+20)	ẹjìwálétà (2X10+3)	ẹjìgbárọkan-létà (20+3)
24 ẹrinlélogún (4+20)	ẹjìwálérin (2X10+4)	ẹjìgbárọkan-lérin (20+4)
25 àrùndíngbọ̀n (5-30)	ẹjìwálárùn-ún (2X10+5)	ẹjìgbárọkan-lárùn-ún (20+5)
26 ẹrindínlogbọ̀n (4-30)	ẹjìwáléfà (2X10+6)	ẹjìgbárọkan-léfà (20+6)
27 ẹtádínlogbọ̀n (3-30)	ẹjìwáléje (2X10+7)	ẹjìgbárọkan-léje (20+7)
28 ẹjídínlogbọ̀n (2-30)	ẹjìwáléjọ (2X10+8)	ẹjìgbárọkan-léjọ (20+8)
29 ọkàndínlogbọ̀n (1-30)	ẹjìwálésàn-án (2X10+9)	ẹjìgbárọkan-lésàn-án (20+9)
30 ọgbọ̀n (30)	ẹtawá (3X10)	ẹtagbárọkan (30)

For 100 and beyond, the number of decimal places after the first digit all the way to the right, will determine what is to be the power of, that is /agbára-/ 'to the power of'.

Now, on the other hand, the traditional system has the mechanisms/strategies that enable the numbers to expand within the spaces of the higher tenths/decades, the higher hundredths/centuries, and the higher thousandths/millennia. Such mechanisms/strategies are subtraction, addition, division, and multiplication. They are controlled by and within the morphological component of the grammar of the language; and as such, their outcome still yields more words, not sentences or phrases.

Inside the block of each multiple of 'ten' on the way up, are the two processes of addition and subtraction, shared into two un-equal parts of 'four' and 'five'. The first four digits after the multiple of 'ten' is governed by addition, while the second half of the multiple after 'ten' is governed by subtraction. Both the onset of the multiple of 'ten' and the endpoint of the multiple are excluded from the two processes given that they mark the two edges. Thus we have 1-4 for addition, and 5-9 for subtraction. Despite this irregularity, it remains a puzzle why it has to be this way. Almost every Yoruba grammarian has wondered why there have to be two processes (addition and subtraction) instead of one process; or why addition has to precede subtraction; and so forth. There are no easy answers.

Traditional Booster Numeral Ten and First Tenth/Decade

4.1.1. Traditional Additives

The additives add cumulatively to the left edge of the base, up to the fourth consecutive digit as in the following:

Chart xiv: Traditional Additive Numerals

Inde- ndent	Sequential	Quantitati- ve	Each	All- Inclusion	Re-Iteration	Positional /Fractional
10 <i>ẹwàá</i>	<i>ẹwá</i>	<i>mẹwàá</i>	<i>ẹwẹẹwá</i>	<i>mẹwẹẹwá</i>	<i>ẹẹmẹwàá</i>	<i>ikẹwàá; ẹkẹwàá; kẹwàá</i>
11. <i>ọkànlá, ọkànlà</i>	<i>ọkànlà</i>	<i>mọkànlá</i>	<i>ọkọọkànlá</i>	<i>mọkọọkànlá</i>	<i>ẹẹmọkànlá</i>	<i>ikọkànlá; ọkọkànlá; kọkànlá</i>
12. <i>eéjilá</i>	<i>Èjilá</i>	<i>Méjilá</i>	<i>èjèèjilá</i>	<i>méjèèjilá</i>	<i>ẹẹmẹjilá</i>	<i>ikéjilá; èkẹjilá; kéjilá</i>
13. <i>ẹtálá</i>	<i>ètálá</i>	<i>métálá</i>	<i>ètẹètálá</i>	<i>métẹètálá</i>	<i>ẹẹmètálá</i>	<i>ikétálá; ẹkétálá; kétálá</i>
14 <i>ẹẹrínlá</i>	<i>ẹrínlá</i>	<i>mérínlá</i>	<i>ẹrẹẹrínlá</i>	<i>mérẹẹrínlá</i>	<i>ẹẹmérínlá</i>	<i>ikẹrínlá; ẹkẹrínlá; kẹrínlá</i>

While the morphology of addition may appear opaque in the formation between /ọkànlá/ 'eleven' and /ẹẹrínlá/ 'fourteen' above, it is clearly transparent in the verb /lé/ 'exceed' between /ọkànlélógún/ 'twenty one' and /ẹẹrínlélógún/ 'twenty four' below:

20 <i>ogún</i>	<i>ogún</i>	<i>Ogún</i>	<i>ogún</i> <i>kọọkan</i>	<i>ogoogún</i>	<i>iyé igbà ogún</i>	<i>ogún</i>
Independent	Sequential	Quantitative	Each	All-Inclusion	Re-Iteration	Positional/Place
21. <i>oókànlélógún</i>	<i>òkànlélógún</i>	<i>mókànlélógún</i>	<i>òkọọkànlélógún</i>	<i>ún</i>	<i>ẹẹmókànlélógún</i>	<i>ikọkànlélógún; òkọkànlélógún; kọkànlélógún</i>
22. <i>eéjilélógún</i>	<i>èjilélógún</i>	<i>méjilélógún</i>	<i>èjèèjilélógún</i>	<i>méjèèjilélógún</i>	<i>ẹẹmẹjilélógún</i>	<i>ikéjilélógún; èkẹjilélógún; kéjilélógún</i>
23. <i>ẹtálélógún</i>	<i>ètálélógún</i>	<i>métálélógún</i>	<i>ètẹètálélógún</i>	<i>métẹètálélógún</i>	<i>ẹẹmètálélógún</i>	<i>ikétálélógún; ẹkétálélógún; kétálélógún</i>
24 <i>ẹẹrínlélógún</i>	<i>ẹrínlélógún</i>	<i>mérínlélógún</i>	<i>ẹrẹẹrínlélógún</i>	<i>mérẹẹrínlélógún</i>	<i>ẹẹmérínlélógún</i>	<i>ikẹrínlélógún; ẹkẹrínlélógún; kẹrínlélógún</i>

4.1.2. Traditional Subtractives

The traditional subtractives look ahead to the endpoint of the right edge and subtract /dín/ forward to the beginning of the second half of the multiple of ten. The grammar uses a fossilized sentence to state that the lower number is taken away from the higher number, that is, X gets extracted from Y.

Chart xv: Traditional Subtractive Numerals

INDEPENDENT	SEQUENTIAL	QUANTITATIVE	EACH	ALL-INCLUSION	RE-ITERATION	POSITIONAL /PLACE
10. <i>ẹwàá</i>	<i>àrúndínlógún</i>	<i>mẹfẹdógún</i> (<i>márúndínlógún</i>)	<i>àràrúndínlógún</i>	<i>máràrúndínlógún</i>	<i>ẹẹmárúndínlógún</i>	<i>ikárúndínlógún; òkárúndínlógún; kárúndínlógún</i>
11. <i>ẹrínlógún</i>	<i>ẹrínlógún</i>	<i>mẹrínlógún</i>	<i>ẹrẹẹrínlógún</i>	<i>mérẹẹrínlógún</i>	<i>ẹẹmẹrínlógún</i>	<i>ikẹrínlógún; òkẹrínlógún; kẹrínlógún</i>
12. <i>ẹtálógún</i>	<i>ètálógún</i>	<i>métálógún</i>	<i>ètẹètálógún</i>	<i>métẹètálógún</i>	<i>ẹẹmètálógún</i>	<i>ikétálógún; òkétálógún; kétálógún</i>
13. <i>ẹjilógún</i>	<i>èjilógún</i>	<i>méjilógún</i>	<i>èjèèjilógún</i>	<i>méjèèjilógún</i>	<i>ẹẹmẹjilógún</i>	<i>ikéjilógún; òkẹjilógún; kéjilógún</i>
14. <i>ẹkàndínlógún</i>	<i>ẹkàndínlógún</i>	<i>mọkàndínlógún</i>	<i>ọkọkàndínlógún</i>	<i>mọkọkàndínlógún</i>	<i>ẹẹmọkàndínlógún</i>	<i>ikọkàndínlógún; òkọkàndínlógún; kọkàndínlógún</i>
20. <i>ogún</i>	<i>ogún</i>	<i>ogún</i>	<i>ọkọkànlélógún</i>	<i>ẹẹmọkànlélógún</i>	<i>ogún</i>	

INDEPENDENT	SEQUENTIAL	QUANTITATIVE	EACH	ALL-INCLUSION	RE-ITERATION	POSITIONAL /PLACE
10. <i>ẹwàá</i>	<i>àrúndínlógún</i>	<i>mẹfẹdógún</i> (<i>márúndínlógún</i>)	<i>àràrúndínlógún</i>	<i>máràrúndínlógún</i>	<i>ẹẹmárúndínlógún</i>	<i>ikárúndínlógún; òkárúndínlógún; kárúndínlógún</i>
11. <i>ẹrínlógún</i>	<i>ẹrínlógún</i>	<i>mẹrínlógún</i>	<i>ẹrẹẹrínlógún</i>	<i>mérẹẹrínlógún</i>	<i>ẹẹmẹrínlógún</i>	<i>ikẹrínlógún; òkẹrínlógún; kẹrínlógún</i>
12. <i>ẹtálógún</i>	<i>ètálógún</i>	<i>métálógún</i>	<i>ètẹètálógún</i>	<i>métẹètálógún</i>	<i>ẹẹmètálógún</i>	<i>ikétálógún; òkétálógún; kétálógún</i>
13. <i>ẹjilógún</i>	<i>èjilógún</i>	<i>méjilógún</i>	<i>èjèèjilógún</i>	<i>méjèèjilógún</i>	<i>ẹẹmẹjilógún</i>	<i>ikéjilógún; òkẹjilógún; kéjilógún</i>
14. <i>ẹkàndínlógún</i>	<i>ẹkàndínlógún</i>	<i>mọkàndínlógún</i>	<i>ọkọkàndínlógún</i>	<i>mọkọkàndínlógún</i>	<i>ẹẹmọkàndínlógún</i>	<i>ikọkàndínlógún; òkọkàndínlógún; kọkàndínlógún</i>
20. <i>ogún</i>	<i>ogún</i>	<i>ogún</i>	<i>ọkọkànlélógún</i>	<i>ẹẹmọkànlélógún</i>	<i>ogún</i>	

Both multiplication and subtraction can interplay between multiples of ten (10) up till two hundred as in the following:

Chart xvi: Traditional Multiplicative and Subtractive Numerals

Traditional Multiplication		Traditional Subtractives	
40	ogóji <ogún-èji (20X2)	30	àádóji <èwá-dín-òji (40-10)
60	ogóta <ogún-èta (20X3)	50	àádóta <èwá-dín-òta (60-10)
80	ogórin <ogún-érin (20X4)	70	àádórin <èwá-dín-òrin (80-10)
100	ogórùn-ún <ogún-àrún (20X5)	90	àádórùn-ún <èwá-dín-òrùn (100-10)
120	ogófà <ogún-èfà (20X6)	110	àádófà <èwá-dín-òfà (120-10)
140	ogóje <ogún-èje (20X7)	130	àádóje <èwá-dín-òje (140-10)
160	ogójò <ogún-èjò (20X8)	150	àádójò <èwá-dín-òjò (160-10)
180	ogósàn-án <ogún-èsán (20X9)	170	àádósàn-án <èwá-dín-òsán (180-10)
200	ogówàá <ogún-èwá (20X10)	190	àádówàá <èwá-dín-òwá (200-10)

5. Loose Operations

By loose operations we mean instances of free addition, free subtraction, free multiplication, and free division, which are controlled by the open syntax of the language. We see them as word-external. These can be expressed in simple sentential or phrasal prose. They never result in words. There are no particular morphological forms assigned to each of these forms. They are not as morphologically complicated as the numerals in the morphological component, and they come in handy wherever and whenever the numerals prove difficult to state.

The commonest template for two of these loose operations is /X ó lé Y/ 'X it exceeds by Y', for addition; and /X ó dín Y/ 'X it is less by Y', for subtraction. X in both cases represents the higher number while Y is the lower number. The /ó/ co-refers with X. It is more usual for X to be any numeral above the multiples of 20. Some examples of the two operations follow below.

5.1. Free Addition

The numbers from 11 – 14 and 21 – 24 can be expressed as free addition in open syntax. The lower numbers can be either independent or quantitative. Again, the pattern is closer to the morphology.

11. /èwàá ó lé oókan/òkan/kan/ 'ten (higher) it exceeds by one (lower)'; 12. /èwàá ó lé eéji/méji/ 'ten (higher) it exceeds by two (lower)'; 13. /èwàá ó lé èta/méta/ 'ten (higher) it exceeds by three (lower)'; 14. /èwàá ó lé èrin/mérin/ 'ten (higher) it exceeds by four (lower)'; 21. /ogún ó lé

oókan/òkan/kan/ 'twenty (higher) it exceeds by one (lower)'; 22. /ogún ó lé eéji/méji/ 'twenty (higher) it exceeds by two (lower)'; 23. /ogún ó lé èta/méta/ 'twenty (higher) it exceeds by three (lower)'; 24. /ogún ó lé èrin/mérin/ 'twenty (higher) it exceeds by four (lower)'.

The second structure of free addition also employs an imperative sentence structure. There are three formats in the open syntax. There seems to be no restrictions on what numbers can be added to each other, and in what order. The imperative structures below do not sound as enumeration at all.

11. /ro oókan pò mó èwàá/ 'add one to ten'; /ro oókan àti èwàá pò/ 'add one and ten'; /fi oókan kún èwàá/ 'join one with ten'; 12. /ro eéji pò mó èwàá/ 'add two to ten'; /ro eéji àti èwàá pò/ 'add two and ten'; /fi eéji kún èwàá/ 'join two with ten'; 13. /ro èta pò mó èwàá/ 'add three to ten'; /ro èta àti èwàá pò/ 'add three and ten'; /fi èta kún èwàá/ 'join three with ten'; 14. /ro èrin pò mó èwàá/ 'add four to ten'; /ro èrin àti èwàá pò/ 'add four and ten'; /fi èrin kún èwàá/ 'join four with ten'.

The third structure (cf. Adesola (p.c.)) is what we call free pairing, usually using either the sequential numeral, or the quantitative numeral, as in /èji èji/ vs. /méji méji/ 'in pairs', /èta èta/ vs. /méta méta/ 'in triples'; /èrin èrin/ vs. /mérin mérin/ 'in quadruples'. These are close to, but are not semantically identical with the 'all-inclusive' numerals. They will be generated by the syntax not in the morphological component.

5.2. Free Subtraction

There are two ways of expressing free subtraction. (1) is more usual and it can follow the pattern of subtraction in the morphology. This pattern is closer to the morphology. The lower numerals are quantitative.

15. /ogún ó dín márùn-ún/ 'twenty (higher) it be less by five (lower)'; 16. /ogún ó dín mérin/ 'twenty (higher) it be less by four (lower)'; 17. /ogún ó dín méta/ 'twenty (higher) it be less by three (lower)'; 18. /ogún ó dín méji/ 'twenty (higher) it be less by two (lower)'; 19. /ogún ó dín oókan/ 'twenty (higher) it be less by one (lower)'; 25. /ogbón ó dín márùn-ún/ 'thirty (higher) it be less by five (lower)'; 26. /ogbón ó dín mérin/ 'thirty (higher) it be less by four (lower)'; 27. /ogbón ó dín méta/ 'thirty (higher) it be less by three (lower)'; 28. /ogbón ó dín méji/ 'thirty (higher) it be less by two (lower)'; 29. /ogbón ó dín oókan/ 'thirty (higher) it be less by one (lower)'.

The other way employs an imperative sentence structure. The lower numbers are of the independent class; the quantitative numerals are not quite coherent.

15. /yò aárùn-ún kúrò lára/nínú ogún/ 'remove seven (lower) from twenty (higher)'; 16. /yò èrin kúrò lára/nínú ogún/ 'remove four (lower) from

twenty (higher)'; 17. /yọ ẹ́ẹ́ta kúrò lára/nínú ogún/ 'remove three (lower) from twenty (higher)'; 18. /yọ ẹ́ẹ́ì kúrò lára/nínú ogún/ 'remove two (lower) from twenty (higher)'; 19. /yọ oókan kúrò lára/nínú ogún/ 'remove one (lower) from twenty (higher)'.

5.3. Free Multiplication

Unlike the two processes of subtraction and addition which are already embedded in the morphological component to cement the inner workings of the multiples of ten, free multiplication is outside of the realm. There are four patterns for free multiplication in the open syntax.

5.3.1. Independent X Quantitative

This sequence can be ambiguous. It can mean either Independent times Quantitative, or two separate entities of the Independent.

	Free Multiplication	Literal Quantity
òkẹ méjì	forty thousand	two tokens of 'òkẹ
àpò méjì	two hundred in currency	two tokens of 'àpò'
ogórùn-ún méjì	two hundred	two tokens of one hundred
igba méjì	four hundred	two tokens of two hundred

5.3.2. Sequential X Mass Independent

	Free Multiplication	Literal Quantity
igba òkẹ	four million	two hundred tokens of 'òkẹ'
ogórùn-ún òkẹ	two million	one hundred tokens of 'òkẹ'
egbèrún àpò	ten thousand of a currency	one thousand sacks/bags
èjìdínlógbò òkẹ	fifty six thousand	twenty-eight sacks

5.3.3. X in Y Places

Both X and Y are freely interchangeable in the syntax, as in /egbèrún lónà ogún/ [one thousand in twenty places] 'twenty thousand'; /ogún lónà egbèrún/ [twenty in one thousand places] 'twenty thousand'.

5.3.4. Imperative

Free multiplication can also be expressed in an imperative sentence as in the following:

(a) / ẹ́e ogójì ní ilọ́pọ ogun/ [make forty (higher) in many times of twenty (lower)] 'eight hundred'; (b) /fi ogún se ilọ́pọ fun igba/ [make twenty (lower) be many times for two hundred (higher)] 'four thousand'; (c) /fi ààbọ se ilọ́pọ fún odidi/ [make half (lower) be many times whole (higher)].

5.4. Free Division

Free division takes two formats: (a) what we refer to as free plain fraction, and (b) free imperative division. Plain fraction (cf. Adesola (p.c.)) is always phrasal using /idá/ 'division' with either a quantitative numeral, or a place numeral, as in /idá méjì/ 'two divisions', or /idá keji/ 'second division'. Again it is the syntax that will generate these. On the other hand, there are two restrictions on free imperative division. (a) The place numerals are excluded from such division. It does not make sense to say /*fi ikérin pín ikárùn-ún/ 'use the fourth to divide the fifth'; or 'divide the fifth by the fourth'. (b) It is also not possible to divide a smaller number by a bigger number. So, we cannot say /*pín ààbọ sí odidi/ 'divide a half into a whole'; nor can we say /*fi odidi pín ààbọ/ 'use the whole to divide the half'. However, it is possible to say /pín odidi sí ààbọ tàbí wẹwẹ/ 'divide a whole into halves'; or /fi ààbọ pín odidi/ 'use a half to divide a whole'.

6. Conclusion

The paper has tested the decimal system in all the traditional seven contexts of functions and it holds firmly. While the focus of Longe (2009b) was essentially to lay out what the language of a decimal system would look like, our own focus has been to stretch the decimal system to all the available contexts and highlight the formational consequences. Our effort has shown that the resources of the Yoruba language are rich enough to handle the two systems of enumeration efficiently, and this may point the way to a robust transition from the traditional to the decimal system to satisfy the demands of the technological age. But is this transition necessary and inevitable? Given the technological advantage of the decimal system, would that lead to the demise of the traditional system? And when can, or will that happen? Can the language afford to retain the two systems, and for how long?

Such questions point to the reality. Given the millions upon millions of Yoruba speakers worldwide who use the traditional enumeration system in speech, education, commerce, industry, religion, literature, etc., and the length of time they have been using it, it is not going to be very soon that they will shift to the decimal system. Unless the decimal system is now incorporated into the educational system officially, especially for the future generation, it may remain in the academic realm for awhile. Just like the struggle for supremacy between the analog and decimal time clocks, we may choose to let the two systems co-exist until one system dies a natural death, if the two systems cannot co-exist.

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Realisations of the Particle *kV* in the Tarok Language of Plateau State, Nigeria

Selbut R. Longtau

Abstract The Tarok particle *kV* has diverse roles in the language. The variability of its syntactic positions in the sentence and wide semantic domains makes it appear as a kind of mystery particle. However, a close attention given to the working of tones and semantic realisations will disambiguate the segment as clear polysemes, homonyms and allomorphs. This should help curtail the much energy and ink spent on how to write it in the Tarok orthography. The semantic uses of the morph include: preposition and locative roles; coordinators; genitive constructions; aspect and mood markers in subordinate clauses, including conditional ones; verb; adverbs; part of some interrogative phrases, pronoun, postposition and politeness marker. These will be described and examples provided. The paper attempts to fill the lacuna that largely remains. Our methodology is simple. A search is made of how the particle is in use in a variety of Tarok texts and documents as Lar (1983) folktales; Tarok New Testament (1988) of wide genre; Longtau (1997) children songs; Lar (2015) children songs; Lar et al. (1994) trilingual wordlist; and Longtau et al. (in progress) Tarok dictionary. Participant observation of several years is the major source of knowledge in the study of the semantics and sociolinguistics of the particle. The particle is defined as a CV unit where C is a voiceless velar plosive [k] and V is [ə], a close central vowel with spread lips and accompanying tones. This is the vowel in the deep structure but it may simply be elided or assimilated in the shallow structures at junctures depending on syntactic positions and tones. The particle in the environments of some locativised nouns gives rise to new forms due to obligatory vowel elision thereby making grammaticalisation a productive process in the language. However, it remains stable in the environment of a word with a consonantal onset and in a number of archaic vowel-prefixed nouns. The unpredictability of both vowel elision and especially of assimilation makes the roles of the particle perplexing. We shall be preoccupied more with characterizing the grammatical realisations of the variants of the morph rather than orthographic matters.

Key words: prepositions, homonyms, allomorphs, semantics and word boundary

1. Introduction

The particle *kV* ~ *kə* plays principal roles in the Tarok language as prepositions and locatives; coordinators; part of a genitive construction; postpositions, pronoun; verb; adverb; tense, aspect and mood markers in

subordinate clauses, including conditional ones; part of some interrogative phrases and politeness marker. Each role is defined by the modifications of the morph through tones, juncture features, syntactic positions and sociolinguistics of mother language speaker's perceptions of meaning. Longtau (1993: 34) treated the phonology of the particle only in passing. Blench et al. (in progress) discusses the prepositional and locative functions of the morph.

The bulk of works on the subject are plethora of unpublished write-ups using mainly phonological principles for the purpose of fine-tuning the 1977 Tarok orthography without much unanimity. Longtau (2008: 198-202) noted the semantic diversities of the particle for a good orthography without any discussion. Aaron (in a mimeograph, 1997:4, based on an earlier version of Longtau 2008) suggested the need for a constant word image for the particle and consistency throughout any written text. This was reiterated by Gambo (in a mimeograph, 2012: 5-11) that took a swipe at the myriads of 'inconsistencies' in the Tarok New Testament. He proposed how the orthographic challenge of its changing contexts should be resolved. Longtau (in a mimeograph, 2012:10-11) gave a catalogue of motions for adoption in revising the Tarok writing system. Longtau (2014: 24; 2015: 46; 2016a: 2; 2016b: 9) advanced evidence that the 'inconsistencies' are not inconsistencies at all but rhetorical devices to capture emotive meanings as well as concealment of surface meanings to avoid shame from a sociolinguistic angle. Longtau (2014:23-25) contains further recommendations on how the Tarok orthography can be revised using insights from lexical phonology in a wider Nigerian context.

However, an in-depth study of the semantics and sociolinguistics of the particle largely remains a lacuna that this paper hopes to fill. Osu (2002) undertook a similar study of the 'meaning of the meaningless Ikwere -kè-'. In the case of Tarok a reference to *kV* ~ *kə* as a 'mystery particle' may be more apt due to its chameleonic nature. Moreover, the particle can be dropped in certain constructions, although it is optionally present. However, we shall be preoccupied with characterizing the grammatical realisations of the variants of the morph rather than orthographic and phonological matters. Transcription of texts is basically according to IPA values with some modifications in line with Longtau (1993) and not the Standard Tarok Orthography of 1997 via the following conventions for these cases;

Gh	Ng	ny	sh	Zh	c	j	y	'	e	ə'	ɨ	o
ɣ	ŋ	ɲ	ʃ	ʒ	tʃ	dʒ	j	ʔ	ɛ	ə	ɨ	ɔ

ɨ and ɨ are included here for the sake of completeness because in the STO the sounds have counter-intuitive representation of ɨ and ə. However, these are retained as ɨ and ə only in quoted excerpts.

Tarok has 3 level tones and 2 rising and falling contours. The particle can carry only the level tones marked in this way:
 // for a high tone mid tone is shown by an absence of a tone mark or +
 / for a low tone.

The symbol ' marks vowel elision in transcription of examples as found in Longtau et al. (in progress); and Lar (2015). Writing the words in the non-elided forms in a situation where the particle is followed by a grammaticalised noun will be unnatural, because even in slow speech such forms are never heard.

In this Babel of an example (1), the particle is highlighted for us to begin to appreciate its wide context and the challenge if tones are left out:

kə	n	la	a	bu	kə	nlam	pə	u	lɔp	uyen	a	tā
perfective	I	tell	to you	on-of	yesterday	that	you-imperative	tie	child	it	that	marker
kə	'sɪm	ka	awa	na	u	ga	kə	na	kə	'tak	anɪnang	tə
at	Back	with	skin	so-that	you-imperative	go	with him	at-of	place	mother-his	so	
u	Lep	u	ga	ce	kə	na	kang	nna	mma	bu	kə	nsat zete
you	branch	you	went	where	with	him	and	Then-focus	you-emphatic	of	standing	zete
kə	Ta	ki	lpyang	bu	və	ta	ya?					
at	there	with	Mucous	yours	it	that	interrogative					

I told you yesterday that you should take the baby to the mother, where did you branched to that you are still standing there lackadaisically, you clumsy one!

2. Perceptions on the particle in different works

The perception of different authors on the range of meanings of the particle is revealing. Table 1 is culled from Lar et al. (1994) entries of the trilingual wordlist to summarise what might define the range of meaning of the particle.

Table 1 – Lar et al. (1994) perceptions of the meanings of *kv*

Head entry	Definition	Cf. plausible source of grammaticalised noun		
		Noun	Gloss	Page reference
ka+ ci ya?	where?	-	-	p. 47-48
ka+ co	over there	co	there, demonstrative is more accurate	p. 21
ka+ mbəp	at the side of	mbəp	side	p. 53
ka+ mpyal	in front of	mpyal	front	p. 60
kā nlam	yesterday	nām	yesterday	p. 68
ka+ nsəm	at	-	-	p. 47-48
ka+ nvañ ²	behind	nvañ	behind	p. 72
ka+ ta	there	-	-	p. 47-48
ka+ ta	here	-	-	p. 47-48
ka+ zumo ya?	when?	-	-	p. 47-48
kadi+	again	-	-	p. 47-48
kadof+	Instead	-	-	p. 47-48
kəgbai+	Outside	agbai	outside	p. 5
kakul+	Because	-	-	p. 47-48
kapal+	on (top of)	apal	up	p. 12
kapəpal+	on it	-	-	p. 47-48
kashe+	Inside	ashe	inside	p. 14
kashishe+	inside it	-	-	p. 47-48
katətak+	at his place, with him	atak	place and adverb for specificity (sic)	p. 14
kavañ+	Under	avəñ	underneath	p. 15

Source: Lar et al. (1994: 47-48, and as cited above).

I have marked the tone on the particle since they were lacking in the original text. + stands for mid tone.

Table 2 – Longtau et al. (in progress) perceptions of the meanings of *kv*

Head entry	Definition
k- conj.	The vowel shows concord and tonal agreement with the following noun-prefix. UJucit yár ngbət kā ndakal. Julcit carried a pot and a mat. ŪTālī wur ngbət ko ován. Tali and the children carried the pots.
k- part.	conditional marker that occurs in secondary clauses. The vowel agrees with the vowel of the pronoun of the dependent clause. ki i ga Abuja kā nlam té, ki i ya imwa bet.
k- part.	emphasises politeness in imperatives. If immediately following the head-verb the vowel shows concord and tonal agreement with the following noun-prefix. ʔBa kā akwàp a mi bring me shoes. ʔBa kā mmi a mi . Bring oil for me. If placed at the end of the clause, it is always kā : ʔBa mmi a mi kā . This syntactic change overtly marks politeness.
k- part.	particle that precedes measures of time to modify them. e.g. kā nda 'today'. If it immediately follows the head-verb the vowel shows concord and tonal agreement with the following noun-prefix. Uzā ku kā nda . He died today <i>but</i> uzā ku ki ipín. He died in the morning.
k- part.	combines with interrogative pronouns to form questions. u ba ki ize? How did you come? u ba ku ude who (sg.) did you come with? u ba ko ode who (pl.) did you come with? u ba kā nza nnap è? What issue brought you?

Source: Longtau et al. (in progress)

Table 2 considers *kv* both as conjunction and particle.

² In the 1977 orthography is the velar nasal.

3. Locative roles of *kV*

The particle *kV* in Tarok is basically an unbound locative or prepositional morph in deep structure but bound in surface structure to nouns it precedes with low, mid or high tone. The wide variety of contexts *kV* can occur as a locative or preposition or postposition is perplexing. Therefore an overarching 'locative' terminology may be more accurate but a prepositional/postpositional versus locative disparity is still maintained in this paper to enable us highlight better some aspects of grammaticalisation in Tarok.

The principal locative particle in Tarok is *kV*, meaning 'at, on, in'. It is clearly both prepositional and 'adverbial' in interpretation. Mid tone *kə* seems to be the default form. Examples of the prepositions are:

(2a) <i>líp</i>	<i>Ûyèn</i>	<i>kə</i>	<i>'sím</i>	<i>Ná</i>	<i>í</i>	<i>gà</i>
carry	Child	on	back	So	we-should	go

Carry the child on your back and lets go.

An elision of the prefix *a-* in the locativised body part noun 'back' has taken place.

(2b) <i>nàr</i>	<i>Ûyèn</i>	<i>kə</i>	<i>m̃bín</i>	<i>ná</i>	<i>í</i>	<i>gà</i>
lay	Child	on	ground	so	we-should	go

Keep the child on the ground and let's go.

(2c) <i>ùwa</i>	<i>sàr</i>	<i>ikpàl</i>	<i>kə</i>	<i>m̃bíp</i>
he-is	tie	knife	at	side

He has a knife by his side.

(2d) <i>avivik</i>	<i>Kér</i>	<i>ná</i>	<i>ki</i>	<i>iwú</i>
splint	pierce	him	in	eye

A splint has chucked him in the eye.

(2e) <i>ùyèn</i>	<i>Kú</i>	<i>kə</i>	<i>ná</i>	<i>kə</i>	<i>'she</i>	<i>afu</i>
child	Die	with	her	at	inside	womb

She has a still birth.

In (2e) the tone on the particle meaning 'with' and 'at' is the same and mid. In the next example at/against' the tone is also mid.

(2f) <i>ùyèn</i>	<i>yár</i>	<i>ikpàl</i>	<i>kə</i>	<i>ná</i>
Child	carry	knife	at/against	him

The child went after him with a knife.

The vowel of the particle is stable in the environments of pronouns and nouns with consonant-initial stems. However, in the environments of pronouns and nouns with vowel prefixes, assimilation takes place on the surface both for the vowel and tone as in:

(2f) <i>ùyèn</i>	<i>Yár</i>	<i>ikpàl</i>	<i>kù</i>	<i>ùwan</i>	<i>wò</i>
Child	Carry	knife	at/against	peer	his

The child went after his colleague with a knife.

(2g) <i>ùyèn</i>	<i>Yár</i>	<i>ikpàl</i>	<i>kì</i>	<i>ìnà</i>	<i>wò</i>
child	Carry	knife	at/against	cow	his

The child went after his cow with a knife.

However, unassimilated *kə* has high and low tone allomorphs/homonyms as in the following examples;

(2h) <i>nak</i>	<i>Ìsò</i>	<i>nak</i>	<i>a</i>	<i>mì</i>	<i>kə</i>	<i>m̃mín</i>	<i>á</i>	<i>tā</i>
Put	malt	put	for	me	In	gruel	it	that

Please do help me put the processing malt in the gruel dough.

(2i) <i>ó</i>	<i>Ḃá</i>	<i>kə</i>	<i>m̃mín</i>	<i>və</i>	<i>kə</i>	<i>tə</i>
you-should	Bring	with	gruel	that	at	Here

Please bring the gruel here.

(2j) <i>ipín</i>	<i>té,</i>	<i>î</i>	<i>Gà</i>	<i>ilàngtáng</i>	<i>kə</i>	<i>Nnà</i>
Tomorrow	then,	we-will	Go	Langtang	at	it-is-still

We will still go to Langtang (in spite of the challenge).

(2k) <i>ó</i>	<i>gà</i>	<i>kə</i>	<i>ŋmgbət</i>	<i>Á</i>	<i>tà</i>	<i>kə</i>	<i>Có</i>
you-should	go	With	pot	It	that	at	There

Please take that pot away!

Where *kV* is clause-final a variety of tonal outputs are also possible. In sentences such as those below it can be treated as a standalone locative, corresponding to English 'inside, within, for it' etc;

(2l) <i>nak</i>	<i>M̃mì</i>	<i>Á</i>	<i>ná</i>	<i>kə</i>
Put	Oil	For	him	at

Put oil on it for him

(2m) <i>nak</i>	<i>M̃màn</i>	<i>kə</i>
Put	Salt	in (it)

Season it with salt

(2n) <i>Ḃá</i>	<i>kə</i>
Bring	it.

Bring it.

(2o) <i>Ḃá</i>	<i>kə</i>
come	for-it

Come for it.

(2q) <i>Ḃá</i>	<i>kə</i>	<i>ipín</i>
come	for-it	tomorrow

Come for it tomorrow.

4. Homophonous *kə* particles

The locative particle can easily be confused with other particles with the same form but different functions. These include:

Dative markers

(3a)	má	yár	ikəm	má	lɪp	ná	kə	pə	kak
	someone	carry	club	someone	hit	him	with	of	kak
	He was hit heavily with a club, kak!								
(3b)	yɪŋ	ki	iyəm	ɓú	áyen	mi			
	Cry	for	thing	your	child	mine			
	Cry, my child, so your thing will be given to you.								
(3c)	áyen		mi		yɪŋ	kə			
	child		mine		cry	for (it)			
	Cry for it my child								

kə as in 'progressive marker'

(4a) ùzə	kə	mma	iyəm
He	progressive	measuring	things
He is buying grains.			

kə as in 'perfective marker'

(4b) ùzə	kə	Ma	ikùr	kə	nlám
He	perfective	measure	sorghum	at	yesterday
He bought sorghum yesterday.					

kə as in 'with'

(4c)	mi	yár	akum	ɲmkpán	asəl	anyín	ság	ka	afú	alálák	yá?
	I-willcarry	type	going	way	farm	how	with	stomach	empty		Q
How will I set out for the farm on an empty stomach?											
(4d)	ùzə	kə	mbəl	Kl					iwú		
	He	with	tears	At					eye		
He is mourning.											

kə as in 'by means of'

(4e) má	ɓit	nzɛŋkɛŋ	á	mi	kə	mmək	imār
someone	mould	bread	for	me	with	flour	millet
They made bread with millet flour for me							

kə as in 'in spite of'

(4f) má	dàŋ	ná	kə	mbwàl	kə	nnà	kpáté,	ùzə	gà	acèn	kə	nnà
	refuse	him	with	money	still	that-so	too	thathe	go	journey	still	that-so
They												
He was not given money to travel still yet he embarked on the journey.												

kə as in 'after, later'

(4g) kə	nvəŋ	və	í	cú	té,	í	ya	ná	kət
At	after	that	we	reached,	then	we	see	him	not
We did not see him when we had arrived.									

kə as in 'again'

(4h) ùzə	gà	acèn	cít	kə	dí
He	go	journey	already	at	different
He had gone on a journey again.					

kə as in 'alone'

(4i) ùzə	gà	kə	n(ku)kwa
He	go	of	alone
He went alone.			

kə as in 'instead'

(4j) ùwà	gà	kə	(a)ɗor	mi
he-it-is-one	go	of	instead	me
He went in place of me.				

kə as in 'would'

(4k) ùDwàl	kə	Yár	awá	áyen	wò	kə	lɛp	(ná)	kə'sim,	ùDwàl	kə	waŋkat	kwəŋkat
Tel	would	carry	skin	child	hers	would	tie	(him)	on-back,	Tel	of	kwəŋkat	kwəŋkat ³
A Tel woman would take a child skin to back it and she would show off <i>kwəŋkat kwəŋkat</i> .													

The polite marker *kə* has a different and unchangeable tone and so is not a homonym.

5. *Kə* in interrogative contexts

kV has a high tone allomorph which occurs in interrogative expressions and follows the noun to which it refers. Where a further interrogative marker in sentence-final position is dropped, it is meant to achieve emotive force. The

³ Ideophone of the noise made by a dry skin.

following examples show the main interrogative expressions, with the vowel of the introducer particle copying the prefix of the question word.

(5a) í	nak	akál	və	kə	cě?
We	place	charcoal	that	at	where?
Where should we keep the charcoal?					
(5b) u	ḡá	kí	izè?		
You	come	with	what		
How did you come?					
(5c) u	ḡá	kí	izè?		
You	come	with	what		
What did you bring?					
(5d) u	ḡá	kí	izè?		
You	come	for	what		
Why did you come?					
(5e) u	ḡá	kú	ùdè?		
You	come	with	who		
Who (sg.) did you come with?					
(5f) u	ḡá	kú	ùdè?		
You	come	for	who		
Who (sg.) did you come for?					
(5g) u	ḡá	kó	òdè?		
You	come	with	who		
Who (sg.) did you come with?					
(5h) u	ḡá	kò	òdè?		
You	come	for	who		
Who (sg.) did you come with?					

Where the interrogative expression carries a formal final question morpheme as in the examples below it is for the purpose of focus;

(5i) ùzə	le	ká	Azumò	yà?
He	returned	at	When	Q
When did he return?				

In transitive verbs, no pronoun is required and the interrogative expression almost behaves like a dummy object;

(5j) í	nim	kə	sáng	yà?
We	do [it]	with	how	Q

What should we do with it?

(5k) u	nim	kə	Sáng	káng	à	lar	yà?
You	do [it]	with	How	that	it-did	lost	Q
What did you do with it that it got lost?							

(5l) u	nim	kə	Sang	Wa	acár	yà?
You	do	at	How	Like	woman	Q
Why are you behaving because of it like a woman?						

(5m) ùPài	yáp	kə	m̀pícìng	yà?
Pai	sold [it]	at	how much	Q
How much did Pai sell it for?				

(5n) u	ḡá	kə	nzə	ǹnàp	è?
You	come	With	what	matter	Q
What issue brought you?					

This question form expresses surprise;

(5l) ó	dyang	ǹding	və	á	mi	kə	cè	yà?
You	fetch	water	It	for	me	at	where	int.?
Where did you keep the water I asked you to fetch?								

6. Time contexts

kV is a particle that precedes measures of time to modify them, e.g. *kə ǹdá* 'at today'. If it immediately follows the main verb the vowel shows concord and tonal agreement with the following noun-prefix as these examples;

ùzə	kú	(kə)	ǹdá
He	die	at	today
He died today.			

ùzə	kú	kí	ipín
He	die	in	morning
He died today			

When the particle is articulated, there is tonal change *ǹdá* instead of *ǹdá*.

7. Demonstrative contexts

Kə can also precede the demonstratives *tə* [here], *tà* [there] and *có* [yonder, remote distal] with the meaning 'to' as a referential demonstrative as in:

ḡá	Kə	kə	tə
Bring	it	to	here
Bring it here.			

ḡá	kə	kə	tà
Go	(with)-it	to	there
Take it away there.			

ḡá	kə	kə	có
Go	(with)-it	to	yonder
Take it over there.			

8. Conclusion

Our attempt here has amply demonstrated the richness and diversity of the semantic roles of the particle *kV*. This description will not only help to inform how to write it in the orthography, but it sets the stage for comparative studies with related languages. It will be of historical interest to have a foundation from which to launch out for the reconstruction of such grammatical particles. Its potential as data for theoretical abstracts is the real strength of the paper.

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The Semantics of Yoruba Slangs

Olawuyi Hafsat Omolola¹ & Oyinloye Mayowa Emmanuel

Abstract

The aim of this paper is to examine the semantic structure of a variety of language use that is presently pervasive among the Yoruba's younger generation. This language variety is known as 'slang'. Three semantic modules: idiom, euphemism and paraphrase, are employed as eclectic conceptual frameworks for the study. The data analysed in this paper were obtained principally via researchers' observation and unstructured oral interview. The observation which spanned over a period of three months (February - April, 2017) was carried out by the researchers at football viewing centres, club houses and salons within the Ilorin metropolis during conversations involving the target language users. Ten (10) participants (7 illiterate youths and 3 students) were randomly selected for unstructured oral interview. Their conversations and responses were tape-recorded; the recorded data were eventually extracted, translated and analysed using a descriptive approach. From its findings, the paper establishes that virtually all the Yoruba slangs are idiomatic because their overall meanings cannot be predicted from the meanings of their component words. Also, it is found out that some of the slangs are euphemisms in themselves, as the speakers employ them to avoid taboo or unpleasant expressions in certain communication contexts. Finally, many of the slangs are synonymous with one another; hence, they are used to express paraphrase relations. Because of the semantic uniqueness of Yoruba slangs, the paper concludes that slangs, though are ephemeral linguistic expressions, often give a language a new look whenever they evolve. Hence, Yoruba is not an exception in this regard. The study therefore recommends a linguistic documentation of the contemporary Yoruba slangs as well as teaching them to foreign learners of the language in order to intimate the learners with the informal aspect of Yoruba communication.

Keywords: Yoruba slangs, idiom, euphemism, paraphrase, linguistic documentation.

Introduction

Sociolinguistics is a field which concerns itself with the study of the interconnectivity between language and society. It principally delves into how social forces influence the use of language among different social groups and in diverse communication situations. In the human society, one of the phenomena that diachronically evolve is slang. Slangy expressions have a way of connecting language users particularly the younger group. The youth tend to favor this medium of communication in order to entrench group

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solidarity and reflect socio-cultural dispositions that are concealed in their worldviews.

In the words of González (1994), the study of slang is often overlooked or disregarded, due, in great part, to its ephemerality and the informal, humorous and taboo character of many of its expressions, which lead to the belief that it is a deviation from the standard language. However, a careful scrutiny of the current Yoruba slangs among the younger generation revealed that these expressions have a rich semantic structure that cannot be overlooked or glanced at in a hurry. Apart from the fact that the slangs normally portray the socio-cultural belief or inclination of the users, it is also observed that the speakers display 'semanti-cultural' competence when they use them in different contexts of communication. Therefore, it becomes paramount in this paper to subject them to semantic analysis with the aim of exploring the semantic features with which they are characterized. Yoruba is one of the three major indigenous languages in Nigeria; it is a kwa language of the Niger-Congo subphylum that is spoken in the south-western region of the country.

Conceptual Framework

To a large extent, of all the significant units of language (namely phone, phoneme, syllable, morpheme, etc.), the sememe (meaning) relatively appears to be the most difficult to study. This is partly due to its abstract nature, being a phenomenon which mainly resides in the mind of language users; or wholly due to the fact that decoding the meaning of a linguistic form in most cases transcends the literal realm but is largely governed by certain non-linguistic variables such as the socio-cultural context of discourse, socio-cultural background of the interlocutors, speakers' worldviews cum experiences, among others. However, despite that meaning seems somewhat challenging to study, language scholars and philosophers alike have tried as much as possible to do justice to the nature of meaning within the context of theories and models of semantics.

Semantics concerns itself with the scientific study of the meanings of words and sentences (Saeed, 2003). When language is put into use, what speakers communicate to one another is meaning, that is, the semantic knowledge which resides in their mental faculty. It is this knowledge that semanticists attempt to study. Syal & Jindal (2007, p. 141) argue that "semantics is the most abstract level of linguistic analysis, since we cannot see or observe meaning as we can observe and record sounds". In order to give a systematic account of the nature of meaning, semanticists developed theories of meaning such as the referential theory, the imagery theory, the truth-conditional theory, etc. A theoretical account of meaning does not presuppose prescribing what the meanings of expressions should be but

boils down to describing the implicit semantic knowledge that speakers have about their language.

The study of meaning within the field of semantics is largely restricted to the basic, primary or literal denotation of an expression (Saeed, 2003). That is, the immediate impression a language user has in mind whenever he hears or reads an utterance. For example, the literal meaning of the English word 'dog' would constitute the picture/image of a certain kind of four-legged domestic animal which is conjured in the mind or the tactile referent to which the word refers in the real world. Thus, a level of interpretation of the word 'dog' which goes beyond the above natural tendency exits the boundary of semantics, it is taken care of in another meaning-based field known as pragmatics. Although semantics and pragmatics are theoretically interwoven, there is a noteworthy point of divergence between them which is succinctly captured by Saeed (2003, p. 101) as follow: semantics would deal with conventional meaning, those aspects which do not seem to vary too much from context to context, while pragmatics would deal with aspects of individual usage and context-dependent meaning.

In the light of the above enunciation, the study of Yoruba slangs in this paper is therefore situated within three conceptual semantic modules. Specifically, the analysis is premised upon three principal spectra of meaning: idiom, euphemism and paraphrase.

An idiom is a phrase where the words together have a meaning that is different from the dictionary definitions of the individual words (www.usingenglish.com/reference/idioms). In other words, an idiom is a fixed group of words with a special meaning that cannot be interpreted from the combination of the constituent words. Since idiomatic expressions usually have culturally understood meanings that differ from what their composite words' denotations would suggest, foreign learners of a language have to systematically learn this aspect of meaning of the language. In essence, a learner of English, for example, must acquaint himself with the idioms in the language rather than doing 'guesswork' about their meanings; otherwise, semantic predictions would generate wrong (or different) meanings altogether. Consider the following English idioms:

1. At the drop of a hat
(Without any hesitation; instantly)
2. Add insult to injury
(To worsen an unfavorable situation)
3. Bite off more than one can chew
(To take on more responsibilities than one can manage)
4. A wild goose chase
(A frustrating or lengthy task that accomplishes little)

In the above examples, one would notice that the corresponding meaning of each idiom is different and/or cannot be understood or deduced from the individual meanings of its component words.

Euphemism, as a literary term, refers to polite, indirect expressions which replace words and phrases that are considered harsh and impolite or which suggest something unpleasant. 'Unwanted' expressions such as vulgarity, linguistic taboo, offensive terms, and unpleasant remarks are better expressed using semantic permissible alternatives in the form of euphemisms. For instance, the expression 'kick the bucket' is an alternative way of reporting the death of someone. Thus, euphemism is an idiomatic expression which is deliberately employed by language users to mask rude or impolite expressions but to communicate the idea courteously, as shown in the following English examples

5. In the family way
(Expressing that someone is pregnant)
6. Temporary negative cash flow
(Expressing that one is broke)
7. Economically disadvantaged
(Expressing that one is poor)
8. Mentally challenged
(Expressing that someone is stupid or imbecilic)

A major function of euphemism, as implied in the examples above, is that it helps one to convey ideas which have become a social taboo or are too embarrassing to mention directly.

Finally, a paraphrase is a restatement of the meaning of a sentence using other words. In other words, to paraphrase a sentence is to convey the same message without losing the essential meaning. As a semantic relation between sentences in language, a paraphrase serves the purpose of explaining or clarifying the meaning of the sentence that is being paraphrased. A sentence can be paraphrased either by lexical items permutation as in converting an active sentence to a passive one or employing new words entirely. Consider the paraphrase relations in the following English sentences:

9. a) The police chased the burglar (active)
b) The burglar was chased by the police (passive)
10. a) Mary bought some jewelry from Susan.
b) Susan sold some jewelry to Mary

The (a) and (b) sentences in each of the above pairs are obviously very similar in meaning, in that once the first is true, the other is also true. In a nutshell, two sentences that can have the same meaning are said to be paraphrases of each other (O' Grady and Katamba, 2011). Therefore, as synonymy is to words, so is paraphrase to sentences.

Slangs

According to Dozie & Madu (2012, p. 99), "the origin of the socio-linguistic phenomenon 'slang' dates back to 1800 and was used in English as a 'special vocabulary' by any set of persons of low or disreputable character". In time, its use gained access, acceptance and spread to other parts of the world. In the words of Ellis (2002), slang is a variety of language used by members of a group to express their sense of belonging. Following McGregor (2009), slang refers to an informal word or expression that has not gained complete acceptability and is used by a particular group. A defining feature of slang is that it is usually associated with a particular group of language users and plays a role in constructing group identity and identifying individuals as members of groups. Therefore, using the slang of a particular group will associate an individual with that group. The aim of slang users is to establish or reinforce social identity or cohesiveness within their group.

The younger generation of speakers constitutes the major group with which the use of slangs is mostly associated. This is because the youths are dynamic individuals who can invent novel expressions in order to satisfy their communication desires. González (1994) echoes these sentiments by asserting that of all social groups, the young are the most prone to the use and renovation of slang because they exhibit great social dynamism and are receptive to changes in fashion such as clothes, look, style, and also in speech. Furthermore, slang is not only a vocabulary that is specific to a particular generation of younger speakers but also an ever changing set of colloquial words and phrases (Eble, 1996), so informal that many people view it as a deviation from or subversion of the standard variety. In the light of this enunciation, Mathiello (2008, p.11) gives an example of the terms "foxy" and "shagadelic". The author explains that neither term makes sense given a standard interpretation of English. For instance, the slangy form 'foxy' does not make sense semantically, as it is a synonym with the word 'sexy' and has nothing to do with foxes.

For an expression to qualify as slang, it must meet at least two of the following conditions (Dumas & Lighter, 1978):

- It should be used informally.
- It should be used in such a way that the use is familiar with its referent or its co-users.
- It should be considered forbidden in casual conversation involving people of a higher social status.
- It should serve as a substitute for a popular conventional synonym.

Therefore, once an expression fulfils two or more conditions out of the above, it is given a linguistic license to be recognized as slang in the language. In the literature, several features have been attributed to slang.

Anderson and Trudgill (1990) provide a comprehensive list of the features of slang: it is typical of informal situations; it is found in the lexicon not in the grammar; it is not dialect, swearing, register, cant or jargon; it is creative and often short-lived, and so on.

Finally, there are a lot of reasons for which people use slangs (see Crystal, 1997 & Adamu, 2014). Some of those reasons include the following:

- To be different
- To be picturesque
- To reduce seriousness in speech or writing
- To induce intimacy among users
- To enrich the language
- To escape from clichés
- To catch fun
- To enhance easy communication
- To demonstrate a sense of belonging
- To be secretive

Methodology

The data analysed in this paper were obtained principally via researchers' observation and unstructured oral interviews. The observation was carried out by the researchers at football viewing centres, club houses and salons within the Ilorin metropolis. The conversations of the members of the social group (illiterate Yoruba youths and tertiary institution students whose native language is Yoruba) who used Yoruba slangs frequently were documented using a tape recorder. The observation spanned over a period of three months (February - April, 2017). Ten (10) participants (7 illiterate youths and 3 students) were randomly selected in the final month of the investigation for unstructured oral interview. Among other things, they were asked to explain the semantic technicalities enshrouding some of the slangs, as well as give reasons behind the choice of some slangy expressions in certain contexts of communication. Their responses were also tape recorded. All the recorded data were eventually extracted, translated and analysed using a descriptive approach within the context of three semantic modules: idiom, euphemism, and paraphrase.

Data Presentation 'on Yoruba Slangs'

11. *Mà á tẹ ojú yín mole*
I will press eye your (pl) to-ground
'I will trample your eye under my foot' (literal meaning)
'I will insult you' (implied meaning)

12. *Tẹ ẹ sójú ẹ*
press it in-the-eye it
'Press it to the actual point' (literal meaning)
'Do it in the normal/right way' (implied meaning)
13. *Mo fé jẹ ìgbín*
I want eat snail
'I want to eat snail' (literal meaning)
'I want to have sex' (implied meaning)
14. *Tibẹ fún bọbọ yẹn jọọ*
close-place for guy that please
'Close the place for that guy please' (literal meaning)
'Shun/ignore that guy please' (implied meaning)
15. *Bodé ti padà sí ọmọ yén lẹ*
Bodé has later open child that ground
'Bodé has finally opened that child to the ground' (literal meaning)
'Bodé has finally abandoned/divorced the girl' (implied meaning)
16. *Mo ya dànù*
I tear pour-away
'I tore away' (literal meaning)
'I haphazardly ran away' (implied meaning)
17. *Mo gbé e ró*
I carry it bend
'I carried it and bent it' (literal meaning)
'I hastily ran away' (implied meaning)
18. *Mo ká a rílẹ*
I roll (up) it from-the-ground
'I rolled it up from the ground' (literal meaning)
'I speedily ran away' (implied meaning)
19. *Wálẹ na/to iṣẹ ọmọ yẹn*
Wálẹ stretch/arrange work child that
'Wale stretched/arranged that child's work' (literal meaning)
'Wale wooed the girl' (implied meaning)
20. *Bọbọ yẹn ti jẹgò*
guy that has eat-bottle
'That guy has eaten bottle' (literal meaning)
'That guy has run into trouble' (implied meaning)

21. Bàbá Jídé ti fúndìí
father Jídé has close-buttocks
'Jide's father has closed his buttocks' (literal meaning)
'Jide's father has died' (implied meaning)
22. Èyìn ọmọ yẹn bad
back child that bad
'The back of that child is bad' (literal meaning)
'The girl's buttocks are big' (implied meaning)
23. O ò ní fẹ fi ata gígún lé tìròò
You neg will want use pepper ground paint antimony
'You will not want to use ground pepper in place of antimony' (literal meaning)
'You dare not do the impossible' (implied meaning)
24. O ò ní fẹ fi ọmọ-odó tayín
You neg will want use child-mortal pick-tooth
'You will not want to use a pestle as a tooth-pick (literal meaning)
'You dare not do the impossible (implied meaning)
25. O ò ní fẹ kirun lórí express
You neg will want perform-Salat on express
'You will not want to perform Salat on the express road (literal meaning)
'You dare not do the impossible' (implied meaning)

Data Analysis

From the data presented above, it could be deduced that the Yoruba slangs have a semantic structure which encompasses three inter-connected modules: idioms, euphemisms and paraphrases. With respect to idioms, it could be observed that all the slangy expressions presented are strictly idiomatic because their overall meaning cannot be construed on the basis of the intrinsic meanings of their component words. For instance, saying *Bọbọ yẹn ti jẹgò* 'That guy has eaten bottle' in example (20) is idiomatic as one would be wrong if one interprets it literally as given in the parentheses. This is because *jẹ* 'eat' and *ìgò* 'bottle' have been used in a sense that transcends their literal interpretation. Since eating a bottle connotes something dangerous or weird, the intended meaning of the expression is 'That guy has run into trouble'; hence, it is idiomatic. Something similar applies to the expression below:

26. Orí ẹ fọnká síbẹ
head your scatter there

- 'Your head is scattered there' (literal meaning)
- 'You are an expert' (implied meaning)

If one goes by the basic interpretation of the above expression, wrong meaning would be presupposed because its implied meaning has nothing to do with *orí* 'head' and *fọnká* 'scatter'. Thus, it is best to say that the expression is idiomatic.

Also in example (13), the transitive verb *jẹ* 'eat' and the nominal complement *ìgbín* 'snail' have meanings that do not contribute in any way to the intended meaning of the expression *Mo fẹjẹ ìgbín* which literally means 'I want to eat snail'. Because what is implied in the mind of the speaker of the expression is 'I want to have sex', it suffices to infer that the expression has an idiomatic meaning.

Furthermore, apart from the fact that the slangy utterances are idiomatic, it is also observed that they are euphemisms. This is because some of them are used to politely express certain ideas which would ordinarily be taboo in Yoruba language. For example, it is completely unethical in Yoruba culture for a younger person to warn an elderly person against being disrespected or insulted by literally saying: *E má jẹ kí n fí yín wọlẹ tàbí kàn yín lábíkù* 'Don't let me insult or disrespect you'. Rather, the speaker will make recourse to a permissible alternative in the form of slang below:

27. Ẹ má jẹ kí n gbéná wójú yín
You (pl) neg let that I carry-fire look-eye your
'Don't let me carry fire to look at your eye' (literal meaning)
'Don't let me disrespect/insult you' (implied meaning)

Though the above slang is idiomatic in itself, it has been used euphemistically in order to avoid being verbally rude to an elder. A similar scenario is witnessed in example (11) in the given data. Instead of telling an elderly person directly that 'I will insult you' with the statement *Mà á kàn yín lábíkù*, a younger Yoruba speaker would rather employ a slangy equivalent: *Mà á tẹ ojú yín mọlẹ*. To him/her, this latter expression is more polite than the former, bearing in mind that it is verbally impolite rendering the former to a Yoruba elder.

Also, it is a linguistic taboo in Yoruba culture to say *Mo fẹ ẹ ibáldpọ* 'I want to have sex' in the public, as it is strictly against the moral inclination of the people. A possible strategy that can be employed in avoiding this forbidden expression is using a euphemistic slang (as in example (13)): *Mo fẹ jẹ ìgbín*, which literally means 'I want to eat snail'. From oral interview, it was reported that *ìgbín* 'snail' in Yoruba slang stands for the female genital. Therefore, the custodians of this slang use *ìgbín* metaphorically as a result of the observable similarity between snail and the vagina. According to the

young Yoruba ladies interviewed, both resemble each other in two ways. One, the vagina has almost the same physiological shape as a snail, and two, as the vagina is always moistish, so also a snail. For this reason, the Yoruba version *òbò* 'vagina' is euphemized as *ìgbín* 'snail' in the expression *Mo fé je ìgbín* whose intended meaning is 'I want to have sex'. By implication therefore, sex is portrayed as food in the slang.

Moreover, it is unpleasant reporting the death of an elderly person literally by saying, for example, *Bàbá Jídé ti kú* 'Jidé's father is dead'. Alternatively, the younger generation of Yoruba speakers would use a slangy expression such as the one in example (21): *Bàbá Jídé ti fúndí*, literally meaning 'Jidé's father has closed his buttocks'. In this way, the unpleasantness inherent in the direct announcement of the death of a Yoruba elderly person is avoided using the slang. In essence, the slang is euphemistic.

Another example of how Yoruba slang is used as a euphemism is given below:

28. *Iwájú ọmọ yẹn gàzà*
front child that (meaningless)
'The front of that child is big' (literal meaning)
'The/That girl has big breasts' (implied meaning)

According to the users of the slangy expression in (28), the word *iwájú* 'front' represents the breasts (*ọyàn/ọmú*) of a lady. Therefore, instead of vulgarly saying that a lady has big breasts using the Yoruba expression *ọyàn/ọmú obìnrin yẹn tóbi* 'The breasts of that girl are big', a permissible alternative is employed to avoid being verbally unrefined as in example (28) above. What only sounds weird in this slang is the form *gàzà* which is not semantically coded in English but is attributed with a meaning known as 'big' by the users of the slang.

Finally, some of the Yoruba slangs are paraphrases of one another. For instance, examples (23), (24) and (25) roughly mean the same thing which is 'You dare not do the impossible' even though their literal meanings differ. The same semantic relation applies to examples (16), (17) and (18) despite having different literal interpretations. It is, however, important to point out that despite the paraphrase relation among these sets of slangs, one notices that they are mutually exclusive in terms of contextual usage. That is, while one may be considered appropriate in a particular context, the other may not, but may be preferable in another context. For instance, context of communication is the factor that will determine the expression to be selected from among the synonymous slangs in (29), (30) and (31). According to the male participants interviewed, example (29) is uttered in the face of danger or pandemonium; example (30) is preferred mostly when the speaker is

guilty of a crime and is being targeted for arrest at a place; whereas example (31) is the choice when the speaker is late for a particular appointment.

29. *Mo ya dànù* - 'I haphazardly ran away'
30. *Mo ká a ríḽe* - 'I speedily ran away'
31. *Mo gbé e ró* - 'I hastily ran away'

Although the manners of running away in the above utterances differ, it is still tenable to say that they convey the same message, i.e., taking to one's heels.

Discussion of Findings

Using idiomatic and euphemistic expressions basically illustrates the degree of semantic competence 'unconsciously' possessed by this group of language users. Even though the majority of them are uneducated let alone having any knowledge of semantics, they still have the semantic initiative of using slangy idioms and euphemisms to communicate, rather than using ordinary terms which might sound offensive or unpleasant in certain situations. It is logical to say, for instance, that the users of these slangs possess a cultural competence that certain lexical items or sentences are forbidden in the language and should therefore be alternatively expressed using euphemistic equivalents. For example, they substitute *òbò* 'vagina', *ọyàn* 'breast' and *ídí* 'buttock', which are taboo terms, with *ìgbín* 'snail', *iwájú* 'front' and *eyìn* 'back' respectively, as permissible alternatives.

Also, the speakers' innate knowledge of paraphrase relation is quite phenomenal. Knowing that the same idea can be communicated in different ways using slangs testify to their semantic intuition. Thus, the speakers make a choice from among the synonymous slangy expressions that is suitable for their contextual communicative need. This indeed corroborates the universal claim that language users, whether educated or not, have a perfect knowledge of their language, notwithstanding the flaws that occasionally surface in their linguistic performance.

Concluding Remarks

Recent survey reveals that the study of slangs has not enjoyed much research interest if relatively compared with other sociolinguistic fields such as language conflict, language shift, language choice, maintenance or endangerment, language planning and policy, multilingualism, among others. However, this paper has advocated the study of slang owing to the semantic intricacies that are enshrouded in the 'semanti-cultural' competence possessed by the younger generation of Yoruba language users. Although slangs are ephemeral linguistic expressions, they often give a language a 'new look' whenever they evolve. On the premise of this observation, this

paper hereby recommends that the Yoruba slangs currently in use be documented before they wear out or pave way for new ones in the language. Also, they should be made pedagogically relevant by teaching them to foreign learners of the language so as to furnish them with adequate knowledge about the informal aspect of Yoruba communication.

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Kru as Kru, Kru as Kwa, Kru as Kruan

John Victor Singler

Abstract

At various points across the past 250 years and leading to the present, there have been Kru mariners, crewmen on European ships; Krumen/Krooboys, migrant workers along the West African coast; the Kru/Klao ethnolinguistic group, one of sixteen recognized by the Liberian government; and Kru languages, a constituent of the Niger-Congo language family. Apart from three isolates, the Kru languages are spoken in southern and eastern Liberia and southwestern Côte d'Ivoire. Greenberg placed Kru languages within the Kwa branch of Niger-Congo but said that "the affiliation of Kru . . . to the Kwa group is to be considered tentative" (1966:39n). Beginning in the 1970's, a procession of scholars examining Greenberg's classificatory scheme have concurred that the Kru languages do not belong within Kwa. The post-Greenberg classifications from 1974 to 2000 divide as to whether Kru should be grouped with Gur (or Gur-Adamawa) or treated as a separate branch of its own, but they are in agreement that it should not be placed within Kwa. Nevertheless, Liberians and Liberianist social scientists—apart from linguists—continue to refer to the Kru languages spoken in Liberia as "Kwa."

To understand the persistent application of Kwa to languages that aren't Kwa, it is useful to examine the emergence of the term Kru in its various applications and then to consider how the status of an ethnolinguistic group was imposed upon the people who are called Kru today. Once that is done, it becomes possible to explore various explanations for the aberrant application of the term Kwa to Liberian languages. One explanation is inertia—or indifference. "Kwa" had become a term that includes Liberia's Kru languages, so why change it? A second is scholars' desire to link their own ethnic heritage to the groups of southern Nigeria, especially to Yoruba speakers. The third—and ultimately the argument that seems to carry the most weight—is that Liberians and Liberianists employ Kwa in order to obviate ambiguity between the language and ethnolinguistic group Kru and the larger set of Kru languages and their speakers. Ingemann (1973) proposes an alternative; however, Kwa continues to prevail, as illustrated by its recent use by, for example, Shellum (2016) and Ballah (2017).

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- Kru languages, a constituent of the Niger-Congo language family.

Greenberg (1963, 1966) classified the Kru languages as a part of Kwa but said that the grouping was "tentative" (1966:39n). Subsequent analyses have all departed from Greenberg on this placement of the Kru languages. The change in thinking among linguists who work on African classification notwithstanding, Liberians and Liberianists have continued to refer to Liberia's Kru languages as Kwa. This quotation from President Ellen Johnson Sirleaf's memoir illustrates the practice: "The third major group [of languages spoken in Liberia], the Kwa linguistic group, includes the Bassa, Dei (Dey), Grebo, Kru, Belle (Kuwaa), Krahn, and Gbee peoples, found mostly in the southern and eastern parts of Liberia" (2009:2).

Sawyer (1992) contains a cogent synthesis of Liberian societies before there was a Liberia, i.e. before the American Colonization Society and African American emigrants established themselves early in the nineteenth century on what became the Liberian coast. He too uses "Kwa" to refer to ethnolinguistic groups whose language is a Kru language. Sawyer is unusual in actually citing Greenberg (1963:45), but his description of Kwa societies is quite clearly applicable only to Kru-speaking societies and is most definitely not, for example, descriptive of the Ashanti Confederacy or the Kingdom of Dahomey:

Kwa societies were characterized by smaller settlements and many by a seafaring culture. (p. 48);

Before the Liberian government designated chiefs for African societies, many Kwa-speaking societies did not even have chiefs.

Where chiefs existed, their authority was very limited (p. 51).

In a footnote (325n), Sawyer lists "other Kwa-speaking groups": the list consists of four Kru languages spoken in Côte d'Ivoire.

The Liberian use of "Kwa" extends beyond academics and government leaders. There are situations where Liberians more generally use Kwa with specific reference to the country's Kru languages.

I begin this paper by reviewing proposals for the classification of Kru languages within Niger-Congo. I then consider the origin of the term "Kru" and examine the history of the Krumen, including Kru mariners. From there I look briefly at the nature and status of ethnicity in Liberia among speakers of Kru languages, considering in particular the difference between ethnicity in the rural homelands and ethnicity in the city. I then address the question as to why Liberians—social scientists, government leaders, and Liberians in general—use Kwa as a term for Kru languages and Kru-language speakers.

find my answer in church. I examine an alternative to "Kwa" for Kru languages proposed by Ingemann (1973). I conclude by considering the future in Liberia of the competing forms.

2. Kru Languages and Niger-Congo¹

2.1 The Classification of Languages in the Kru Family

At its most basic, the organization of Kru languages is non-controversial. It is the following (Marchese 1979, 1989):

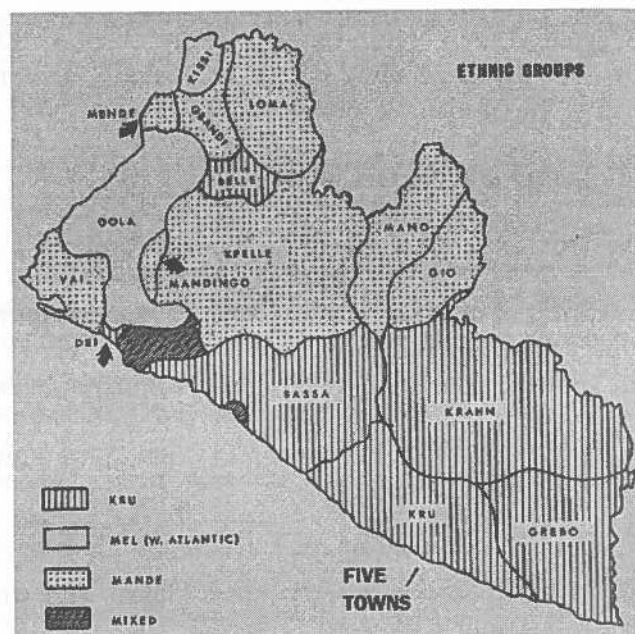
- a western branch, consisting of languages spoken in southern and eastern Liberia and southwestern Côte d'Ivoire,
- an eastern branch, of languages spoken in Côte d'Ivoire immediately to the east of the western Kru languages,
- three isolates, distinct from one another and from the eastern and western branches:
 - Kuwaa (Belle), spoken in northwestern Liberia and surrounded by Mande and Atlantic languages,
 - Aizi, specifically Tiegba and Abrako (cf. Marchese and Hook 1982), spoken on the Ebrié Lagoon in Côte d'Ivoire, and
 - Seme, spoken near Orodara in Burkina Faso, and arguably the furthest removed of all.

The Liberian government recognizes six Kru ethnolinguistic groups, hence six Kru languages. Apart from the isolate Belle (Kuwaa), they are Western Kru: Dei, Bassa, Kru (Klao), Grebo, and Krahn. (However, the 2008 Liberian census separated Sapo from Krahn. Johnson Sirleaf (2009), cited above, treats Gbii [Gbee] as distinct from Bassa.)

The map in (1), taken from von Gnieleski (1972:38), presents the sixteen ethnolinguistic groups recognized by the government.

(1). The sixteen ethnic groups recognized by the Liberian government, from von Gnielinski (1972:39). In addition, the location of the Five Towns, discussed in Section 3, has been indicated.

¹Sections 2.1 and 2.2 owe much to Marchese (1979, 1989).



Although von Gnielinski gives the map the heading "Ethnic Groups," the coding reflects language classification. With minor changes, Dwyer (1981) presents von Gnielinski's map with the heading "Location of Liberian languages" (p. 3). For the Kru part of the country, the implicit isomorphism in the relationship between languages and ethnolinguistic groups is not fully supported. Dialect surveys carried out in the 1970's by The Institute for Liberian Languages (TILL), a Lutheran Bible translation organization, posit seven Grebo languages, five Krahn languages, two Kru (Klao) languages, and two Bassa languages, Bassa and Gbii.²

2.2 The Place of Kru Languages within Niger-Congo

The status within Niger-Congo of Kru languages as a whole is vexed. Westermann (1927) classified the Kru languages as a part of Kwa, but then Westermann and Bryan (1952) moved them out of Kwa, saying that they formed an "isolated language group." Greenberg placed the Kru branch within Kwa, but commented, "The affiliation of Kru and Ijo to the Kwa group is to be considered tentative" (1966:39n). Welmers, acknowledging Greenberg's hesitation in placing Kru within Kwa, suggested that "Kru may well deserve the status of a separate branch" (1973:18). Classifications from 1974 to 2000 have gone back and forth as to whether Kru should be grouped with Gur (or Gur-Adamawa) or treated as a separate branch of its own, as the following list documents:

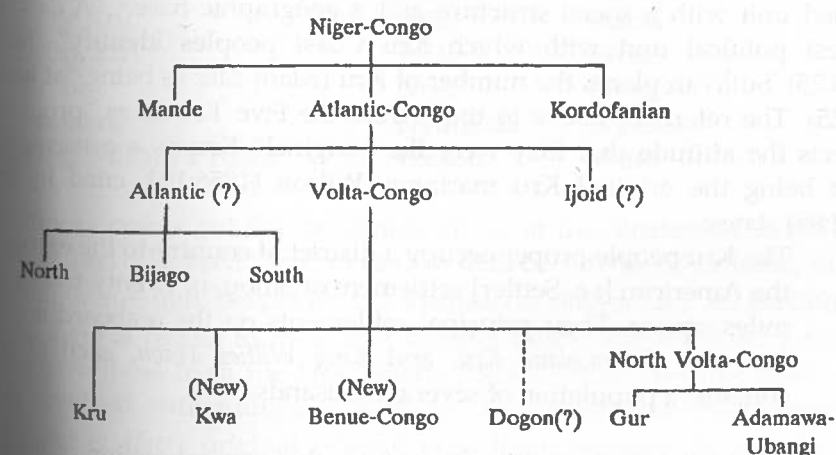
² Ingemann and Duitsman (1977) for Grebo; Ingemann, Duitsman, and Doe (1972) for Krahn; Duitsman, Bertkau, and Laesch (1975) for Kru (Klao); Bertkau, Gbadyu, and Duitsman (1974) for Bassa.

(2). The placement of Kru within Niger-Congo, assuming that Kordofanian, Mande, Atlantic have already been separated

- Vogler (1974), with Gur³
- Welmers (1977), a separate branch
- Bennett and Sterk (1977), **either** tripartite with Gur and Adamawa **or** a separate branch
- Marchese (1979, 1989), a separate branch
- Williamson (1989), a separate branch
- Williamson and Blench (2000), bipartite with Gur-Adamawa

The classification in Williamson (1989), identified by Olson (2004) as "the most widely accepted general classification of Niger-Congo", is given in (3).

(3). Niger-Congo classification proposed by Williamson (1989:21)



The question marks are in the original. Olson (2004) states, "The exact placement of Ijoid, Kru, and Dogon within the Niger-Congo genetic tree remains to be determined" (p. 23), but elsewhere he refers to Gur and Kru as Adamawa-Ubangi's "nearest linguistic neighbors" (16).

3. The Term Kru and its Early History: Kru Mariners and Krumen

The peoples along the Liberian coast have traditions of having moved there from interior lands. For some groups now on the coast, their arrival there was the end of the journey, the conclusion of their travels. For others, arriving on the coast was the end of their journey by land but only the beginning of their travels. They became skilled mariners. In this capacity, some of them interacted with Europeans engaged in maritime trade along

³ According to Marchese (1989:121), "Vogler attempts to show that Kru is closer to the Gur and Mande families than to Kwa." The putative link to Mande places Vogler at odds with other analysts.

the African coast. "The indigenous group first involved to a large extent with European trade" were the men of the Five Towns, a coastal region in what is now eastern Sinoe County in Liberia (Breitborde 1976-77:110). They were also called the Five Tribes and were sometimes referred to in nineteenth-century documents as "proper Kru" (Tonkin 1978-79:3), as in the quote from Wilson below. Kru (Klao) ethnicity was, at that time, nascent. (Arguably, it was still nascent a century later.) Kru/Klao societies were acephalous; age sets and lineage were central components of governance. Although they spoke a common language—with dialect variation—and largely shared a common culture, the Kru (Klao) did not see themselves as a people. Fishman (1977) sees as forces in defining an ethnic group a belief in shared ancestry (Fishman's "paternity"), a common heritage ("patrimony"), and a recognition by members of the group and by others that the group exists as a group ("phenomenology"). It is this last that is crucial in this case. Individuals saw themselves as belonging to a particular *dakɔ* (pl. *dake*), a named unit with a social structure and a geographic base.⁴ "A *dako* is the largest political unit with which Kru Coast peoples identify" (Sullivan 1978:25). Sullivan places the number of Kru (Klao) *dake* as being "at least 40" (p. 25). The reference above to those from the Five Towns as "proper Kru" reflects the attitude that they were the "original" Kru as a consequence of their being the original Kru mariners. Wilson (1856:103, cited in Brooks 1972:95) states:

The Kru people proper occupy a district of country to the eastward of the American [i.e. Settler] settlement of Sinou, of twenty-five or thirty miles square. Their principal settlements on the seaboard are *Settra Kru*, *Kru Settra*, *Nana Kru*, and *King Willies Town*, each of which contains a population of several thousands.

While the employment of men from this general section of the Grain or Melegueta Coast by European ships started earlier, Brooks (1972) estimates that systematic hiring of these mariners by European trading vessels probably began in the 1780's. In the following decade, the Sierra Leone Company, which administered Freetown, instituted standard wage scales for African laborers, "an unprecedented practice for this part of West Africa," (Brooks 1972:5). This drew men from the Five Towns to Freetown. They worked on the Company's ships and also engaged in manual labor.

4 In the literature on the Kru (Klao) and Grebo, *dakɔ* and *dake* are spelled in various ways, the variation occurring in the final vowel. Klao has—or had—ATR vowel harmony, a characteristic of Kru languages and, in the case of Klao, identical to that of Grebo as described by Innes (1966:14). Singler (1983, 2008) argues that the Klao vowel system is undergoing restructuring, shifting from a nine-vowel system to a seven-vowel system, with vowel harmony being lost as a consequence. The "old" and "new" versions of the singular form of *dakɔ* are identical, but the plural is in the process of changing phonetically from *dake* to *dake*, a flat-out violation of the vowel harmony system.

including agricultural labor, for the Sierra Leone Company and then for the colonial government that succeeded it. The men from the Five Towns established a Kru Town in Freetown.

The link between the term "Kru"/Kroo" and the Five Towns seems clear enough, as reflected in their names, but it should be noted that the names listed are the towns' English names. I am not aware of any explanation for the existence of these names. In the chart in (4), I present the English name for each of the Five Towns as well as the name of the town in Kru/Klao, as presented in Tonkin (1978-79) and Sullivan (1978):

(4) The Five Towns, with their English and Kru (Klao) names, the latter coming from two sources, Tonkin (1978-79: opposite p. 1) and Sullivan (1978:424-425).⁵

English name	Tonkin	Sullivan
Little Kru	Jirifà	Jlufaa
Settra Kru	Wètè	Wete
Kruba	Nìgbí	Nyigbi
Nanakru	Nyimbala	Nyimala
King William's Town	Weaou	Weao

Brooks points out that no group, either in the nineteenth century or the present day, calls itself 'Kru' in its own dialect. On the other hand, in the population in question, people do call themselves *klau* (or *kla*). As Breitborde suggests, there is reason to think that initially *kla/kra* and *klau/krau* referred specifically to those from the Five Towns (1976-77:110). Then, as other *dake* became involved with European ventures, they employed these terms as well. Whatever *klau*'s original referent was, there remains the question of where the term "Kru" comes from. The two liquids are allophones, and both are routinely used in this environment, i.e. as the second element of an onset cluster. Thus, the question is about the difference in vowels between "Kru" and "Klau." The received account (which I have no reason to challenge) has two parts. The first is that early Dutch navigators represented [krau] as <crow>. In Dutch, <ouw> represents [aw], and the Dutch transcription is close to the *krau* original, certainly as close as Dutch spelling could get to the actual pronunciation. The second part is that speakers of English misinterpreted the Dutch orthography and rendered Dutch <crow> as English <Kroo> or <Croo> or <Kru> (Davis 1976:2, Johnston 1906, vol. 1:84, 88). Moreover, the homophony of Kru and *crew* may extend still further. As noted, the Kru (Klao) call themselves *klau*. The word in *klau* for 'crew' is

⁵ Tonkin carried out her research in Sasstown, Sullivan in Greenville. The differences between the researchers' terms are to be explained at least in part by dialect differences.

likewise *klav*, as in *mɛ-klav* 'ship's crew' (Breitborde 1976-77:111). Thus, the Klao analogue of English Kru/crew is *klav/klav*.

As we have seen, the people of the Five Towns were only a part of what comprises the Kru/Klao ethnolinguistic group today. Nineteenth-century descriptions of the coastal region distinguished between Krumen (focusing on the Five Towns) and the Fishmen. The Fishmen were, as their name suggests, proficient fishermen, from the Gbeta and Kabor *dake*. Gbeta and Kabor were different from other *dake* in that each consisted of several dispersed communities located according to where the fishing was good. A third part of the population was the Bushmen, people who lived away from the coast. As noted, other coastal *dake*, including Gbeta and Kabor, followed the lead of the Five Towns in becoming involved with European trade. In time, so too did Bushmen. Speakers of Grebo languages to the southeast of the Kru/Klao also participated. The term "Kru Coast" was used as a reference to the source of Krumen, but its scope varied and expanded. Tonkin (2010) presents a map that displays four competing versions of it. In one, it refers to the area occupied by the Five Towns. In a second variant, it refers to the homeland of the Kru (Klao). It corresponds to the coastal part of the Kru (Klao) section of Liberia in Figure 1. The third is roughly equivalent to the Grain Coast, which in turn constitutes modern Liberia's coastline. Finally, what Tonkin terms the "Krooman Coast" extended from Monrovia to the Sassandra River in Côte d'Ivoire. This ambiguity of reference to the "Kru Coast" reflects the ambiguity surrounding the term Kru/Krumen.

As suggested by the growing territory covered by the term "Kru Coast," especially by what Tonkin designates the "Krooman Coast," over time the number of "Krumen" increased vastly, and their provenance expanded, into the interior (including people who today would be considered Bush Grebo or Krahn) and northward along the coast to include Bassa and, in smaller numbers, Vai (Mande) and Gola (Atlantic). Whatever their actual ethnicity, the mariners and migrant workers were called Krumen.

Across the nineteenth century and into the twentieth, the geographic range of their employment grew as did the scope of the jobs they held. Schwartz observes: "Ainsi, à partir de 1830, les Kroumen sont associés à la quasi-totalité des entreprises européennes, sur la côte africaine et dans le monde tropical" (1980:153). He details the remarkable range of their activities, including working on British sugar plantations in the Caribbean after the emancipation of the enslaved population had created a labor shortage (cf. Wood 1981), helping to build the Suez Canal, and working on the ill-fated French attempt to build a Panama canal (Kuhn 1975). Schwartz also notes that in 1873 there were 2,000 Krumen employed on the Bays of Benin and Biafra in palm oil production. Work in British colonies in West Africa became a major source of employment for Krumen. Martin (1982)

states that, prior to World War I, Nigeria was the primary location for Kru labor. After World War I, this shifted to the Gold Coast. Krumen were domestic servants for the British, they built and then manned the port at Sekondi-Takoradi, they worked on the railroad, in the gold mines, and on cocoa plantations. They were night soil collectors in Accra and elsewhere. The Krumen's presence was tied to the British presence.

When colonialism ended and the Krumen returned home, the local workers who replaced them were, with one exception that I am aware of, not called Krumen. That exception involved night soil collection. An Akan colleague told me that in his village the night soil collectors now came from Northern Ghana but were still referred to as Krumen.

Although I noted above that there were some Vai and Gola (speakers of a Mande and an Atlantic language respectively), the preponderance of Krumen were in fact speakers of some Kru language. Since they were known as "Krumen," it is not surprising that early linguists called the set of languages spoken by the Krumen "Kru," whether they were in fact speakers of Kru (Klao) or not. Koelle (1854) presents five Kru languages in *Polyglotta Africana*: Dey, Bassa, Kru (Klao), Grebo, and Gbii (as noted above, closely related to Bassa and considered to be a part of Bassa in the Liberian government's assignment of ethnicity).

4. Language and Ethnicity in Southeastern Liberia

The government's recognition of sixteen ethnic groups manifested itself in the government's inclusion of them in the list of ethnic affiliation in the 1962 census. Earlier I made reference to *dake* and made the point that they were the fundamental units of ethnicity for residents of the southeastern region, the home of the Kru (Klao), Grebo, and Krahn. McEvoy (1977) argues that in Liberia's southeastern region the government **imposed** overarching ethnic groups. Arguing against the government's assumption of ethnic homogeneity within each of these, he says, "There is no *single* 'Grebo' tribe. . . Neither is there a *single* 'Kru' tribe nor a *single* 'Krahn' tribe" (66, emphasis in the original).

McEvoy proposes that these larger units (as opposed to the level of the *dake*) emerged outside a group's homeland. In the context of Krumen working along the West African coast, "the combination of processes of 'lumping together', by others, and the 'coming together' of the migrants themselves led to the emergence of a 'Kru', and perhaps later, a 'Grebo' ethnicity among Kru- and Grebo-speaking migrants in locations outside the Kru-Grebo homelands" (68, emphasis in the original). Their sense of being "Kru" (specifically Kru/Klao) evolved from how others saw them and how, over time, they came to see themselves—this description embodies

Fishman's point introduced earlier as to the role of phenomenology in defining ethnicity.⁶

McEvoy locates "such places as Freetown, Monrovia, or Accra" as the sites where Kru (Klao) and Grebo ethnicity emerged (68). Sullivan makes similar comments. Speaking of the late twentieth century, she writes, "It is only in an urban context such as Greenville [the county seat of Sinoe County], Monrovia, or a foreign concession, that one would use the term Kru to identify oneself, in particular to distinguish oneself from other ethnic groups in Liberia. That is, one is Kru in terms of **not** being Krahn or Bassa or Vai" (1978:27, emphasis in the original).

Insofar as the orientation of the present paper is toward urban Liberia and western-leaning scholarship, these ethnic groups—the government's sixteen—are more directly relevant than the *dako*-level ethnicity of the groups' homelands.

5. A Name for the Set of Liberia's Kru Languages

5.1 Kru qua Kwa

We have seen that a term associated at the outset with individuals from the Five Towns became a term that referenced a particular set of occupations. If the term no longer bore a direct association with a particular ethnolinguistic group, it was still the case that most of the Krumen were speakers of some Western Kru language. Thus, the transformation was from ethnic to occupational, but it was also from one language and ethnic group (the Klao of Five Towns) to a range of occupations and a range of related languages. This brings us back to the original question: why do people refer to the set of Liberian Kru languages as Kwa?

This is not something that academic linguists do. I am only aware of a handful who have published on Liberian Kru languages in recent decades, but each of them has referred to the language group as "Kru." Nonetheless, the use of Kwa for Liberian Kru languages and ethnolinguistic groups endures among other social scientists. Sawyer (1992), as I noted above, and also Moran (1990) cite Greenberg (1963) but make no reference to subsequent modifications to Greenberg's classification. The lone non-linguist whom I have found who acknowledges work on classification subsequent to Greenberg is the historian George Brooks in his 1993 book, *Landlords and Strangers*. As part of his discussion, Brooks presents a slightly modified diagram of Bennett and Sterk's (1977) re-organization of Niger-Congo.

⁶ By all accounts, this Fishman was neither Gbeta nor Kabor.

⁷ Frances Ingemann is an exception. I discuss her contribution below.

In 1990, I published an article in the *Liberian Studies Journal* on recent developments in linguistics pertaining to Liberian languages. The opening paragraph of that article cites Vogler (1974), Welmers (1977), Bennett and Sterk (1977), and Marchese (1979, 1986) in asserting that the Kru languages are not part of Kwa. Brooks (1993) acknowledges my comments about the Kru branch not being Kwa and about the uncertainty as to where Kru languages fit in Niger-Congo, but I am not aware of any other scholar ever having done so. Three years after my article, the *Journal* published an article that took the use of "Kwa" one step further. In that article, Burrowes labels the Liberian coast from the Cestos River to Cape Palmas the "Kwa Coast" (1993:231ff). The Cestos River being the boundary between the Bassa and Kru (Klao) ethnic groups, this stretch of coastline corresponds roughly to what Tonkin labels "Kru speakers," i.e. the homeland of the Kru [Klao] [2010:103].

Two decades after my *Liberian Studies Journal* publication, at the 2010 meeting of the Liberian Studies Association, held at Temple University, I tried again. I gave a paper entitled "On the classification of Liberia's languages." In it I point out that that "Kwa" had originated with linguists and that linguists had now determined that the term did not properly apply to Kru languages. A few hours before my talk, I was near the registration desk when a participant in the conference came out of the auditorium where it was taking place and demanded to see the local organizer. The scholar announced that she was Grebo. The Grebo, she said, were Kwa, and—like their fellow Kwa, the Yoruba—the Grebo were great warriors. Therefore, she was not to be trifled with. I had heretofore assumed that the primary motivation for scholars' perseverant use of Kwa to characterize Liberia's Kru languages had simply been that scholars were unaware of developments in the classification of African languages after Greenberg, or, if not unaware of those developments, then indifferent to them or uncertain what to make of them. As the Grebo scholar/warrior showed me, there is sometimes a proud assertion of a link to the Yoruba. (Those who assert the Yoruba connection are apparently unaware that not only Liberia's Kru languages but also, in, for example, Williamson (1989), Yoruba and Igbo and their congener languages have likewise been escorted out of Club Kwa, in their case into Benue-Congo).

I understand the Grebo scholar's desire to align herself with the Yoruba, specifically with legendary Yoruba warriors. After all, within linguistics, like Bamgbose and Awobuluyi before him, Akinbiyi Akinlabi is a legendary warrior. I say this with regard to his attention to phonological theory, his scholarly rigor, and his intellectual energy. To these should be added his work on undocumented languages. Further, I have seen firsthand his efforts on behalf of the African Linguistics School. His integrity and his concern for the well-being of participants, most especially students, have been vital to the success of the ALS.

However, as I was to discover (and no doubt should already have understood), neither lack of knowledge about language classification nor a desire to assert kinship with the Yoruba tells the whole story.

St. Mary's Roman Catholic parish on Monrovia's Bushrod Island started out with a church by the Duala market, just on the edge of New Krutown. (The "Kru" in Krutown refers to the Kru [Klao].) However, the parish outgrew the edifice, in part because of the meteoric growth of Monrovia after Liberia's civil war ended in 1996 and especially during and after the fighting in 2003. A new church, Our Lady of Lourdes, was built for the parish at Tweh Farm, further out on the Island. While the parish is still Kru[Klao]-dominant, other ethnic groups are now also active in the church, most prominently the Kisi (Atlantic) and Kpelle (Mande). There are six choirs in the parish: the primary choir, the youth choir, and the children's choir all sing in English, and the Kru (Klao), Kisi, and Kpelle choirs sing in their languages. At the 8 o'clock Mass on Sunday, the Gospel is read in English and then in Kru (Klao); the same is done at the 10 o'clock Mass with Kisi and at 12 o'clock with Kpelle. Organizations within the church meet once a month after the 10 o'clock Mass. This is when the parish council, the ushers' guild, the women's organization, and the Knights and Ladies of Marshall, among others, hold their regular meetings. In addition, there are four identity-based groups that meet on an ad-hoc basis after the 10 o'clock Mass in order to undertake projects to benefit the parish, e.g. to provide new chairs for the parish hall. The four groups are the Kisi, the Kpelle, the Nigerians, and the Kwa. Using the designation "Kwa" brings in not just the Kru (Klao), but also the Bassa, the Grebo, and the Krahn. In my description of the liturgy and activities of the church, each instance where I have written "Kru (Klao)" is one where Comfort Swen Toe, president of the ushers' guild, used "Kru" in detailing them for me, e.g. the Kru choir, and someone reads the Gospel in Kru. It is clear that announcing a meeting after Mass of "the Kru community" or even "the Kru communities" would bring in the Kru (Klao) and nobody else. Using "Kwa" rather than "Kru" signals that the meeting is not just for the Kru (Klao) but for the Bassa, Grebo, and Krahn as well. When fundraising is involved, it is always a good idea to cast a wide net.

Disambiguation has practical consequences in churches and other organizations. It is also a desirable practice in academic writing. Thus, the use of Kwa to encompass the entire set of Liberian Kru languages has the virtue of distinguishing between (1) the whole set and (2) Kru (Klao). Although I would not say it occurs frequently, there are instances where a scholar confuses the two, as seems to have been the case for Adebajo (2002:21): "Most of these groups [the "usual" sixteen] had ethnic clansmen in neighboring states: Mende, Gola, Kissi, and Vai also resided in Sierra Leone; Loma, Kpelle, Mandingo, Mano, and Gio in Guinea; and Grebo, Kru, and

Krahn in Côte d'Ivoire." There are Kru languages in Côte d'Ivoire, but the Kru (Klao) are not there.

5.2 Kru qua Kruan

Frances Ingemann, a linguist at the University of Kansas and a consultant to The Institute for Liberian Languages, proposed a solution. In the opening paragraph of a paper delivered in 1972 at the Mid-American Linguistics Conference at Oklahoma State University and published in 1973 in the conference proceedings, Ingemann states: "Within Liberia and the Ivory Coast there is a group of languages which are usually called Kru. Because one of the languages within the group is also called Kru, I propose to avoid confusion by referring to the group as Kruan and retaining the name Kru only for the language" (1973:108). Ingemann provides no further arguments in support of her proposal, but then no further arguments are needed. She has stated the one overriding reason for the change she proposes: to remove confusion. Dialect surveys and other relevant publications from TILL immediately made the shift. In 1979, at the First International Conference on Kru Languages, held in Abidjan, Ingemann proposed the adoption of "Kruan" to designate the language family. She explained that she had proposed the *-ansuffix* based on its use in Amerindian linguistics to distinguish languages from the families that contained them, e.g. Iroquois/Iroquoian, Sioux/Siouxan, Chinook/Chinookan. Those present at the Abidjan conference rejected her proposal with little discussion. A majority of those present were linguists and missionaries who worked on Ivoirian Kru languages. They worked on "les langues kru," but, as I have indicated, there is no individual language in Côte d'Ivoire named "Kru." Hence, ambiguity wasn't *their* problem.

Kruan has now achieved some acceptance beyond the TILL sphere and is used by other Liberianists. However, Kwa also continues to be used with reference to Liberian Kru languages. I did a count to gauge the comparative frequency of each of the three possibilities, i.e. Kru, Kwa, and Kruan. I looked at all 49 issues of the *Liberian Studies Journal* from 1988 to the present, I worked my way through the Liberia-related books in NYU's library, and did searches on Google. I tried to ensure that my methods of finding materials online did not favor one of the candidates. In all, I found 49 articles or books that had one or more references to Kru languages as a group. "Kru" as a term for the Kru branch was much less common than the other two. "Kwa" was used about twice as often as "Kruan." With either term, the group being referred to was almost always Liberian Kru languages rather than the entire set of Kru languages.

In looking at the uses of "Kwa," "Kruan," and "Kru," I searched for distributional regularities, but none appeared. The three terms are used in

the same contexts. Also, I did not see evidence of any quantitative changes over time. I did notice that the set of "Kruan" users included some prominent Liberianists, as did the set of "Kwa" users. Also, some authors used two out of three, presumably to assist the reader who might know one of the terms but not the other, by establishing their equivalence, as the following authors do:

the area where the Kruan/Kru languages are spoken (Tonkin 2010:104),

the Kruan-speaking (or Kwa) peoples of the south (Moran 2013:30),
Bassa people are part of the Kwa (or Kru) linguistic group (Chukpue-Padmore 2014:61).

6.0 Conclusions and Recommendations

From the point of view of linguists, the use of "Kwa" to describe languages that are not Kwa is unsatisfactory. It is true that, in the sample of publications that I examined, those who used Kwa were not likely to have any point of reference to the "real" Kwa languages. However, drawing on Greenberg's schema, two authors say that Kwa extends from Liberia east to the Niger Delta (Sawyer 1992, Sundiata 2003). So long as "Kwa" is used for Liberian Kru languages, the danger of confusion or warrior appropriation lurks. The primary problem with "Kruan" is that it has come to mean "Liberian Kru languages and ethnolinguistic groups," not "the entire set of Kru languages and ethnolinguistic groups." Those who study Ivoirian Kru languages and ethnolinguistic groups have continued to use "Kru" (or the equivalent "Krou"). If Kruan is employed only in Liberia, this entails that the Kru branch of Niger-Congo consists of Liberian Kruan and Ivoirian Kru languages. This division obscures the instances where a language either in the Grebo complex or the Guere [Krahn] complex has dialects on both sides of the border. My own preference is to use the term "Kru" for this branch of Niger-Congo, but, because of the overlap between Kru (the set of languages) and Kru (Klao), this seems doomed. I tried to come up with an alternative—in the spirit of created linguistic terms like "Bantu" (the class 2 human plural marker plus the word for 'person') or "Gbe" (the common word for 'language or dialect'), but I did not find a suitable shared form. Because "Kwa" represents the misappropriation of an existing term while "Kruan" is *sui generis*, I have come to favor the use of "Kruan" over "Kwa" by social scientists generally.⁸ However, I won't be taking "Kruan" to church. Rivalry among Kru-speaking ethnolinguistic groups can be intense, just as rivalry between *dake* can be intense and rivalry between *pāt5* 'patriclans' (the term is represented in English in Liberia by 'quarters') within a *dakɔ* can be intense. "Advantage" in the sense of 'unfair or unmerited advantage' is heavily

⁸ Prior to writing this paper, I would have said that neither was acceptable. I now have come to accept "Kruan" as the lesser of two evils.

policed. The first syllable of "Kruan" privileges the Kru (Klao). It's as if someone was saying *kru dem*. On the other hand, "Kwa" gives no one an advantage. Until Liberian churches replace Mass with sessions devoted to the mass comparison method, the godly and the academic are sufficiently removed from each other that a confusing collision between book people and God people seems unlikely.

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Documenting Oral Media in African Languages as a Tool for National Development¹

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Abstract
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Keywords: oral media, language documentation, traditional language resources, national development

1 Introduction

The African continent is a linguistic paradise. It contains more languages than any other continent. Over 2,000 of the world's estimated 6,700 languages are spoken in Africa (Grimes 1996, Bamgbose 2011) by over 400 million people. This language total is not certain as many language areas in Africa remain inaccessible or have not been accessed at all. Even though this number may well be an underestimate, it represents nearly one third of the world's languages. Very few of these languages are spoken by large populations and more than 1,800 of them are minority languages (Batibo 2009). Amongst the major languages, a few such as Hausa, Fulfulde and Kiswahili are spoken in more than one country. With Africa being the home of almost one third of the world's languages, it is not surprising to discover

¹ This is a revised version of a paper presented at the 18th Annual Conference of the African Council for Communication Education (ACCE), held at the University of Port Harcourt, October 26 – 29, 2016. The author is grateful for helpful comments from participants at a parallel session led by Prof. G. B. Okon.

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Documenting Oral Media in African Languages as a Tool for National Development¹

Ebitare F. Obikudo

Abstract
In African rural societies, many aspects of life are transmitted from generation to generation via spoken language usually through some form of oral media such as town crying, folklores, songs, narratives, dances, rites of passage, etc. Many forms of African oral media are today threatened by such factors as migration, education, religion, contact with 'prestigious' languages and urbanization that lead to lack of use and eventual loss of the associated vocabulary and practices. One way of preserving and developing oral media is by documenting language as expressed in its oral culture. Language documentation aims at providing a long lasting record of the linguistic and cultural practices of a people so that it can be used for a myriad of purposes (Himmelman 2006, Austin 2010). This paper posits the documentation of oral media, which is the traditional form of communication in African societies, as a tool useful for creating traditional language resources, preserving the cultural and linguistic heritage of the people and arousing both local and international interests; towards the development of the indigenous languages that in turn can enhance national development.

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1 Introduction

The African continent is a linguistic paradise. It contains more languages than any other continent. Over 2,000 of the world's estimated 6,700 languages are spoken in Africa (Grimes 1996, Bamgbose 2011) by over 400 million people. This language total is not certain as many language areas in Africa remain inaccessible or have not been accessed at all. Even though this number may well be an underestimate, it represents nearly one third of the world's languages. Very few of these languages are spoken by large populations and more than 1,800 of them are minority languages (Batibo 2009). Amongst the major languages, a few such as Hausa, Fulfulde and Kiswahili are spoken in more than one country. With Africa being the home of almost one third of the world's languages, it is not surprising to discover

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that no African nation is monolingual. Rather, what we find are languages of varying status existing side by side.

According to Emeka-Nwobia (2015:115), "language holds the power to maintain national and cultural identity". In other words, every nation is identified by its language (or languages) and culture. It only makes sense that if one has to develop a nation, its language and culture must be developed. When one speaks of development, the images that quickly come to mind are those that pertain to transformation, growth, progress, advancement, and improvement. For a society or a nation, development should be all-embracing, encompassing every facet of a people's lifestyle which includes language development, economic development, educational development, social development, technological development, political development, etc. Development is a process that involves putting in place policies, infrastructure and resources that are capable of raising living standards, improving the quality of human lives, and maintaining self-esteem and freedom (Topadro and Smith 2011). Development is thus people-oriented and the medium by which information that enhances standards of living is communicated to people is via language. Therefore language and communication are essential components for the advancement of any society. This means that development cannot be achieved without a channel of communication for it is necessary that the transfer of knowledge, skills, resources and information that propel progress must be communicated to the people via a medium. There can therefore be no meaningful development without language.

Language is a key factor in the development of African nations because it enhances the participation of citizens in national development (Bambgose 2000, Ndhlovu 2008, Kanana 2013). Since the African continent is a multilingual state hosting both indigenous and foreign languages (as a result of colonialism), the question we should ask ourselves then is, in what language should the transfer of knowledge, skills, resources and information that propel progress be passed on to the people – in their indigenous language or in a language that is foreign to them? Kanana (2013) posits that development is slow in Africa because important communication is transmitted in foreign languages (usually the language of colonialism and prestige) and this hinders effective interaction between the parties involved in the development process, (who are speakers of indigenous African languages) as participation of all citizens cannot be fully utilized. In her words, "we need to acknowledge that all the world's developed countries have developed on the basis of their national languages, as they have adapted and integrated technology within their cultural and social values thus reaching all the people in their countries" (Kanana 2013: 49). According to Mazrui (1999), "no country has ascended to a first rank technological and economic power by excessive dependence on foreign languages". Every form

of advancement, be it educational, economic, political, social, technological, etc., can only succeed within the cultural and linguistic framework of the nation or society in question. Therefore, this paper advocates that development strategies in Africa should be based on indigenous languages. One way to exploit the potentials of indigenous languages for national development is via language documentation.

1.1 Defining language documentation

Language documentation is an emerging field in linguistics. Also known as documentary linguistics, it arose out of a need to address language endangerment. Its aim is to provide a comprehensive and lasting record of the linguistic practices of a speech community in such a way that it can be used for a myriad of purposes (Himmelman 2006). According to Boerger et al. (2016:1), "Language documentation is about creating a record of the language and culture of a human community that will outlast the individual memories of those creating it". It involves "working directly with members of speech communities in their home environments to compile an audio-visual record of their linguistic and other cultural practices" (Boerger et al. 2016:2). It is linguistic field work that is done in, with, for and in some contexts, by the speech community.

Language documentation is "achieved by systematic recording, transcription, translation and analysis of a variety of spoken (and written) language samples collected within their appropriate social and cultural context" (Austin 2014:60). Language data so collected should be digitally archived and made accessible to interested persons. The collection, analysis, preservation and dissemination of documentary records has been enhanced by advancements in information, media, communication and archiving technologies of which documentary linguistics is a beneficiary. As such, multimedia products derived from various computer-based genres should form part of the documentary records created. Information technology is thus a vital component in documenting languages (Nathan 2006).

2.0 African societies: an indication of orality

Generally, African societies have a predominant oral culture and lack a tradition of literacy. In other words, many aspects of life are transmitted from one generation to the next via spoken language usually through some form of communication media such as town crying, folklores, songs, narratives, dances, rites of passage, etc. Orality forms the bedrock of the traditional system of communication in African societies which is "instrumental in the mobilization of people at the grass root level for community development ... and other communication purposes leading to group and national cohesiveness" (Wilson 1987:87). However, many forms of African oral media

are today threatened by such factors as migration, education, religion, contact with 'prestigious' languages and urbanization that lead to lack of use and eventual loss of the associated vocabulary and practices. Documenting African oral media is a vital key to preserving and developing its oral culture. Such efforts will add value to the language and the speech community. Some features or characteristics of oral media (also known as oramedia) include the fact that:

1. They are inexpensive and readily available within the speech community. Many of the objects such as drums, pieces of cloth, leaves, cowries, etc. can be found within the community and in cases where they have to be made, there are usually people in the community that can make them.
2. They are usually characterized by a face to face kind of communication.
3. They are culturally transmitted.
4. They may be verbal or non-verbal. Verbal communications involve practices that are transmitted by word of mouth while non-verbal communications include signs and symbols, objects or instruments and body gestures.
5. They are native or indigenous to the people who associate with them as part of their cultural identity.
6. They are communal practices and so involve the whole community.
7. They portray and reinforce the value system and ethical conduct of the community (Ugboajah1982, Salawu 2015).

These indigenous means of communication have been in existence for generations and reflect the cultural values and traditions of the people. They constitute part of the identity of the people and so are indispensable components of the culture useful for transmitting information, educating and shaping social behaviour. In the words of Osho (2011:1), "oramedia are highly effective in the dissemination of information among the peoples of Africa". For instance, among the Malawi Tonga, folktales were taught in junior primary schools as a strategy to communicate development and inculcate the right social values in the children. "Children were taught in their own languages, read local literature with local content in local languages" (Manda 2015:608). This was during the British colonial era. It is however evident that various forms of oral communication in many present-day African societies are endangered due to lack of use; the result of which would be an eventual loss of the vocabulary associated with these practices. For instance, among the Nkqorq, an Eastern Ijo language group in Nigeria, the female initiation rite into womanhood known as *qbokq* is hardly practised². Among the Ikwerre people (Ikwerre is an Igboid language spoken

²This was observed by the author during her field trips to Nkqorq town while working on a project documenting Defaka and Nkqorq.

in Rivers state, Nigeria), palm wine tapping is an endangered activity and so is the associated vocabulary³. Documenting African oral media is thus a vital key to preserving and developing its oral culture. Such efforts will add value to the language and the speech community.

2.1 Documenting African oral media

The need to digitize African oral media in this age of rapidly evolving technological advancements cannot be overemphasized. Documenting oral narratives provide "excellent materials not only for dictionaries and linguistic analysis but also for stimulating writing and reading in the language" (Soto 2010:87). Oral media documentation as proposed in this paper entails creating traditional language resources from the oral culture of a people. Traditional language resources in this work refer to the linguistic materials associated with the cultural practices of a people that may be derived from traditional modes of communication (i.e. oral media). 'Traditional' in this sense is different from Childs, Good and Mitchell (2014) where it refers to the norm expected of most language documentation projects that lead to the production of dictionaries and grammars. The activities that characterize oral media documentation should be carried out with the aim of creating traditional language resources. Examples of language resources that may result from oral media documentation include; *Texts*: specialized lexicons, encyclopaedias, primers, storybooks, anthologies and other literary works.

Multimedia products: interactive encyclopaedias, multimedia thematic dictionaries, annotated audio-visual recordings, digital pictures, computer games, etc.

Documenting oral media does not in any way discourage the oral cultural practices of the people. Rather, in addition to a tradition of orality, it encourages a tradition of literacy and digitization. Oral media documentation involves the following activities:

- a. Systematically collecting language data that portray the oral culture of a people in a variety of contexts.
- b. Transcribing, translating and annotating linguistic data with the aid of annotation software such as Transcriber, Toolbox, FLEx, We say, ELAN, Praat, etc.
- c. Audio and video recording of data. (Digital pictures of recorded data should also be taken).
- d. Recording metadata about the documented data.
- e. Interdisciplinary research collaboration (e.g. linguists, communication experts, musicologists, oral literature experts, film and theatre professionals, etc.)

³This information was gotten through personal communication with Dr. R. I. C. Alerechi at the University of Port Harcourt.

- f. Community participation.
- g. Creating digital resources as part of the documentation.
- h. Creating websites that will host the language resources. The purpose of the websites should be "primarily cultural and secondarily linguistic" (Columbia 2012:160).
- i. Sourcing for grants to fund the documentation project.

It is important to note that any form of language documentation does need some amount of funding to cover expenses that range from buying recording equipment, travelling expenses, remuneration for native speakers to website hosting. All well-known granting bodies that fund documentation projects are either from Europe or North America. It is sad to note that African governments and organisations have not been involved in funding language documentation. Some of the granting bodies and their websites are listed below:

1. National Science Foundation (NSF), USA

www.nsf.gov

2. Endangered Languages Documentation Programme (ELDP) at the School of Oriental and African Studies (SOAS), UK.

www.eldp.net

3. Volkswagen Foundation DoBeS Project, Germany.

<http://dobes.mpi.nl>

4. Endangered Language Fund (ELF), USA

www.endangeredlanguagefund.org

5. Foundation for Endangered Languages (FEL), UK

www.ogmios.org

6. Fire Bird Foundation for Anthropological Research, USA. The Firebird Foundation provides fellowships for the documentation of oral literature and traditional ecological knowledge.

www.firebirdfoundation.org

2.1.1 Types of African oral media for documentation

Oral media include all forms of verbal and non-verbal communication practices traditionally used in African communities to transmit information to members of their speech community. It includes all activities involved in African traditional face to face communication. Some of these are:

- i. Songs – dirges, lullabies, ceremonial songs, praise singing, etc.
- ii. Poetry
- iii. Proverbs
- iv. Dances and pantomimes
- v. Initiation rites – rites of passage into manhood & womanhood, coronation rites, burial rites, etc.
- vi. Folktales
- vii. Myths

- viii. Traditional herbal medical practices
- ix. Migratory history
- x. Procedural narratives – how things are made (e.g. basket-making, blacksmithing, hunting, farming, fishing, food preparation, palm wine tapping, etc.)
- xi. Town crier practices
- xii. Talking drum
- xiii. Masquerades
- xiv. Village square/market square/town hall meetings
- xv. Signs and symbols – native chalk, palm fronds, cowries, certain colours of cloth, etc.
- xvi. Festivals – fishing festivals, new yam festivals, etc.

Some pictures of oral media documentation are shown below. The pictures were collected as part of the 'documenting Defaka and Nkqorq project' sponsored by an NSF grant (no. 0553971) which was awarded to Akinbiyi Akinlabi and Bruce Connell. Defaka and Nkqorq are two Ijoid languages spoken in the Niger delta region of Nigeria.

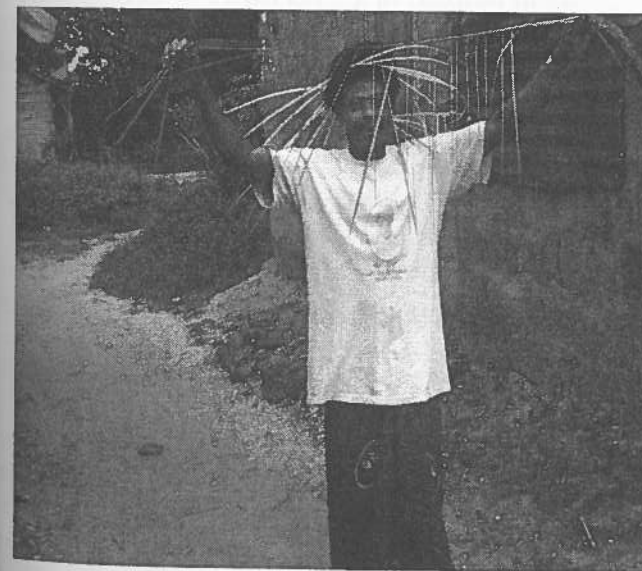


Fig. 1: Burial rites among the Defaka (Ijoid, Nigeria)

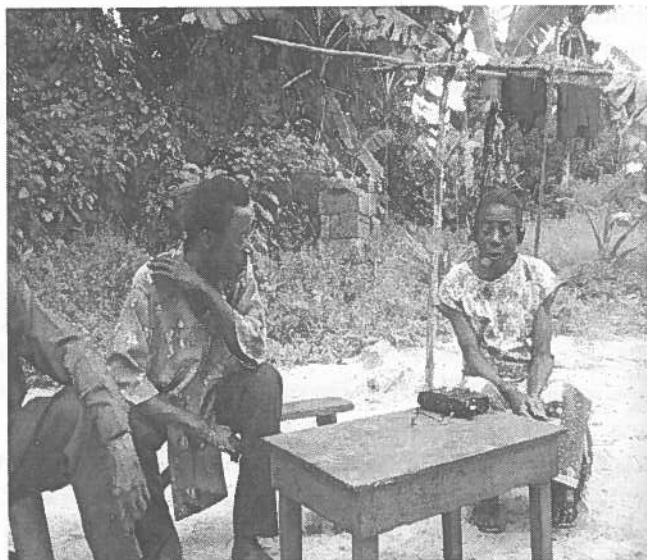


Fig. 2: Folktale narration among the Defaka

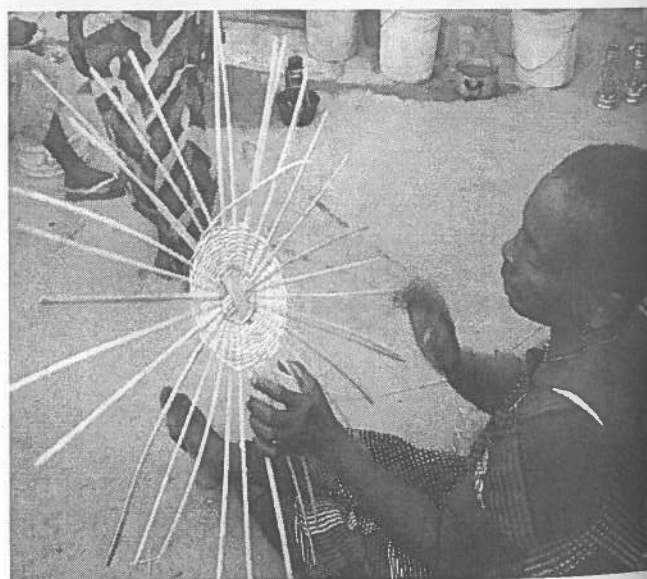


Fig. 3: Basket making among the Nkqorq (Ijoid, Nigeria)

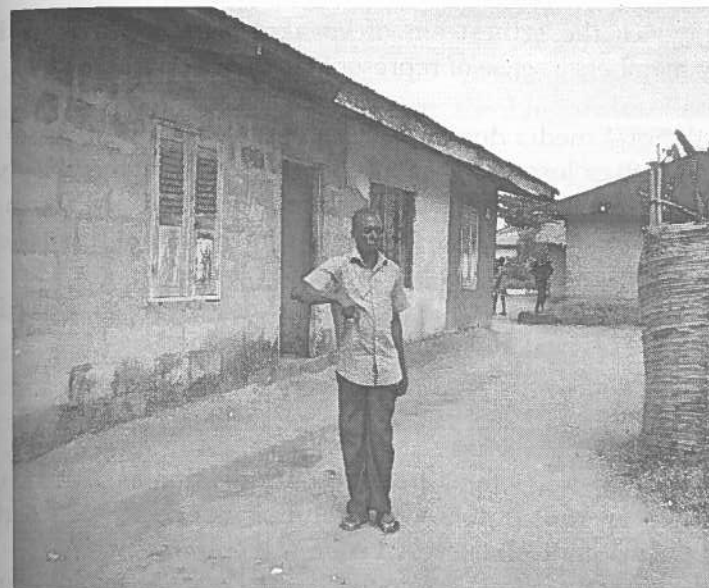


Fig. 4: Town crying at Nkqorq town

3.0 The role of oral media documentation in national development

There are many ways in which oral media documentation can aid national development. This is achieved mainly through language development activities. While collecting language data, language documenters can get involved in corpus planning through: terminology development, orthography development, graphization, etc. One of the immediate results of engaging in oral media documentation is that participation by both members and non-members of the speech community is encouraged. Such participation fosters communal and national identity and unity.

Oral media documentation also facilitates the development of literacy materials such as specialized dictionaries, user-friendly texts, story books, primers, etc. Such language resources encourage literacy in the language, increase the amount of data available in the language and provide additional domains of use. As a result, the status of the language is elevated thereby enabling language empowerment.

The creations of linguistic websites that host oral media documentation resources provide global visibility for the language. This can arouse both local and international interests. For instance, as a result of being part of the 'documenting Defaka and Nkqorq' project which is hosted on a website⁴, I have received calls and emails from people in Nigeria and outside Nigeria who were interested in the work we were doing. In addition, global

⁴<http://defaka.rutgers.edu>

visibility elevates the self-esteem of speakers of the language by giving community members a sense of representation in the digital world.

Lastly, oral media documentation can aid revitalization in the event of language death or loss and vocabulary loss. A language may be viable and still experience loss of aspects of its vocabulary that are associated with practices for which its speakers are no longer engaged. This is usually the case when a particular cultural practice is no longer in use. The associated vocabulary is lost. However, if there are documentary records of this practice, it can be revived and its vocabulary sustained.

4.0 Conclusion

It is worrisome that a vital aspect of our identity as Africans is being threatened by numerous factors. Oral culture is not peculiar to Africa. Many of the epic poems and folktales of Western literature such as *The Iliad* and *Odyssey* in Greek, *Beowulf* in Old English, *Hansel and Gretel* in German, were handed down for centuries as traditional oral literature before they were documented in writing (Boerger et al. 2016). If these aspects of European culture could survive for centuries until they were taught to Africans in schools because they were written, how much more would African oral media be preserved with the aid of digital technology if they are documented. Not only would documentation preserve this form of communication, it would also aid the development of the indigenous languages, the speech community and the nation at large.

5.0 Recommendations and suggestions

The following recommendations that will aid oral media documentation are suggested:

1. African researchers especially in such fields as linguistics, communication studies, music, theatre and film studies, etc., should form collaborations that would engage in oral media documentation with the aim of creating traditional language resources.
2. Research collaborations should involve the participation of members of the speech community.
3. African governments should dedicate funding to document indigenous languages.
4. Private and non-governmental organizations (such as banks, telecommunication companies, manufacturing companies, etc.) based in African countries should be encouraged to fund oral media documentations especially in the communities where they carry out their economic activities.
5. Academic Linguistics bodies in various African countries (such as the Linguistics Association of Nigeria, Linguistics Association of Ghana,

etc.) should drive the helm in sourcing for funds to organize training workshops and summer schools in language documentation methods. It is worthy of note that the Linguistics Association of Nigeria (LAN) in association with the National Educational Research and Development Council (NERDC) and with support from the Council for the Development of Social Science Research in Africa (CODESRIA) recently organized a training in language documentation for doctoral students in linguistics, early career researchers, language activists and community members.

6. Language documenters should strive to create and digitize as much language resources as possible such that these resources are accessible for the development of the languages in which they are created. Such resources as primers, story books, anthologies, dictionaries, etc., can be used for teaching indigenous languages in schools.

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Linguistic Genocide against Development of Indigenous Signed Languages in Africa

Emmanuel Asonye, Mary Edward & Ezinne Emma-Asonye

Abstract
The UN 1948 Convention on Linguistic Genocide did not expressly consider the gradual but continuous suppression of minority languages and cultures by a superior one and/or the authorities, which has been the situation with, not just the spoken languages as has been emphasized in literature, but the signed languages in Africa. However, the Convention's definition of 'genocide' includes "...destroying in whole or part, or of preventing preservation or development." Significant number of African signed languages are said to have originated from American Sign Language ASL (Asonye, 2016), a few others have their bearing from British Sign Language BSL and French Sign language LSF (Nobutaka, 2004). Some of these African signed languages are still threatened or at least influenced by their foreign "parent languages" till this day. While the indigenous African signed languages are struggling to emerge, and develop, the undue influence of their foreign counterparts continue to suppress the languages, delude the users, learners and even teachers of the languages.

Edward (2015a) and Asonye (2016), both have reiterated the gradual endangerment of signed languages used in Africa, which is claimed to be caused by contact with spoken languages, local laws, formal education, and other post-colonial ideologies. Thus, these signed languages are gradually being battered by social and educational policies. Apart from village sign languages, many African countries can also boast of national sign languages.

This paper argues that the Africa's deaf communities are rich in signed languages which are sustained by several socio-cultural factors including the obvious lack of linguists' interest to study signed languages, and have been under the continued attack of the colonist languages and cultures considered superior because they are documented and largely studied. It also seeks to demonstrate patterns of the effects of linguistic genocide on signed languages in Africa and their users. Examples are drawn from the signed languages used in selected deaf communities in Nigeria and Ghana. A multidisciplinary approach was used in the data collection and analyses, which includes simple questionnaires and interviews from deaf individuals, deaf educators, and signed language instructors. A large corpus of indigenous signed language items were also collected from different deaf communities and were analyzed and findings show that these signed languages have developed unique structural features distinct from the ASL, Signed English or any other imposed signed language.

1.0 Introduction

A number of African signed languages are claimed to have originated from American Sign Language ASL (Asonye, 2016; Nyst, 2010) and others have their bearing from British Sign Language BSL and French Sign language LSF (Nobutaka, 2004). The undue influence on some of these African signed languages by the foreign languages is felt till this day. The influence is mainly through "borrowed" materials of the parent signed language that are used in teaching in schools for the deaf. The lack of print materials in most signed languages used in these Deaf schools is a major reason for relying on foreign materials, especially when the signed language of education is a product of a foreign signed language. Whereas this influence is mainly on signed languages of education used across African communities, there remain another "battle" on local signed languages.

Local or indigenous African signed languages are found in many African communities (Nyst, 2010). In Ghana, Adamorobe Sign Language (AdaSL) is a village signed language that is used in Adamorobe, a village with a high rate of genetic deafness (Nyst, 2007, Edward, 2015a). Nanabin Sign Language (NanaSL) is a home sign system developed by a family in Ekumfi (Ghana) with a high rate of genetic deafness (Nyst, 2010). Bura Sign Language is a village sign language used in Bura, an Hausa community in North-East Nigeria (Blench & Warren, 2006). Maganar Hannu also known as Hausa Sign Language is local sign language that is used in Kano State in Nigeria (Schmaling, 1997). Village signed languages develop within small communities or villages with a high incidence of hereditary deafness (Meir et al. 2010) and home signs are usually used by families with recorded deafness affecting two or three generations. Both village sign languages and home sign systems are products of local communities and are therefore indigenous legacies. Most indigenous African signed languages are older than the foreign based signed languages and an example is AdaSL which is older than Ghanaian Sign Language (GSL). Okyere & Addo (1994) record that co-existence between Deaf and hearing people at Adamorobe dates back to the year 1733, and this implies that AdaSL begun in the 18th Century. GSL on the other hand was introduced in the 1960's through the effort of Andrew Foster. Thus, whereas, many foreign based signed languages in African countries are through the effort of Andrew Foster [1], indigenous signed languages are community legacies and most times no individual can claim ownership.

The use of indigenous signed languages in Africa dates back to the transatlantic slave trade where it was identified that the deaf people used gestural resources to communicate (Miles, 2004). Apart from the signed languages of education, village and home signs have been used in several communities in Africa (Nyst 2010). The indigenous signed languages are faced with language endangerment (Edward 2015a, Nyst 2010) because of

the preference of the new signed languages of education. The existence of societal norms and laws has reduced the numbers of deaf populations in some societies (Edward 2015a; Kusters 2012; Nyst, 2007). While the indigenous African signed languages are struggling to develop, the undue influence of their foreign based counterparts continue to suppress the local signed languages, delude the users and learners of the languages. Studies conducted in different deaf linguistic communities in Nigeria and Ghana show the influence of ASL on the signed languages used in these countries.

The signed languages of Africa have been under constant contact with the spoken languages used in the communities. Edward (2015a, 2015b) discusses the effect of language contact on AdaSL. One of such contact has led to the pidginisation of AdaSL by some speakers of Akan in Adamorobe. She quotes that, "[t]he pidgin AdaSL has the structure of Akuapem Twi and the signers try to incorporate the few AdaSL signs that they know" and the result "is primarily gestural rather than a regulated sign language like AdaSL" (Edward, 2015a). Further, the gradual endangerment of signed languages used in Africa, is claimed to be caused by contact with local laws, formal education, etc. (Nyst, 2007; Edward 2015a, 2015b). The gradual linguistic genocide of indigenous African signed languages is therefore a compounding of several issues.

Whereas indigenous signed languages are struggling to develop, most foreign based signed languages in some African countries are yet to develop enough study materials for learners. Research conducted at the School for the Deaf Kuje in Abuja in 2016 [2] revealed that students and teachers rely on materials from American Sign Language (ASL) to teach. Thus, deaf signers in ¹Kuje and most parts of Nigeria rely on ASL materials for teaching and learning. However, deaf signers in this school and several parts of Nigeria have developed a distinct signed language that is similar to ASL but very relevant to the Nigerian community. Language development policies in most African nations seem to overlook the importance of signed language documentation and the development of material for studies. Further, as more linguists in Africa research on languages that are used within their communities, research work on signed language linguistics is limited to the very few and most times the ground-breaking researches in signed languages within Africa are conducted by foreigners. The problem is compounded by the seeming neglect of government intervention in Deaf education. For example, although primary and junior high school education

¹Andrew Foster, a deaf missionary from America is credited with the emergence of Deaf education in many African nations (see, Nyst, 2010).
²S-del community engagement project in Nigeria

is free in Ghana and Nigeria (for both mainstream and special schools), the resources available to some special schools are not adequate for the students.

Special attention to minority languages in many African countries is needed to sustain them from possible endangerment. However, since this intervention is delayed in most countries, there is a gradual *extermination* of minority languages and some signed languages (like AdaSL) are potential candidates for language death if all users shift to GSL. This paper seeks to discuss "this linguistic genocide" and also offer possible solutions to both indigenous and foreign based signed languages in Africa to thrive and also maintain their statuses.

2.0 Methodology

A large amount of linguistic and demographic data has been collected from various deaf communities in Nigeria the past four years through grassroots community engagement and family intervention outreaches. Major data collection instruments include signed language videos comprising name signs, monologue shots, and discourse sessions; personal interviews with deaf individuals, (adults and students), family members and signed² language instructors; questionnaires and reports from deaf schools. Sensitization forums at different deaf communities aimed at discussing the social stigma faced by deaf individuals and their signed language(s) and the solution included the deaf individuals, their family members, deaf educators/sign language interpreters and school administrators.

Signed language materials collected are being classified distinctively as "school signs" and "out of school signs". While the "school signs" represent signs taught/learned in school, "out of school signs" represent the signs that are not necessarily taught in the classroom, may be part of home signs, village signs or gestural expressions. In the Special School for the Deaf Kuje and Junior Secondary School Pasali, both in Abuja, Nigeria, several words were signed differently in school and outside school by the same deaf students in different contexts. Nevertheless, over 95% of Nigerian Deaf signers acquired/learned signed language in Deaf schools, where they

²We use the expression Nigerian Sign Language to refer to the linguistic entity, which is an embodiment of the culture of deaf people in Nigeria, and the expression Nigerian signed language as a more general term "parallel to spoken or written language (Wilcox, 2009).

³Deaf with the capital 'D' is widely used in literature to refer to those who are culturally deaf (see Padden & Humphries, 1988; Padden, 1999; Stokoe, 1999; Kannapell, 1999; Wilcox & Wilcox, 2002), as opposed to other signed language users, who are also members of a deaf community. We also use the term here as a collective noun rather than adjective.

are led to believe that they are learning American Sign Language (ASL) (Asonye, 2017). In the same vein, a similar percentage of deaf educators and signed language interpreters in Nigeria believe they are using American Sign Language, as a result, we make attempts to find out the similarities and differences between ASL and the signed language varieties used in Nigeria.

Data from interviews, questionnaires, and personal stories are focused, among other things on establishing the literacy level in signed language of members of deaf communities, which include the Parents of Deaf Children PODCs, Children of Deaf Adults CODAs, deaf educators, etc. in relation to the documentation and development of the Indigenous Nigerian Sign Language INSL. It also extends to finding out the level of linguists' representation and participation in the study of signed languages, since our earlier studies have shown that linguists' non-participation in the study of signed languages is a major mitigating factor against the development of African signed languages (Asonye and Emma-Asonye, 2013; Asonye and Rarrick, 2017). The data on signed languages used in Ghana were recorded through a series of fieldworks done in 2014 and 2016 by one of the authors. These research works involved both deaf signers of GSL and AdaSL. Other people who were interviewed included both hearing and deaf teachers of deaf schools at Mampong, hearing and deaf signers of Adamorobe, some national executives of the Ghana Deaf Association etc. This large corpus of data from Ghana and Nigeria represented both village and urban sign languages. To identify the linguistic influence on the sign languages, selected data from the corpus were transcribed and annotated. The selected data was chosen because the authors found traces of linguistic influence in the conversations, the individual signs etc.

2.1 African sign languages

Deafness in African history is recorded by Miles (2004). In this paper, Miles presented an overview of deaf cultures in African histories based on earlier research works. According to Miles, "Celine Baduel-Mathon (1971) made a detailed classification of gestural communication in West African countries from documentation of the previous two centuries, but described no formal SL used by deaf people" (Miles 2004:535). Deaf cultures within African histories were recorded to have used gestural resources for communication. Adamorobe deaf signers were quoted in this paper as the earliest deaf group in Africa to have a coordinated signed language. Okyere & Addo (1994) cited that the signed language in Adamorobe emerged as early as the 18th century. Miles' (2004) historical records also showed deafness in Northern Africa; for example, Egyptian records lamented over hearing loss and evidence from papyrus demonstrate that the word deafness was in use in ancient Egypt. In Western part of Africa, especially in Adamorobe (Ghana), deaf and hearing people recounted the history behind deafness in the community and several

reasons were given for the cause of deafness in Adamorobe (see Nyst, 2007; Kusters 2012 for review).

Thus, signed languages have not been new to many societies in Africa. The emergence of foreign based signed language in Ghana was tied to evangelism. Andrew Foster's missionary works led to the establishment of several deaf schools in many African countries (Nyst, 2010). The co-existence of foreign based and local or indigenous signed languages in Africa have led to the terms urban and rural sign languages. The urban sign languages refer to the signed languages of education which are usually the foreign based signed languages. The rural signed languages are the village signed languages and the home sign systems. Few urban signed languages in Africa are products of indigenous signed languages (e.g. *Lingua Gestual Guineense* in Guinea-Bissau, *Langue des Signes Mileane/Langue des Signes Bambara* in Bomako, Mali c.f. Nyst 2010).

Most indigenous signed languages in Africa are at the verge of language endangerment. This endangerment is due to mostly human actions and in this paper, we refer to this process as linguistic genocide (more details in section 3.0). Turning to a popular American example, "for 2 and half centuries, 1690-1950, a high rate of hereditary deafness appeared in the population of the Island of the Martha's Vineyard in Massachusetts" (Groe 1985:43). The people on the Vineyard developed their own signed language that never became identical with American Sign Language. The main reason for the death of the signed language used in Martha's Vineyard in Massachusetts (USA) was the movement of Deaf signers to other communities through education and marriage. Currently, rural, and urban signed languages are used side-by-side in most African societies and the prestige given to urban signed languages (e.g. GSL in Ghana) is indicative of a gradual shift to these signed languages to the detriment of the rural signed languages.

3.0 Linguistic Genocide in Perspective

The UN Convention of 1948 captures linguistic genocide in different perspectives which however point towards a singular act or intention – to kill a language; to suppress a language towards its extinction. Linguistic genocide, which was discussed alongside physical genocide was considered a serious crime against humanity:

Any deliberate act committed with intent to destroy the language, religion or culture of a national, racial or religious group on grounds of national or racial origin or religious belief, such as (1) Prohibiting the use of the language of the group in daily intercourse or in schools, or the printing and circulation of publications in the language of the group; and (2) Destroying or preventing the use of libraries, museums, schools, historical monuments,

places of worship or other cultural institutions and objects of the group. (Encyclopaedia of Genocide and Crimes Against Humanity, 2005)

The UN 1992 General Assembly further captures the "Declaration on the Rights of Persons Belonging to National, or Ethnic, Religious and Linguistic Minorities" thus:

Article 1/1: States shall protect the existence and the national or ethnic, cultural, religious and linguistic identity of minorities within their respective territories and shall encourage conditions for the promotion of that identity.

Article 2/1: Persons belonging to national or ethnic, religious and linguistic minorities... have the right to enjoy their own culture, to profess and practise their own religion, and to use their own language, in private and in public, freely and without interference or any form of discrimination.

Article 4/3: States should take appropriate measures so that, wherever possible, persons belonging to minorities may have adequate opportunities to learn their mother tongue or to have instruction in their mother tongue (UN General Assembly, 1992).

In the light of the above excerpts, deaf individuals in Nigeria and in all other African countries belong to the minority groups, either ethnic or national minority. In Nigeria, the Deaf are part of the national minority groups – they are a linguistic community, but the question is whether the language used in this community qualifies as "their own language", "their mother tongue". Over 98% of deaf children in the world never receive education in their most fluent language, Sign Language, the language of their group (Jokinen, n.d.). This in general sense refers to the act of forcibly giving education to deaf children in spoken or aural language as opposed to signed language, but in the African setting, we are concerned about deaf children forcibly receiving education in an alien signed language, a language they cannot culturally claim.

3.1 Patterns of Linguistic Genocide against African Sign Languages

American Sign Language (ASL) is the language of deaf education in most, if not all countries in West and Central Africa (Nyst, 2010), and only Zimbabwe for now has a constitutionally recognized national signed language. African signed languages are often described and classified according to their source in relation to either ASL or British Sign Language, BSL (Asonye, 2016). The fact is that, with Nigeria as an example, the signed language varieties used in deaf education in most African countries have evolved and developed grammatical structures different from ASL used in the United States of America or BSL used in the United Kingdom today, yet the deaf signers and deaf educators rather chose to profile the languages used in schools for the Deaf as ASL. This is the *neo-colonial* ideology, which has resulted in the lack of commitment by the deaf and hearing signers to the development of the

national signed languages and the suppression of the home and village signs. Kusters (2014) has done an extensive work on this type of ideology in shared signing community of Adamorobe. Our studies in Nigeria among deaf communities also indicate that the word ASL is used more often by deaf students and their teachers to refer to their language than the words *Sign Language*, and the words Nigerian Sign Language are hardly used at all, even when used, there is a nuance of confusion on which Nigerian sign language is referred. An average deaf student, for instance would choose to say, "I know American Sign Language" rather than "I know signed language".

Studies show that deaf people in various times and in rural communities such as deaf communities in Kano, Nigeria (Schmaling & Hausawa, 2011), Bamako in Mali (Nyst, 2015) have always invented, adopted, or developed out-of-school signs, home signs or village signs with which they communicate, and this linguistic behaviour is traceable back to deaf education era in Africa. The origin and development of ASL is traceable to Old French Sign Language (OFSL), although there were records of Natural Signed Language used at the Martha's Vineyard and other deaf communities before the emergence of Old American Sign Language (Wilcox and Wilcox, 2002), but today we have French Sign Language (LSF) and ASL as two distinct languages and not LSF-American Sign Language as has been suggested in African setting – ASL-based Nigerian Sign Language, ASL-based Ghanaian Sign language or Nigerian ASL, Ghana ASL, etc. (see Nyst, 2015). It is in our view that this pattern of linguistic genocide is subtle but powerful; it prevents deaf people of African descent from protecting "the existence and the national or ethnic, cultural, linguistic identity" (UN Convention, 1948).

This pattern of linguistic genocide against African signed languages is also seen in "Prohibiting the use of the language of the group in daily intercourse or in schools..." (Encyclopaedia of Genocide and Crimes Against Humanity, 2005), as young deaf individuals from a signed language active community or village has no choice but to drop the local sign s/he has learnt as soon as s/he gets enrolled into a deaf school regardless of how fluent the deaf individual is in the local sign, and regardless of the fact that natural signed languages have often and spontaneously developed among primary sign users (Jokinen, n.d.). Students of Junior (Inclusive) Secondary School Pasali in Abuja, Nigeria, stated that at first, they were confused as to which sign to use, and later they gradually embraced the classroom sign at the expense of the local signs they knew. Deaf students from Adamorobe (Ghana) studying at a nearby School for the Deaf in Mampong Akuapem, have to switch to ASL at school because that is the language of instruction and communication at the school. This very subtle switch has led to most educated young Adamorobeans to use GSL at home. As reported by Nyst (2007) and Edward (2015a) the signers switch to AdaSL completely only in the presence of old

deaf signers who do not know GSL. However, the impact of GSL on AdaSL is enormous as some of the old deaf signers have gradually borrowed some GSL signs and these appear uncontrolled in their conversation.

It is incredibly worrisome that over 50 years ago, a version of ASL (Old ASL) with "The Joy of Signing" was introduced into African countries, with time and events bringing change throughout the linguistic world, 50 plus years later, the most officially reliable sign language book used in the Deaf classrooms in Africa is "The Joy of Signing", while the mother language ASL has continued to evolve through a lot of study by both deaf and hearing experts. What is the joy of signing and imposing a language that has refused to develop upon African deaf communities? Today, sign language in Nigeria and other English-speaking African countries are closely assuming the structure of Exact Signed English (ESL) or Signing Exact English (SEE), which is rather characterized as a devised or derivative signed language – a language of classroom (Jokinen, n.d). SEE, a component of Manually Coded English (MCE) is described as a means of communication invented with the aim of assisting deaf children in Western world to learn English – it is not a natural language like ASL.

3.3 The Status of Nigerian Sign Language (NSL) and Ghanaian Sign Language (GSL)

Over the past four years, lots of linguistic studies have been going on in Nigerian Deaf Communities like never before. A lot of signed language data has been collected from different deaf communities across the country. Prior to now, studies on the Nigerian Deaf had largely focused on Deaf education (e.g. Adima, 1989; Eleweke, 2002; Ajavon 2003; Ajavon, 2006, etc.), Deaf welfare and service provision (e.g. Adepoju, 1984; Eleweke, 1997; Akinpelu, 1999, etc.), and little or nothing had focused on the development of Nigerian Sign Language. Ajavon's (2011/2012) project, *A Sign Language for Nigeria*, seeks to develop a dictionary for NSL that is compared with ASL. We have in the course of our studies in Nigerian Deaf Communities, heard about isolated efforts of some deaf educators, especially in the Southwest, towards *inventing* and preserving a more indigenous NSL for deaf classroom education, but such efforts have hardly been sustained for two major reasons, which we will discuss in this section: the seeming unwillingness or inability of deaf community members to develop their language (Asonye, 2017), and the unwillingness or failure of linguists to study signed language and participate in its documentation (Asonye & Emma-Asonye, 2013; Asonye, Emma-Asonye & Edward, 2018).

Nigerian Sign Language has been described as a variety or a dialect of American Sign Language (Nyst, 2010), not because formal teaching of signed language to deaf children was first introduced by an African

American, or because the variety of Nigerian Sign Language referred to evolved from ASL, but because the users and teachers of the language appear to be caught up with the neo-colonial attitude influenced by linguistic genocide and they are comfortable believing that they are using a foreign language, which they have no obligation to develop (Asonye, 2017). In addition, some undocumented views we collated in our outreaches claim that NSL is a form of ASL because they share a common vocabulary repertoire, but it is our view that the presence of spoken English in Nigeria and its status as a language of education brings a huge influence of vocabulary in the spoken language, which to an extent has influence on the signed language. The classroom sign language has retained a good number of English vocabulary items because 99% of hearing teachers in deaf schools use Nigerian English or at least Nigerian Pidgin in their everyday lives and as such, import English vocabulary in their signs.

The historic call for the development of Deaf education in Nigeria by both deaf and hearing scholars, (such as Adelogbe, 1974; Igwe, 1988; Ihenacho, 1988, Eleweke, 2002 and others) has no doubt helped to get Deaf education thus far, although much is still to be done, but significantly the call has failed to capture an important aspect of Deaf education – signed language development. The call for the documentation and development of Deaf language is as important as the call for a better Deaf education, if not more. Since the call is a one-sided call, deaf scholars, who are products of classroom signs have no choice but to relapse to the influence of the imposition of *foreign signed language* in their linguistic community, even when the sign they learned is neither used by deaf signers in America nor in any other Western World, but in Nigeria, and probably a few other African countries facing a similar linguistic identity crisis (Asonye, 2017).

Nigeria deaf population still pays allegiance to Andrew Foster for his contribution and efforts to Deaf education in Nigeria and other West African countries (Eleweke, et al, 2015). Efforts of indigenous and foreign deaf scholars who have contributed to the development of Deaf education in Nigeria are documented (Eleweke et al, 2015), but the need for the documentation of Indigenous Nigerian Sign Language seems not to have been thought of by Nigerian deaf scholars. On the other hand, our studies (Asonye and Emma-Asonye, 2013; Asonye and Rarrick, 2017, and Asonye, Edward & Emma-Asonye, 2018) suggest that linguists' unwillingness to undertake the study of signed languages is another great disadvantage to signed language development in Nigeria. Nigeria is one of the African countries that has received commendations for establishing Special Education Departments at Tertiary level (Kiyaga & Moores, 2003), yet no Nigerian College or University is currently offering a course in signed language linguistics as at the time of this article, and the institutions that offer Special Education courses, such as the University of Ibadan, the

University of Jos, Alvan Ikoku College of Education, College of Education, Oyo, etc, do not have courses in sign language documentation or sign language linguistics and end up training their students in classroom signed language, while the indigenous signed language varieties remain endangered.

The emergence of signed language research in Ghana began with Frishberg's (1987) work. However, local researchers were not involved in linguistic research of sign language until the late 2000s. Although several research works were done on deafness, deaf education etc., linguistic research began recently. Currently, GSL is the language used in institutions devoted to the deaf and among the educated deaf in Ghana. GSL just like the signed language used in schools for the deaf in Nigeria and many other African signed languages, where Andrew Foster worked, traces its root from ASL. All the educated deaf GSL users who were interviewed (in Accra, 2014) attested that although there exist similarities between GSL and ASL, they would rather refer to the signed language used in Ghana as GSL since it has a certain uniqueness that differentiates it from ASL. This contradicts the views towards NSL that were shared by some users (deaf signers, interpreters) and teachers in Abuja and Pasali. AdaSL and other home signs systems used in some villages and homes in Ghana are indigenous signed languages and different from GSL, especially in sign structure. Documentation of the first dictionary of GSL was pioneered by Boison et al. in 2001 and recent additions and changes have been made to some of the signs in this old dictionary although there is no official revision to the old dictionary. For example, signs for DOCTOR, NURSE, etc. as represented in the old dictionary have been replaced with new signs. New dictionaries have been produced by other teachers and instructors of GSL and some of these are scorned as being more of ASL than GSL.

Research works on rural sign languages have been produced for AdaSL and Nanabin Sign Language (Nyst 2007, 2010; Kusters 2012, 2014; Edward 2015a, 2015b). Whereas research on the rural sign languages have indicated the potential threat to their survival (Nyst 2007; Edward 2015a), very few linguistic researches have been done on GSL (Edward, 2014, work in progress, MacHadjah, 2016). Currently, GSL is taken as a course in some Ghanaian Universities and Colleges. These courses are tailored to teach hearing students GSL so they can act as interpreters and teachers of the Deaf. In the University of Ghana's Department of Linguistics, linguistics research on GSL is done in addition to teaching the students to sign. Thus, students are prepared and introduced to the linguistics of GSL through a year-long course.

Some private Nursing Training Colleges in Ghana have started teaching basic conversations in GSL to the Nursing students. These conversations are made up of simple questions that are asked at the Hospital

and signs for sicknesses and diseases. The longer-term goal of this pilot project is to make Nurses capable of communicating with deaf people who patronize hospitals without interpreters. Some Government Hospitals in Accra (e.g. Ridge Hospital) have in-house interpreters for deaf people who patronize their facilities. These measures are tailored to bridge the communication gap between deaf and hearing people. Although these steps are to mitigate the communication barrier, only few interpreters are available in government and private institutions. The National Television in Ghana has a signed language interpreter assigned to the major news bulletin (at 7pm) and also interpretation services are rendered in GSL for major national events. These efforts may seem great but most deaf people within rural communities do not get access to these facilities. For users of village and home sign systems other than GSL, these services are not relevant to them since they barely understood GSL.

At the time of developing this article, the Department of Special Rehabilitation Sciences, College of Administrative Studies and Social Sciences, Kaduna Polytechnic, Kaduna, Nigeria organized "an intensive training in American Sign Language and Communication" for professional signed language interpreters in Nigeria based on "medical vocabularies, psychiatric assessment of the psychotic deaf patient... legal terminologies and principles of courtroom... principles of advanced descriptive American Sign Language, etc," held on Monday August 28 to Saturday, September 2nd, 2017 at the University of Port Harcourt Medical School. Our concern for this laudable training program is on the subject - the title. We reached the organizers of this program to find out why and how the program was based on "Advanced American Sign Language" and we were informed that some of the signs to be taught in the program were locally generated indigenous signs, despite the emphasis on ASL.

3.4 Are Local Signs Threatened?

Over 95% of deaf children in Africa and beyond are born by hearing parents (Jokinen, n.d, Asonye, 2017). In sub-Saharan Africa, where congenital hearing loss in children is largely caused by accidental factors, preventable or other undiagnosed diseases and defects as opposed to genetic factors (McPherson & Swart, 1997), hearing parents play little or no positive role in their children's signed language acquisition, although the importance of good parent-child communication has been emphasized in literature as one of the factors that ensures a child's safety and development. Hearing children would have learnt over 700 words at age 3, while their deaf mates would have learnt about 25 words at same age.

Studies carried out in over 40 deaf schools in Lagos Nigeria (Asonye and Rarrick, 2017; Asonye et al, 2017) show that only about 1.8% of hearing

parents of primary and secondary school deaf students can sign, and about same percentage of siblings of these deaf students can also sign. Different families devise their own means of communication with the deaf member, which, most times excludes signing. These deaf children are left with little or no sign language access until they get lately enrolled into a formal school, where they begin to learn classroom signs, because of lack of Early Intervention and Deaf Mentoring Programs.

In Adamorobe, young signers are gradually shifting to GSL as the preferred language of communication. This preference introduced at school is gradually being accepted by some of the old uneducated signers. The need for a deaf signer in Adamorobe to acquire bit and pieces of GSL is now necessary for understanding young signers and also for interpersonal communication among other deaf groups. Although most GSL signers will refuse to refer to their language as ASL, the Joy of Signing is still used in many clubs and churches to teach both deaf and hearing signers GSL. Edward (2015a) reported of the influence of religion on local sign languages; the lack of materials in GSL and AdaSL or other local/indigenous signed language has led most religious groups and other clubs to rely on ASL material to teach signed language in their classes. These classes are usually free and attract a good number of people who are interested to learn signed language and thus, pass on the ASL influence. Are local signs threatened? Research evidence shows that they are. To what extent are they threatened? To the extent that they need urgent and conscious attention towards their documentation and further development.

3.4.1 ASL Vs. SEE

Deaf and hearing signers in America understand the horizontal line that represents the spectrum between American Sign Language (ASL) and Signing Exact English (SEE) or simply spoken English. The difference - the gap between ASL and spoken English has been emphasized in literature (see Klima and Bellugi, 1979; Fromkin, 1988; Wilcox and Wilcox, 2002; Humphries, Padden & O'Rourke, 2004), and an average deaf signer with the knowledge of the two forms of signing can effortlessly code switch between the two forms, depending on the context. This is the beauty of any language - the user's ability to 'manipulate'. The ASL signer, who is also skilled in signing English (Kannapell, 1989) knows when s/he code-switches, and understands the difference between the two; s/he also understands that ASL is the embodiment of American Deaf Culture, as opposed to English (Padden, 1989).

The above described linguistic attitude is applicable to any linguistic community, especially to Nigerian Deaf Linguistic Community. If Nigerian signed language users would acknowledge the status of the signed English

and be able to differentiate it from the indigenous signs which is an embodiment of Nigerian Deaf Culture, plus a more conscious effort among the language users to develop the indigenous signs, this would make many more deaf people to be more skilled in INSL. Despite the indiscriminate projection of the term ASL among Nigerian Deaf Communities, many signed language users we have met agree to the fact that Deaf in Nigeria hardly have mutual intelligibility with Deaf in America, who sign 'real ASL' or 'deep ASL'. A professional signed language interpreter, in Team S-DELI⁴, Kindness Okoro, in an oral interaction, explains how she was able to adapt her signing style to appear less of signed English and more of culturally adapted style. According to her, the deaf individuals she interprets for often commend her style as 'beautiful'. It is therefore our take that, while Nigerian signers could keep their version of signed English, (at least for the fact that English is an official language in the country), conscious efforts should be made towards the development of the indigenous signs, some of which are found among local signers, and mostly, out of school.

We are aware that varieties of indigenous Nigerian Sign Language exist across the various deaf communities in the country, especially as a result of the influence of spoken languages on signed languages. To this effect, we have often been asked how we intend to represent all the varieties in our documentation, and our answer has been that we will represent as many varieties that would be captured on our lexical entries, in line with the WFD (World Federation of the Deaf) recommendation. Meanwhile, the question is often asked with the misconstrued understanding that signed language is a signed version of spoken language. WFD discourages the standardization of one signed language over others in a State with more than one variety such as Nigeria but supports the representation of all that exist in a documentation material.

The literacy campaign experiment by the Nicaraguan government that led to the development of a complete signed language with syntax and grammar by deaf children that were not yet exposed to school is one of the modern evidences of human innate ability to develop language (Birth of a Language, 2011). The above experiment is applicable to any linguistic community, either at the village, regional or state level, geo-politically. We are aware of some scholars' views that "there is nothing like Nigerian Sign Language", because of its multilingual nature, but we see this view as coming from the language ideology that signed languages are forms of spoken languages. However, from the point of view of national sign language, Nigeria has no recognized national sign language. Every natural signed language is a language of its own, developing over time out of the

⁴Team S-DELI is the team of field linguists and other professionals working towards the documentation and development of Nigerian Sign Language, Save the Deaf and Endangered Languages Initiative.

community of its users, though not without the conscious efforts of its users to work towards its development. It is our candid opinion, therefore that the linguistic ideology that sees ASL or SEE as replacing indigenous Nigerian Sign Language, is an ideology that is insinuated by linguistic genocide, and such that threatens the existence of local signed languages in Africa.

4.0 Linguistic Impact on Local Signed Languages in Africa

The study of signed language linguistics, which began in the 1960 with the work of William Stokoe, *Sign language structure: an outline of the visual communication systems of the American deaf*, could be said to be an already established discipline in the Western society (McBurney, 2006), but we doubt if such could be said of the discipline in the African society. Linguistic studies, no doubt has greatly improved the status of signed languages around the world and changed people's perspectives of it, but how much of linguistic impact has been felt among signed languages in Africa? Research work on African signed languages by African linguistics began recently. Earlier research works on African sign languages were mostly pioneered by people outside the communities. (Frishberg, 1987 on GSL and AdaSL; Nyst & Baker, 2003 on Ugandan and Malian sign languages; Nyst, 2007, 2010 on AdaSL and several West African sign languages, Kusters 2012 on AdaSL, Blench & Warren, 2006 on Bura Sign Language in Nigeria etc.). There are few indigenous linguists involved in African sign language research, such as Machadja (2016), Edward (2015), Asonye & Emma-Asonye (2013), Orie (2013).

We happened to get in touch with Nancy Frishberg in the course of developing this work, who gladly shared some of her experiences in (1987) while studying AdaSL in Ghana. She stated that the signed language used in the State school was not referred to as ASL, even though "it had some influence." "The State school had mostly kids from hearing families, while the village school had all native signers, but without someone to guide a bilingual educational program", she stated. Sixteen years after, Victoria Nyst studied the signed language of this same village, and nine years ago, Annelies Kusters did a study on the same language. We therefore observe the gap in time within which these studies took place, and we also observe that each of these scholars studied Adamorobe Sign Language AdaSL (and GSL), not ASL.

The earliest serious linguistic study on a Nigerian signed language we have known is Constanze Schmaling's study of Hausa Sign Language (HSL; transliterated as "Language of the Hands"), carried out between 1994 and 1998, first published in Schmaling (1997; 2000; 2001; 2003), then Blench & Warren, (2005) on Bura Sign Language. We are equally aware of Ajavon's (2011/12) "A Sign Language for Nigeria" (although we had no access to this work as at the time of writing this article), Orie (2013) on Yoruba Sign

Language. Among the above-mentioned studies on Nigerian signed languages, Schmaling (2003), though focused on Hausa Sign Language (HSL), is critical about the "transfer" of a developed foreign signed language, (such as ASL in Nigeria), to another Deaf Community (or country). This, according to her, "is not only difficult but also problematic." Until today, the Nigerian Deaf Community is still dealing with the problem of the introduction of ASL variety to Nigeria, which was not conceptually bad, however, its consequences are viewed from the perspective of linguistic genocide or linguistic dominance.

5.0 The Way Forward (Future of indigenous sign languages in Africa)

The introduction or importation of European and American signed languages to African countries, no doubt, has imposed an *anaemic* underdeveloped status on indigenous signed languages such that we still refer to indigenous African signed languages as "local signs" or local gestures", and the foreign signed languages as developed signs (Schmaling, 2003; Asonye, 2017). A number of foreign signed languages imported into different African countries have been accounted for by different scholars as follows: Botswana - ASL, Danish Sign Language, German Sign Language; Ethiopia - Swedish Sign Language, ASL, and Finnish Sign Language; Gambia - Dutch and British Sign Languages; Mali - ASL, and LSF; Tanzania - ASL, Swedish Sign Language, Finnish Sign Language, and others; Ghana - ASL; Nigeria - ASL (Okombo, 1991, 1992; Akach, 1993; Schmaling, 2003). In Nigeria, both deaf native signers and hearing professional signers have been in a kind of confusion on the status of ASL vis-a-vis indigenous signed language(s), although some are coming to the realization of the fact that the indigenous signed languages need to be developed to a standard status. It is a pity that the Sign Language Working Group of 1970, (Schmaling, 2003) never concluded their work of "modifying" ASL for Nigerian use, and never had their work published, although we have heard that some indigenous signed language book is available for deaf educators in the western part of the country (Oyo State College of Education); we have not had access to such a book.

The way forward for African signed languages, no doubt lies in the conscious and collective efforts of signed language users, activists, linguists and educators to document and develop the languages. Asonye and Emma-Asonye (2011), Asonye & Rarrick (2017), and Asonye, Edward and Emma-Asonye (2018), have all emphasized the need for more African linguists to embrace the study of signed languages, and bring their professional efforts to the signed languages in the same way they are doing for spoken languages. Younger African linguists have a future with the study of African signed languages as it is a profoundly untapped area of study. Linguistics departments of more African Universities could incorporate signed language studies in their course curriculum to train more signed language linguists

and augment the efforts of Special Educators. Days are gone when indigenous languages users or community members relied solely on foreign scholars for the study and development of their languages.

More language activists and advocates should spring up from among Children of Deaf Adults (CODAs) and Parents of Deaf Children (PODCs). Our organization, Save the Deaf and Endangered Languages Initiative (S-DELI) has recently begun the incorporation of CODAs and PODCs in the documentation and developmental process of Nigerian Sign Language, although the program is still at the sensitization stage, which will be followed by the training stage.

Most importantly, Deaf in Africa should be highly concerned with the nature and future of their language, and they should be more committed than any other group in the development of their language. We are aware of the stratification gap between the few educated and successful deaf population in Africa and the less educated population. If the findings of the ongoing Deaf documentation project of S-DELI across Nigeria, where about 80% of deaf population is unemployed, and 86% have Secondary School Certificate, were to be applied to other African Deaf communities, we would appreciate the fact that more deaf individuals need better education to understand their role in the development of their language. Unemployment within the deaf communities in Ghana (especially the rural communities) is overwhelming (Edward, 2016, 2017). Since linguistics is still a young discipline in Africa, and sign linguistics, language documentation, and communication disorders are still somewhat strange to most Universities in the continent, we assume that very few (if any) of the few educated African deaf scholars (some of whom are abroad) would be found in any of the above disciplines. That buttresses the importance of linguists wading into the situation. They will assist in the training of deaf individuals on signed language linguistics and signed language documentation programmes.

6.0 Conclusion

Indigenous signed languages used in many African nations have been battered through imposition of ASL (and other foreign signed languages) and unfavourable governmental policies that have hindered the development of these signed languages. The status of most African indigenous signed languages suggests they are endangered. The neglect of the scientific study of signed languages by many linguists within African is not just a coincidence; there is not much motivation to learn and even develop the linguistics of signed languages that are almost moribund. As bleak as the situation might seem, we suggest an alternative view. African signed languages will thrive if users and learners of these signed languages are not deluded with imposed foreign signed languages. We are much aware

of the role of ASL and other foreign signed languages in developing many urban signed languages in Africa. However, just as no ASL signer will deliberately refer to ASL as OFSL, we also believe that, it is time that signers and other users of African signed languages appreciate their signed languages as bona fide indigenous properties instead of gradually turning the language to ASL and other foreign signed languages.

Development of Deaf lives and the development of signed languages move hand in hand (Edward 2016, 2017). As signed languages (both of indigenous and foreign backgrounds) are developed, deaf people will also emerge and develop their talents and intellect through their own languages. Furthermore, signed language linguistics could still be a thriving field in Africa. When we identify the uniqueness of our signed languages, we can then develop linguistic materials that are representatives of African signed languages. Thus, African signed language linguistic study will make it possible for deaf scholars to be involved in the description of their own signed languages. As minority languages, African signed languages are likely candidates of linguistic neglect if language users and policy makers fail to play their part in sustaining the language. Currently, there are over 250 million people suffering from hearing impairment (Mathers et al. 2000) and these people whether suffering from partial or total deafness are classified as members of the Deaf Community. Language is a distinguishing aspect of every community and the constant use of a language promotes it, while the gradual decline in the use of a language is indicative of language endangerment. In the case of African signed languages, the gradual decline in the use of the languages can be attributed to undue influences from other imposing languages.

Alternatively, both indigenous and foreign based sign languages that are used in African nations can preserve their distinct features through encouraging the users and learners to accept these signed languages and avoid undue foreign influence, after all, *every language matters*. Furthermore, the production of local dictionaries and linguistics materials in the sign languages will ensure that users and learners do not rely on foreign materials for the study of their sign languages.

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Plurality of Lexical Signs in HSL

Ibrahim Garba Gwammaja

Abstract
Plurality in Hausa sign language is marked by a variety of ways. I shall begin by briefly discussing four of these ways and then strive to discover how plurality is indicated in Hausa sign language (HSL). Universally, the common position where the morphemes are placed in many languages include the attachment of morpheme (s) at the initial position known as prefix while other morpheme (s) appear at the final position which identified as suffix position. Though some languages have morphemes that are employed to be inserted within the stem of the word, like Hausa and some chadic languages. From this statement, people believe that the morphemes apply to the initial or final positions of the word stem and differ from one language to another language because of the different modalities exist among the languages. Hausa sign language (HSL) falls within the group of the languages that are produced by using the manual and non-manual parameters. It is also encounters to the spoken languages especially Hausa language based on the different modalities occurring in these languages. Most of the morphemes of HSL are linked at the final position of parameters (location and orientation) of each lexical sign to form plural segment. The paper aims to examine and demonstrate the morphemes of HSL and their functioning for the plural signs formation. It also presents an illustration of the singular lexical signs and how the plural lexical signs are formed. The data of this study were collected from participatory observation, pictures and video coverage at various centers where some of Hausa's deaf individuals gather at different times. The artist sketched the pictures for the purpose of this study and analysis was done via the Hand Tiers (HT) model which originated by Sandler (1989). The model consists of location 'hand shape', movement and location 'space or body' and the study also added the fourth parameter (orientation 'finger selection and palm facing') which was identified by Battison (1978) for detailed explanation. However, the study discovered the three processes of plural formation in HSL, namely: repetition, dual, multiple and change of movement and orientate

1.0 Introduction

The notion of morphological processes in sign languages is a domain still in need of further investigation. Unlike spoken languages, sign languages generally avoid sequential and segmental morphology, instead showing a preference toward sign internal modification (Johnston 2006). "One of internal process is reduplication, which seems to be ubiquitous in the sign languages of the world. Similar to spoken languages, reduplication in sign languages has been shown to express variety of meanings, and an iconic

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1.0 Introduction

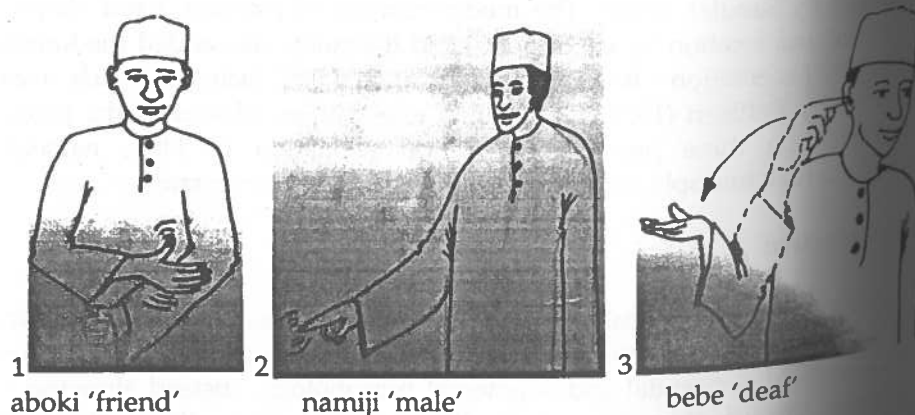
The notion of morphological processes in sign languages is a domain still in need of further investigation. Unlike spoken languages, sign languages generally avoid sequential and segmental morphology, instead showing a preference toward sign internal modification (Johnston 2006). "One of internal process is reduplication, which seems to be ubiquitous in the sign languages of the world. Similar to spoken languages, reduplication in sign languages has been shown to express variety of meanings, and an iconic

element is usually prevalent regardless of language modality. Since 'lexical' can mean so many different things, we cannot take lexical plurality to be a self-explanatory concept which could support an unequivocal definition" (Chierchia, 1998:74).

It seems much more practical to begin with the simple observation that not all plurals are alike, and that we are more willing to describe as lexicalized some of them rather than others. Previous studies on HSL are fairly restricted to just a few studies by Gwammaja (2000; 2002; 2013 and 2014) and Schmaling (2000; 2011; 2013; 2016; 2016 and 2017) states there are few studies on HSL so that there is no chance to compare the findings with other publicly available and linguistically annotated data. Therefore, this chapter will hopefully serve as an introduction to HSL plural. I chose plural aspect because there is no research conducted on this area and the chapter finds out how plural signs are produced in HSL.

1.1 Singular Signs

Singular signs are referred to the sign of a single person or item. Singular signs in HSL are produced via the four parameters (hand, single movement 'straight, arc and rotation', location 'space or body' and orientation 'finger selection and palm facing') which are employed in any lexical sign production. Signs under this class are formed in the various grammatical categories such as *nouns, pronouns, verbs, adjectives, adverbs and demonstrative* etc. Some lexical signs are produced by single hand (active hand), while some signs are produced with two hands (active and non-active), which are followed with movement, location and orientation. Below we can observe some HSL examples:



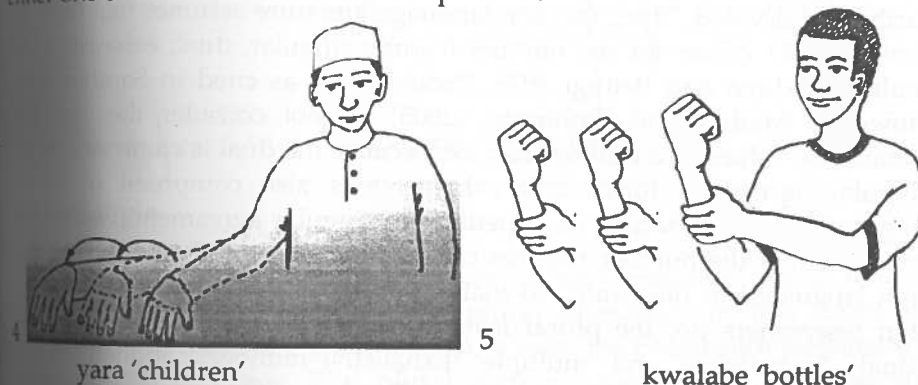
1 aboki 'friend'

2 namiji 'male'

3 bebe 'deaf'

1.2 Plural Signs

Plural signs deal with the sign of numbers from two and above, like two persons or items. Plural signs in HSL are produced with the four parameters (hand, double movement 'straight, arc and rotation', location 'space or body' and change of the initial orientation 'finger selection and palm facing' which are employed in any lexical sign production. Signs under this class are formed in the various grammatical categories such as *nouns, pronouns, verbs, adjectives, adverbs and demonstrative* etc. Signs in this class are formed with either one or two hands. See the examples below:



4 yara 'children'

5 kwalabe 'bottles'

2.1 Methodology of Data Collection

Therefore, the population for this study are ethnically male deaf, due to the fact that lots of meeting places for the deaf are male-dominant. Male deaf are more visible and therefore more observable and easier to access. Many meeting places of deaf people are on the streets and women are infrequent to these places except on rare occasions. Two meeting places of deaf people are selected in each local government of the eight local governments within Kano metropolis. Five subjects (deaf) were selected from each of the meeting places of the eight local governments which resulted in the total number of eight (80) deaf. The subjects are congenital deaf individuals that using Hausa sign language as their primary language. Their ages range from 25 to 45.

However, this study examines daily conversation among Hausa deaf at Tudun Maliki Special School and some centers where Hausa deaf gather respectively. Also substantial information was collected via participant observation as well as taking part in casual conversation in the following deaf centers: - Tukuntawa, Kwanarjaba, Fagge, Gwammaja and Qoqi and I also converse with my deaf friends every day during this experiment.

In addition, lexical signs used by Hausa deaf people were systematically selected. However, some words in spoken Hausa were presented and the deaf were asked to produce the corresponding sign in

their native language (Hausa sign language), On the other hand, signs were presented to them in context and they were asked to demonstrate their meanings in their language. Photographs were taken and sketched by artists for detailed and easier analysis. Written documents on sign languages were also used. The research is qualitative in nature.

3.1 Plural Markers in HSL

Generally, number comprises singular and plural. Plural, however, can be further subdivided. Thus, the sign language literature assumes that there are four possible values for the number feature: singular, dual, exhaustive and multiple (Klima and Bellugi 1979, Padden 1983 as cited in Sandler 2006). However, Mathur and Rathmann (2005) do not consider the dual and exhaustive values as a number feature, because the dual is composed of two singular agreement forms and exhaustive is also composed of several singular agreement forms, i.e. repetition of singular agreement. Hence, they conclude that the number features can be restricted to singular or plural in sign languages. If one wants to maintain various kinds of plural, as many sign researchers do, the plural feature may be further differentiated into "dual", "exhaustive" and "multiple". Exhaustive number is applied when an event is distributed over persons. Hausa Sign Language has some markers in producing plural agreement. The markers comprise of repetition sign (agreement), dual sign and sign of multiple 'many'.

3.1.1 Repetition

In class repetition of a sign is made rather than adding a suffix to some element. It is a common process in producing plural signs of Hausa Sign Language. HSL makes use of different inflections within the plurality of nouns.

3.1.2 Dual

This dual aspect deals with two items, it occurs immediately after head of the following grammatical classes; noun, pronoun and demonstrative etc. The plural sign agreement has occurred when a singular sign attaches with dual aspect. See the dual sign marker in example (6) below.



6 - Dual marker 'biyu 'two''

3.1.3 Multiple

The multiple sign marker refers to a lexical sign (indicated plural marker) that stand as bound morpheme in plural formation. In this formation, singular sign links with a multiple sign to form the plural sign agreement in a Hausa sign language. This plural marker appears after the head sign agreement. Observe the marker of multiple items in example (7) below:



7 - Multiple marker 'da yawa 'many''

3.1.4 Change of Movement and Orientation

This is the fourth category of plural formation in HSL. Changing of movement and orientation in HSL can form the plural sign. Plural signs are formed by two movements (primary and secondary) and change of orientation whereas singular signs are formed with single movement and orientation.

3.2 Plurality in Hausa Sign Language

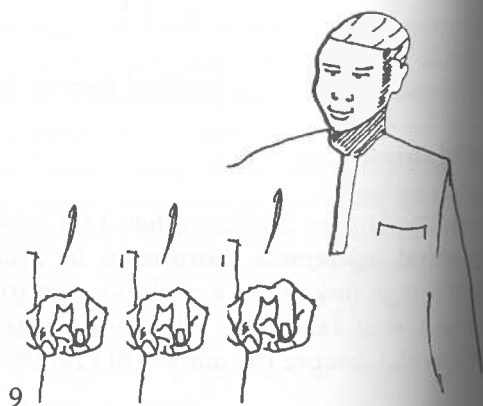
There is plurality in Hausa sign language grammar. Plural aspects occur in various grammatical classes which include nouns, pronouns, demonstratives and adjectives.

3.2.1 Plurality within Noun Signs

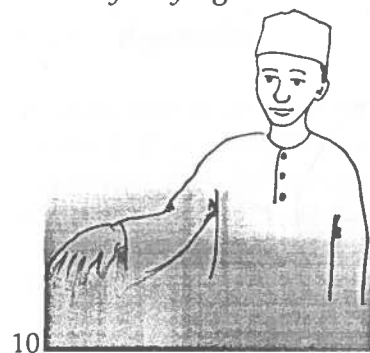
In Hausa sign language, plurality within noun signs occurs by repetition, dual and marker of multiple items. The examples of plural signs that are formed with the repetition marker are represented in examples (8-11) below:



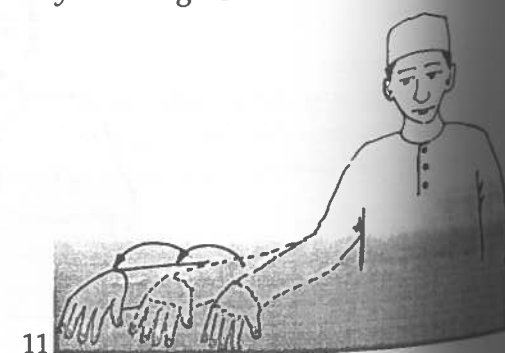
8 yarinya 'girl'



9 yaramata 'girls'



10 yaro 'boy'



11 yaramaza 'boys'

Plural formation via dual marker can be seen from the above figures. The lexical sign in figure (10) represents singular sign of *yaro* (boy) and when it is connected with a dual marker sign, and then the plural sign of *yara* (boys) is produced.



10 yarinya 'girl'



11 biyu 'two'



12 yarinya 'girl'



13 da yawa 'many'

As we can see in figure 10, the sign of *yarinya* 'girl' is formed and figure 11, shows the sign of *biyu* 'two'. When the two signs join together then the sign of *yarinyabiya* 'girl two' (under function) or *yarabiyumata* *yaramatabiya* 'two small girl' (surface function) is produced. The same as in figures 12 and 13. If the sign of *da yawa* 'many' links with figure 12 sign then the sign of *yarinya da yawa* 'girl many' (under function) and the surface function of this should be *yaramata da yawa* 'girls'.

3.2.2 Plurality within Adjective Signs

Adjective refers to the signs that concern size, colour and quantification etc. HSL has plurality of dual and multiple markers within adjective. The plural signs by link of adjective sign with either dual or multiple markers signs. Below we can observe the plural formation. Examples:

14 *dogo* 'tall'15 *biyu* 'two'16 *da yawa* 'many'17 *gajere* 'short'18 *biyu* 'two'19 *da yawa* 'many'

As in figure 14, it shows the sign of *dogo* 'tall'. When the sign in figure 14 linkages with the sign in figure 15 then, the plural sign by employs of dual morpheme is formed as *dogobiyu* 'tall two' (under function) but the surface function of this is *dogayebiyu* 'two tall persons'. Figures 14 and 16 are formed the plural sign in HSL through the use of the multiple morpheme sign, if these figures connect together sign of *dogo da yawa* 'tall many' (under function) is formed. And the surface function of this plural formation should be as *dogaye* 'tall persons'. The same format applies to the plural sign formation as figures 17, 18 and 19.

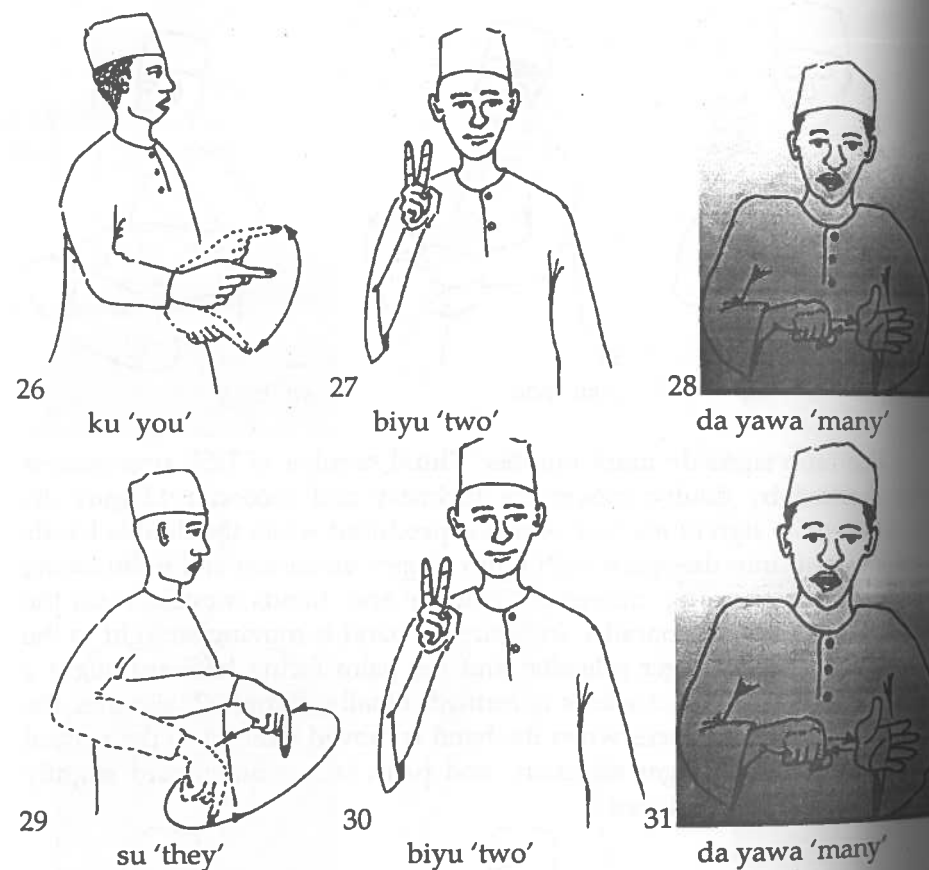
3.2.3 Plurality within Pronoun Sign

In pronouns, singular signs are formed with a single movement (primary 'straight, arc and rotate') and orientation (selection of finger and palm facing) whereas plural signs are formed with two movements (primary 'straight, arc and round' and secondary 'sweep, circular and turn') and changing of orientation. There is Plurality within pronoun in Hausa sign language. Observe the plurality in pronoun category:

20 *mu* 'we'21 *ku* 'you'22 *su* 'they'

Pronoun signs do mark number. Plural number in HSL pronouns is mostly marked by double movement (primary and secondary). Figure 20, demonstrates the sign of *mu* 'we' which is produced when the double hands moved straight into the space with index fingers extension and palm facing opposite slightly, turning movement is made and hands move toward the signer with palm facing parallel. In figure 21, hand is moving straight to the space with an index finger selection and the palm facing leftward slight a sweeping form right to leftwards is formed. Finally, figure 22, signifies the sign of *su* 'they', it produces when the hand is moved straight to the neutral space with an index finger selection and palm facing downward slightly round movement is produced.

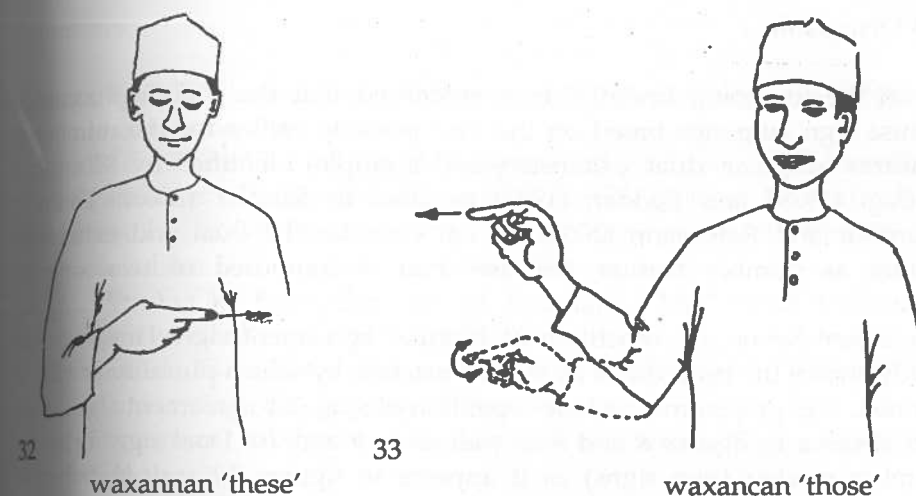
23 *mu* 'we'24 *biyu* 'two'25 *da yawa* 'many'



Therefore, the plurality in HSL pronoun should also be formed by the dual and multiple signs. When figures 23 and 24 are connected, the sign of *mu biyu* 'we two' (under function) is formed and the surface function of the *mu biyu* 'we two' simply means *two of us*. Figures 23 and 25 are formed together but the surface function of signs *mu da yawa* 'we many' (under function) when they are linked together but the surface function of signs *mu da yawa* simply means *mu 'we'*. In addition, the remaining figures 26 and 27, 26 and 28 as well as figures 29 and 30, and 29 and 31 are applied in the same format as it occurred in figure 23 and 24 as well as 23 and 25.

3.2.4 Plurality within Demonstrative Signs

Plurality occurs in the demonstrative signs. Plurality within demonstrative has to do with pointing to item or items at particular location (s). Below are the examples:



From the above figure, we can understand how the plural signs are formed in demonstrative class. Figure 32, demonstrates the plural sign (items) that point items at the location closer to the signer. The pointing would be repeatedly. And figure 33, illustrates the sign that pointed items at the location far away from the signer. This plural sign indicates the location of items which are far away from the signer. This form of plural is formed by double movement (primary and secondary). Figures 34 and 35 show how the singular signs agreement of demonstratives is in Hausa sign language (HSL).



34 Wannan 'this'



35 Wancan 'that'

3.3 Discussion

From the foregoing findings, it is evidenced that the plurality occurs in Hausa sign language based on the four possible values for the number of features (singular, dual, exhaustive and multiple) identified by Klima and Bellugi (1979) and Padden (1983) as cited in Sandler (2006). Thought, Manthur and Rathmann (2005) do not consider the dual and exhaustive values as number feature, because dual is composed of two singular agreement forms and exhaustive is also composed of several singular agreement forms, i.e. repetition of singular agreement sign. However, the study shows the procedures as well as markers by which plurality of HSL is formed. The procedures include repetition of singular agreement sign as we can observe in figures 8 and 9 as well as in 9 and 10. Dual sign forms by number marker (two signs) as it appears in figures 10 and 11, whereas multiple sign forms as result of merging multiple markers with any one of the open grammatical class like nouns and adjectives. In addition, pronouns plurality is formed in HSL, as we illustrate in figures 23 and 24, 23 and 25. The same as in figures 26, 27 and 28 as well as 29, 30 and 31. Still, the demonstratives plurality is also formed in HSL, as exists in figures 32 and 33. These results proven with four possible values for the number of features (singular, dual, exhaustive and multiple) identified by Klima and Bellugi (1979). The Hausa sign language have these four procedures only in forming plurality in HSL as for now because, this study was the first that focused on Plurality in HSL which employs the Hand Tier (HT) model propounded by Sandler (1989).

4.0 Conclusion

Hausa Sign Language (HSL) produces plural signs through manual and non-manual parameters as well as to perceive visually. The chapter discusses how the plural signs in HSL are formed within some grammatical categories like nouns, pronouns, adjectives and demonstratives. These grammatical classes are operating within the morpho-syntactic pattern. This chapter also illustrates pictures of how various plural signs are formed in Hausa Sign Language. However, this chapter discusses how HSL forms plurality by the following morphemes or markers, to mention them are repetition, dual, multiple and change of movement and orientation. These plural markers are formed via hand shape location, hand movement and space or body locations as well as finger (s) selection and where the palm is facing. In addition, the processes of plural markers found in other sign languages but they differ in term of formation. Finally, the chapter shows how the types of markers are employed in plural formation in Hausa Sign Language.

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Principal Components Visualisation of Acoustic-Emotion Profiles in Ibibio

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Abstract
In this contribution, a principal component analysis (PCA) technique for visualizing the effect of acoustic features on different emotion profiles is proposed. To accomplish this, emotions speech corpus were handcrafted, resulting in seven emotions (anger, fear, joy, normal, pride, sadness, surprise), and recorded under suboptimal conditions. Acoustic features including duration, pitch/F0, intensity and the first four formants (F1-F4) were extracted from the sentence, word and syllable units – for the study – using Praat scripting and component-wise normalisation. The normalised features were then subjected to an unsupervised feature selection and dimension reduction process using PCA. A subsequent visualisation of the principal component dominant features (PCDFs) enabled a proper investigation of acoustic-emotion variability profiles for male and female speakers. The results revealed that speech formants, a direct correlate of tone, constitute the most PCDFs and is important for investigating acoustic-emotion variability profiles in African tone languages (ATLs). Efforts to develop emotion databases for Ibibio emotion recognition systems are ongoing, and a comprehensive statistical evaluation is expected in the future.

Keywords: acoustic-emotion profile; emotion recognition; feature component visualisation; PCA; African tone language.

1. Introduction

In spite of the potential benefits of emotion recognition, the problem still remains open (Taylor, Scherer and Cowie, 2005), given the difficulty of emotion recognition systems to appropriately identify a feature space for classification purposes. Research works on speech and emotion have since shifted from exploratory to the production of (some) substantial evidence – mainly in the field of Human Computer Interaction (HCI) – where progress in this area relies specifically on the development of appropriate emotional databases (Douglas-Cowie, Campbell, Cowie and Roach, 2003). While there exist substantial research evidence on emotion classification, constructing a universally applicable classifier remains unsolved and daunting – largely due to context-dependency and variability of the domain and application (Sintsova, Musat and Pu., 2004). Emotion speech features are mostly lower level features, and as such introduces the difficulty to extract and discriminate them. Until now, there exists no clear cut on which speech features are robust in distinguishing emotions (Zheng, Yu and Zou, 2015) – as these features are easily influenced by speakers, speaking styles, sentences, speaking rates, and

more. Further, research inconsistencies arise when these factors heavily influence the extracted speech features such as pitch and energy contours. Although numerous research works have identified good features of emotion speech signal, no widely acceptable set of speech characteristics has been determined. At the suprasegmental level, emotional conditions are governed by fundamental frequency (F0), intensity and temporal characteristics of speech, as there is the possibility that some segmental features may also be influenced by the speakers' emotional state (Katari, 2000; X. M. Cheng, P. Y. Cheng and L. Zhao, 2009). Previous works have highlighted the importance of syllables during emotions transmission and whereas clinical research methods adopted in prosody concentrate mostly on intonation, technological approaches have however focused on the entire speech signal without recourse to the qualitative variability of the spectral content (Origlia, Cutugno and Galati, 2014). Origlia, Cutugno and Galati (2014) proposed a feature extraction method that explores phonetic interpretation using the concept of syllable, and concentrated on the spectral content of syllabic nuclei, thus reducing the amount of information to be processed. They introduced feature weighting based on syllabic prominence, and evaluated their method on a continuous, three-dimensional model of emotions built on the classical axes of valence, activation and dominance. They found that their method compared favourably with state-of-art. In this paper, we investigate the influence of acoustic features on emotions, and the goal is to discover important acoustic-emotion profiles necessary for aiding emotion recognition systems design for African tone languages (ATLs). The language adopted for this investigation is Ibibio – an under-resourced tone language of the Lower Cross group, from the new Benue Congo language family – spoken by about 4,000,000 speakers in Akwa Ibom State, Nigeria, West Africa.

The remainder of this paper is organised as follows: section 2 reviews related works on the effect of acoustic features on emotions. Section 3 discusses the data collection procedure. Section 4 performs the speech feature extraction. Section 5 deals with the speech feature selection and dimension reduction process using principal component analysis (PCA). Section 6 visualises the acoustic feature-emotion profiles at the sentence, word and syllable levels. Section 7 concludes on the research and offers future research directions.

2. Related Works

Studies of the effects of emotion on acoustic characteristics of speech have shown that the average fundamental frequency (F0) values and ranges differ extensively from emotion to emotion, and which F0 contour spans the entire utterance or corpus. Several reasons have been offered why F0 changes with duration are potent at providing clues about the speaker's emotional state. First, considerable degree in the variations of F0 is expected, since only

certain aspects of the F0 contour carry useful information about the linguistic content of a message. The principal linguistic functions of F0 changes (useful stress indicators and boundary markers of different types of utterance (word, phrase and sentence). William and Stevens [8] found that anger, fear, and sorrow situations tend to produce characteristic differences in the contour of fundamental frequency, average speech spectrum, temporal characteristics, precision of articulation, and waveform regularity of successive glottal pulses. Further, attributes for a given emotional situation were not always consistent from one speaker to another. Yildirim, Lee, Lee, Bulut, Busso, Kazemzadeh and Narayanan (S. Yildirim, S. Lee, C. M. Lee, M. Bulut, C. Busso, E. Kazemzadeh and S. Narayanan, 2004) analysed changes in temporal and acoustic parameters such as magnitude and variability of segmental duration, fundamental frequency and the first three formant frequencies as a function of emotion. They also explored acoustic differences among four emotions (neutral, sad, angry, happy). Their results showed that anger and happiness emotions were characterised by longer duration; shorter inter-word silence; higher pitch; and root mean squared (rms) energy with wider ranges. Sadness was distinguished from other emotions by lower rms energy and longer inter-word silence; and differences in formant pattern between (happiness/anger) and (neutral/sadness) were better reflected in back vowels than in front vowels. Zhang, Ching and Kong (Zhang, Ching and Kong, 2006) found that vocal expression of the following emotions (anger, fear, joy and sadness) showed specific characteristics as regards pitch (or F0) contour, intensity contour, and timing of utterance. They observed that anger gave the highest F0 and F0 variance, shortest sentence length, and highest short-time amplitude at sentence level. Their outcomes also compared well with the literature. Lin and Fon (Lin and Fon, 2012) investigated pitch and duration cues of emotion speech in Taiwan Mandarin, where a set of acted emotions (anger, joy, sorrow, fear and neutral) were recorded and analysed. Their results showed that F0 height and speech rate were more correlated with arousal dimension, which differentiate emotions of high arousal, such as anger and joy, from low arousal. However, negative emotions such as anger and sorrow, had longer lengthening than positive emotions. In (Guo, Yu, Hu and Y. Ding, 2016), a quantitative analysis of continuous speech emotion of Lhasa Tibetan (a Chinese tone language) was performed. Using pitch, energy and duration features, they investigated four basic emotion patterns (happy, surprise, sad, neutral), and found positive correlation between Lhasa Tibetan emotions and the studied features, and the pitch, energy and duration of negative emotion acoustic parameters appeared higher than positive emotions.

3. Data Collection

Handcrafted text was created to form the corpus for this study. The resultant corpus consists of a group of sentences that portrayed the target emotions.

Participants were made to act/simulate seven types of emotions (anger, fear, joy, normal, pride, sadness and surprise) under suboptimal environment (background effects, device/channel degradation, etc.). Two sentences were constructed for each emotion class. The constructed emotions and their respective gloss are shown in Table I. The recordings were done using a *zoom handy H4n* sound recorder. The choice of this recorder is in its high-quality recording (up to 24bit/96kHz), direct interfacing with a computer system and support for wave (.wav) format (to prevent a loss of fidelity). The recording was done using a sampling frequency rate of 44.1Mhz in stereo mode. Next, Audacity (a software for audio recording and editing) was used to convert the speech signal to mono mode. The reason for this conversion was to make it amenable to use in Matrix Laboratory (MATLAB) – the programming tool environment for this study. The recording sessions spanned a couple of days, as participants were given ample opportunity to rehearse the script before the recording sessions. Participants were made to repeat each sentence (at least) two times, and were given the freedom to act out the emotion (where necessary). Most participants preferred to introduce additional word(s) to enable them read the sentences successfully, and elicit the emotions properly. For instance, a female participant desired to include the word *μβόκ* 'please', to cue the emotion utterance for anger: *δάρκα κέ υσάν ψάκ μβόκισό* 'leave the way for me to pass' – a frequently used word to cue such emotions – or to stimulate anger, while a male speaker desired to add the overtone sound 'o-o' to the end of the utterances for sadness – in order to stimulate grief. Another male speaker preferred to emphasize the object of reference while simulating the emotions. For instance, in the sentence: *σαί! ινó óδó áτρόςνó áδi ψάάνά ακόμ υφók* '(exclamation) ... that thief has started removing the roofing sheets', *ακόμ υφók* 'roofing sheets' was emphasized.

Table 1. Recorded emotions and their respective gloss

S/No.	Emotion type	Emotion sentence	English gloss
1.	Anger	(i) υσίνάμ ψάκ άσύέν έκά μιμi? (ii) δάρκα κέ υσάν ψάκ μβόκισό	(i) Why have you disgraced my mother? (ii) Make way (leave the way) for me to pass
2.	Fear	(i) κάσέ υράκiκóτ άδák υφók μιμi (ii) σαί! ινó óδó áτρόςνó áδi ψάάνά ακόμ υφók	(i) Watch out! (or any other exclamatory start) ... A snake has entered my house (ii) (exclamation) ... that thief has started removing the roofing sheets
3.	Joy	(i) ανωάάν μιμi άμάν έ-ψiν άωóδέν (ii) έψέν μιμi άψά άδάκάάβió μβάκά ρά νκπόν	(i) My wife has given birth to a baby boy (ii) My child will leave for overseas tomorrow
4.	Normal	(i) νψά κάά υφók νωέδ μφiν (ii) έψiν έκά μιμi άμέσι-έρέ ν=δέ	(i) I will go to school today (ii) My brother (or sister), good morning to you too

S/No.	Emotion type	Emotion sentence	English gloss
5.	Pride	(i) ὡσὲ νῆδιᾷ ἄκρῳ δῶνά μ' ἐμὸν (ii) ἔτε μ' ἐμὸν ἀνίε ἐφάσκει αἶμι	(i) I do eat as freely as I want to (ii) My father owns this street
6.	Sadness	(i) μῦμ ἔτε μ' αἶμα ἀκρῶ ἄκρῳ (ii) μῦμ ἰδέμ ἐκὰ μ' ἰσθύνῳ	(i) mmm ... my father just died yesterday (ii) mmm ... my mother is not feeling well
7.	Surprise	(i) ἰσά! ἀκέ δάμμ' ἰσάσάκε? (ii) ὕωσ! ἀφὸ κέ ἐκέτόπ κέ ἰκάν ἰσά ὀ?	(i) (exclamation) ... when did s/he turn mad? (ii) (exclamation) ... were you the victim of that gun-shot?

4. Speech Feature Extraction

First, *Praat* (version 4.1.43) – a speech processing and analysis software, was used to annotate the recorded emotion speech, and the recorded files were saved in wave (.wav) format. From the sound files, the TextGrid (a product of the annotation) was produced. The TextGrid files were then used in extracting the speech features. We focused on three tiers – sentence, word and syllable tiers, to obtain the respective units for these tiers. The annotations allowed for a structured and easily accessible speech corpus and are useful for future speech processing research. The following features were extracted using *Praat* scripting: duration, pitch/F0, intensity and formants. *Pitch/F0*: Pitch represents the perceptual correlate of fundamental frequency (F0), which measures the rate of vibration of the vocal folds (in speech). It is the relative highness or lowness of a tone as perceived by the ear, and depends on the number of vibrations per second produced by the vocal cords. Pitch is the main acoustic correlate of tone and intonation.

Intensity: The intensity of a sound wave represents the power and loudness of the wave. Intensity correlates with the relative mean square (RMS) amplitude of the wave or how high above (compression) or below (rarefaction) the baseline the wave reaches in each cycle.

Formants: A formant is the concentration of acoustic energy around a particular frequency in a speech wave. It can be seen in a wideband spectrogram as dark bands. The first formant (F1) is inversely related to vowel height, i.e., the higher the (F1) formant frequency, the lower the vowel height (and vice versa). The second formant (F2) in vowels is somewhat related to degree of backness, i.e., the more front the vowel, the higher the second formant (but affected by lip-rounding). The lower of the (F2) formant frequency, the rounder shape of the lip (associated back vowel). Syrdal and Gopal (Syrdal and Gopal, 1986) found that the acoustic cues to vowel recognition are F0, F1, F2, F3 and F4. They normalized the vowels to a fully abstract, speaker independent representation, and observed that within each vowel, F0 and F4 represent speaking qualities, while F1, F2 and F3, are related to vowel identity. Further, F3 has been found to be related to lip spreading, while F4 is more related to lip protrusion (Isei-Jaakkola, Naka and

Hirose, 2010). A classic study in Peterson and Barney (1952) for instance, showed that the first two formant frequencies (F1 and F2), have significant variations among different speakers enunciating same vowel. In addition to demonstrating the overlap between the different vowel classes, the F1-F2 plane has been established as the most descriptive, two-dimensional representation of the phonetic quality of spoken vowel sounds.

In order to obtain a normalised speech signal sequence, a simple *Praat* script was used to scan the long-term F0, intensity and formant features (for sentence, word and syllable units), and the averages collated to yield each instance of the sentence, word or syllable. Tables 2, 3 and 4, show the normalised duration, F0, intensity, F1-F4 extractions for anger emotion of the first female and male speakers, at sentence, word and syllable levels, respectively.

Table 2. Normalised duration, F0, intensity, F1-F4 of male and female anger emotions for sentence unit

Sound Name	Interval Name	Duration	F0	Intensity	F1	F2	F3	F4
f1_anger	Nsinam yak asuenne eka mmi; dakka ke usVN yak mboyoy	4.05	54.88	74.41	551.56	1664.51	2660.16	3825.23
m1_anger	nsinam yak asuenne eka mmi; dakka kusVN yak mboyoy	2.92	156.08	58.85	598.27	1659.12	2744.32	4040.73

Table 3. Normalised duration, F0, intensity, F1-F4 of male and female anger emotions for word unit

Sound Name	Interval Name	Duration	F0	Intensity	F1	F2	F3	F4
f1_anger	Nsinam	0.56	362.78	81.88	499.06	1678.99	2521.33	3564.02
	yak	0.18	253.08	85.23	690.99	1472.05	2375.54	3460.19
	asuenne	0.38	229.95	78.06	588.07	1778.77	2782.60	4063.38
	eka	0.22	173.64	74.52	617.12	2063.97	2755.62	4057.35
	mmi	0.39	152.21	68.38	425.23	1635.55	2627.59	3762.61
	Dakka	0.43	278.38	77.69	785.36	1717.14	2605.53	3964.12
	kusVN	0.44	339.94	79.22	493.87	1216.01	2682.29	3900.62
	yak	0.24	211.33	80.31	666.89	1518.31	2509.39	3537.95
m1_anger	mboyoy	0.64	201.50	76.83	398.92	1756.82	2736.78	3823.50
	nsinam	0.43	210.79	59.61	713.40	1977.09	2961.17	4178.92
	yak	0.14	175.38	64.81	650.59	1489.51	2490.41	3710.70
	asuenne	0.36	133.28	60.20	540.44	1626.55	2743.84	3943.28
	eka	0.29	132.42	54.47	544.00	1460.88	2147.81	3830.30
	mmi	0.28	109.40	47.91	635.32	1842.19	3010.46	4331.63
	dakka	0.29	159.87	61.29	747.98	1265.57	2574.48	3756.40
	kusVN	0.29	212.96	62.09	591.12	1924.89	3223.33	4106.38
	yak	0.26	152.25	65.22	602.15	1355.93	2347.64	3812.90
	mboyoy	0.52	132.73	59.14	429.14	1659.80	2794.29	4271.31

Table 4. Normalised duration, F0, intensity, F1-F4 of male and female anger emotions for syllable unit

Sound Name	Interval Name	Duration	F0	Intensity	F1	F2	F3	F4
fl_anger	N	0.10	226.03	77.37	398.08	1684.00	2771.38	4226.46
	si	0.24	336.39	79.67	427.27	1760.05	2717.86	3587.20
	nam	0.22	440.27	85.80	614.57	1589.00	2214.89	3293.66
	yak	0.18	253.08	85.23	690.99	1472.05	2375.54	3460.19
	a	0.09	207.89	78.24	732.42	1558.01	2549.41	3562.79
	suen	0.18	250.32	77.34	598.67	1744.59	2792.08	4170.98
	ne	0.11	226.66	79.06	455.17	2010.70	2954.82	4293.73
	e	0.13	180.91	74.53	507.06	2289.76	2851.36	4190.88
	ka	0.09	166.04	74.51	781.60	1726.52	2612.53	3857.78
	m	0.14	159.13	69.77	584.32	1608.67	2640.42	3989.08
	mi	0.25	147.81	67.59	335.77	1650.67	2620.38	3635.26
	dak	0.19	220.11	76.68	692.18	1893.62	2767.38	3954.78
	ka	0.24	323.57	78.48	857.65	1580.23	2479.98	3971.34
	ku	0.12	343.73	82.36	446.76	1194.55	2250.52	3734.76
	sVN	0.32	338.29	78.01	511.93	1224.23	2847.74	3964.17
	yak	0.24	211.28	80.29	666.15	1517.81	2509.20	3534.94
	m	0.07	213.15	76.82	600.16	1687.68	2782.97	4020.44
	bo	0.16	223.61	83.32	430.44	1423.70	2652.76	3680.07
	yo	0.41	187.91	74.11	349.67	1907.88	2761.86	3846.22
ml_anger	nsi	0.20	198.30	55.02	826.94	2522.43	3786.88	4638.15
	nam	0.24	214.54	62.86	629.30	1573.14	2349.55	3887.48
	yak	0.14	175.38	64.81	650.59	1489.51	2490.41	3710.70
	a	0.13	71.59	60.03	663.56	1424.16	3050.41	4057.29
	suen	0.13	144.22	59.26	522.29	1614.15	2787.16	3938.14
	ne	0.11	149.83	61.54	417.37	1880.13	2329.93	3815.14
	e	0.09	146.14	57.17	394.23	1848.68	2213.86	3875.11
	ka	0.20	124.96	53.22	613.12	1281.90	2117.33	3808.22
	m	0.17	109.03	50.93	574.37	1723.37	2877.00	4346.20
	mi	0.10	110.41	42.77	739.18	2044.61	3237.84	4306.81
	dak	0.14	143.91	59.45	708.00	1323.45	2733.33	4063.07
	ka	0.15	174.02	62.94	783.96	1213.48	2431.51	3480.40
	ku	0.10	211.22	62.35	593.57	1567.90	3008.23	3839.89
	sVN	0.19	213.84	61.96	589.88	2106.88	3332.98	4229.00
	yak	0.26	152.25	65.22	602.15	1355.93	2347.64	3812.90
	m	0.08	150.58	63.69	455.57	1197.24	2507.53	3937.47
	boi	0.17	149.86	62.73	414.46	1656.46	2694.71	4308.99
	yo	0.27	112.41	55.39	430.44	1801.30	2943.58	4348.13

5. Feature Selection and Dimension Reduction

Our choice of an unsupervised technique to feature selection is that in many applications, the class labels are unknown (Dash and Liu, 1997). A PCA-based unsupervised selection algorithm (Luo, Xiong and Wang, 2008) was adopted in this work to select the dominant principal component features, and eliminate redundant feature frames that hitherto would have contributed to poor selection. PCA is used in this study because, (i.) it is a powerful tool to visualise high dimensional data, (ii.) it shows quantified difference among observations, (iii.) it is useful for assessing data quality and for the discovery of relationship/variability between data points.

Given an input space \mathbb{R}^D and target space \mathbb{R}^d ; $d \ll D$, let $X \in \mathbb{R}^{N \times D}$ be an input dataset of N samples and D features, and $X \in \mathbb{R}^{N \times d}$ its low-dimensional representation. A dimension reduction technique is a mapping $\phi: \mathbb{R}^D \rightarrow \mathbb{R}^d$ that optimises a cost function $\epsilon: \mathbb{R}^d \rightarrow \mathbb{R}$ on the target space. This problem can often be reduced to an eigenvalue problem whose eigenvectors defines the embedding Y . Assuming a training set with N samples $\{x_i\}_{i=1}^N$, each sample represented by an n -dimensional vector $x_i = [x_{1i}, x_{2i}, \dots, x_{ni}]^T$, PCA can be considered as a linear transform that maps data from the original measurement space to a new space populated by a set of new variables. Suppose the linear transform is denoted by matrix L , then pattern x in the new space is represented as,

$$y = L^T x \quad (1)$$

where $y = [y_1, y_2, \dots, y_d]^T$, $L = [q_1, q_2, \dots, q_d]^T$ and,

$$q_j^T = [q_{1j}, q_{2j}, \dots, q_{nj}], \quad j = 1, 2, \dots, d \quad (2)$$

where $d \leq n$, but most often $d \ll n$. The new variables y_j , $j = 1, 2, \dots, d$, are called principal components (PCs). Now, consider the projection of x_i on the k principal axis, then,

$$y_{ki} = q_k^T x_i = \sum_{j=1}^n q_{jk} x_{ik} \quad (3)$$

As seen in equation (3), the projection of a sample on the principal axis is a linear combination of all variables. However, some of the variables might be redundant, irrelevant or insignificant, which indicates that feature selection can only be achieved through the identification of subset of variables whose roles are critical in determining data projections on the principal axes. We observe here that the significance of a single variable x_j can be evaluated based on the value of the corresponding coefficient q_{jk} . An approximate method (Dash and Liu, 1997) is therefore introduced for feature selection in two inter-related steps: (i) select a subset of relevant features; and (ii) select critical features from the relevant features. Further, a recurrence definition of principal component dominant feature (PCDF) about y_k can be defined as follows:

- for a specific principal component y_k , a variance with the largest coefficient in the component is a PCDF;
- for the remaining features, if x_j is a relevant feature about y_k , i.e., $\rho(x_j, y_k) > \omega$, and there exists no PCDF x_p – which is subject to $\frac{|\rho(x_j, x_p)|}{|\rho(x_j, y_k)|} \geq \theta$ ($0 < \theta \leq 1$), then features x_j is a PCDF about y_k .

6. Acoustic-Emotion Profiles Visualisation

Sentence Unit Visualisation

Table 5 shows an extraction of the first three principal components at sentence level from the speech features of the recorded emotions. Observe

that F1 and F3 features of all the emotions within the first principal component (PC1) for male and female speakers were most dominant (i.e., with eigen values above 1 or $|-1|$), and captures the most variance, i.e., 99% for male speakers, and 100% for female speakers (see Fig. 1.). From the visualisation plots, it appears that all the speech features (F1, F2, F3) exhibited major differences between the emotion profiles, and are useful for modelling emotion speech variability in Ibibio.

Table 5. Extraction of the first three components for sentence unit

Speech feature	Principal component					
	Male speaker			Female speaker		
	1	2	3	1	2	3
F1_Anger	-1.2018	-0.2073	-0.6118	-1.2081	-0.4215	-0.2414
F1_Fear	-1.1782	-0.0877	-0.1810	-1.1809	-0.0157	-0.3120
F1_Joy	-1.2263	-0.9512	-0.3669	-1.1970	-0.4856	-0.9618
F1_Normal	-1.2565	0.3280	-0.3360	-1.2528	-0.0744	-0.2215
F1_Pride	-1.2208	-1.0176	-1.1988	-1.2156	-0.1714	-0.6754
F1_Sadness	-1.1734	1.1862	-0.2056	-1.2477	1.8440	1.0251
F1_Surprise	-1.1833	0.3446	-0.0769	-1.1676	0.1450	-1.4817
F2_Anger	0.0173	-0.6416	0.3749	0.0412	0.0884	0.4074
F2_Fear	-0.0226	0.8707	2.4728	-0.0478	-1.8127	2.0674
F2_Joy	0.0057	-0.7485	1.3864	0.0300	0.7597	-0.5447
F2_Normal	0.0389	0.1431	0.4308	0.1011	-0.7209	1.3030
F2_Pride	0.0157	-0.7693	-0.1723	0.0670	0.3593	0.5323
F2_Sadness	0.1256	1.4282	0.7760	0.0282	1.3290	1.7087
F2_Surprise	-0.0044	1.0833	0.8873	0.0058	-1.6350	0.5096
F3_Anger	1.1760	0.6026	-1.0610	1.1624	0.0612	-1.3066
F3_Fear	1.2530	0.2265	0.8210	1.2087	-0.6336	-0.3584
F3_Joy	1.0888	-1.9481	0.4195	1.1060	1.3133	-0.6855
F3_Normal	1.1252	0.6103	-1.8592	1.1582	-0.6759	-0.2771
F3_Pride	1.1105	-2.1764	0.2933	1.1544	0.5465	-1.2153
F3_Sadness	1.3249	0.9485	-0.2059	1.2668	1.5606	1.1210
F3_Surprise	1.1856	0.7757	-1.5865	1.1879	-1.3602	-0.3931

Word Unit Visualisation

In Table 6, extraction of the first three principal components at word level from speech features of the respective emotions is presented. As can be seen in the table, F1 and F3 features exhibited major differences in emotion

profiles for male speakers, while F0 and F4 features exhibited major differences in emotion profiles in female speakers.

Table 6. Extraction of the first three components for word unit

Speech feature	Principal component						
	Male speaker			Speech feature	Female speaker		
	1	2	3		1	2	3
F1_Anger	-1.2396	-0.1176	-0.3342	F0_Anger	-1.3336	0.0546	-0.0281
F1_Fear	-1.1121	0.7317	-0.1651	F0_Fear	-1.2769	0.3279	-0.0001
F1_Joy	-1.1542	0.4120	0.2515	F0_Joy	-1.2981	0.1829	0.0939
F1_Normal	-1.2502	-0.0166	0.0333	F0_Normal	-1.3477	0.0913	0.0659
F1_Pride	-1.2390	-0.0410	0.0156	F0_Pride	-1.3364	0.0781	0.0499
F1_Sadness	-1.1925	0.1432	0.3574	F0_Sadness	-1.3415	0.1395	0.1536
F1_Surprise	-1.1648	0.1589	0.3460	F0_Surprise	-1.2630	0.1146	0.1591
F2_Anger	-0.2170	-0.8749	-1.1545	F3_Anger	0.0858	-1.0614	-1.2826
F2_Fear	0.1103	1.6211	-0.8802	F3_Fear	0.5032	1.9123	-1.3034
F2_Joy	0.1810	0.7299	0.4043	F3_Joy	0.4093	0.8019	0.6199
F2_Normal	-0.0802	-0.6937	-0.1090	F3_Normal	0.2390	-0.8086	-0.2011
F2_Pride	-0.0186	-0.8008	-0.3120	F3_Pride	0.2409	-0.8925	-0.4508
F2_Sadness	0.1568	-0.1359	1.0106	F3_Sadness	0.4040	-0.0693	1.2930
F2_Surprise	0.0709	-0.0007	1.0830	F3_Surprise	0.3809	-0.0689	1.2426
F3_Anger	0.7935	-1.6175	-2.0090	F4_Anger	0.6957	-1.5373	-1.8189
F3_Fear	1.5395	2.5823	-1.8975	F4_Fear	1.1923	2.5275	-1.6789
F3_Joy	1.3044	1.0531	0.8233	F4_Joy	1.1278	1.0302	0.8833
F3_Normal	0.9657	-1.3030	-0.3755	F4_Normal	0.9111	-1.2025	-0.3772
F3_Pride	0.9827	-1.4081	-0.5981	F4_Pride	0.8509	-1.2652	-0.6616
F3_Sadness	1.3310	-0.2510	1.7478	F4_Sadness	1.1004	-0.1634	1.6752
F3_Surprise	1.2322	-0.1714	1.7625	F4_Surprise	1.0559	-0.1917	1.5664

The visualisation plots in Fig. 2 indicates that feature patterns of F1 (for male speakers – Fig. 2 (a)) and F1 (for female speakers – Fig. 2 (b)) tend to cluster together, meaning that speech features in this class maintained similar emotion profiles. Hence, F2 and F3 features in male speakers showed high variability with PC1 (73%) capturing the most variance, while PC2 (14%) and PC3 (5%) captured the least variances. In female speakers: F3 and F4 features showed high variability, with PC1 (79%) capturing the most variance, while PC2 (12%) and PC3 (5%) captured the least variances. We can deduce here that F2, F3 and F4 features exhibit high variability in the emotion profiles, and are useful for investigating emotion feature variability in Ibibio.

Syllable Unit Visualisation

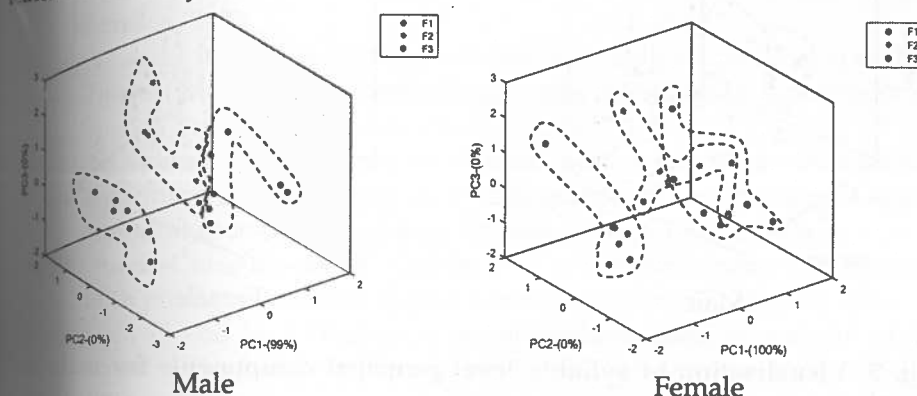
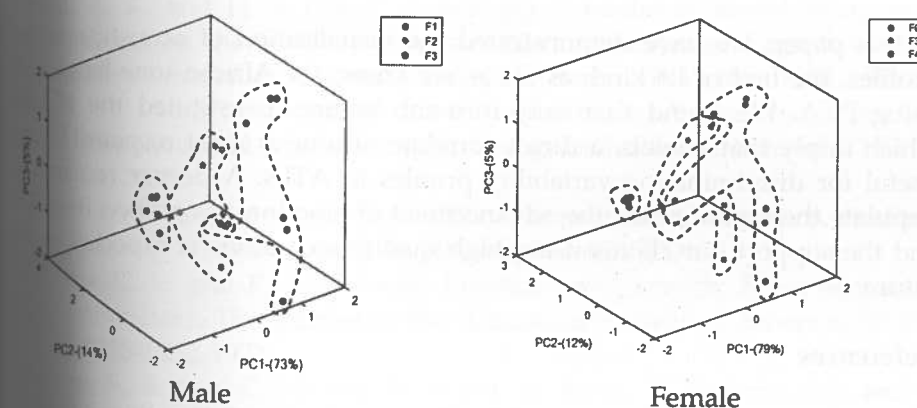
In Table 7, the extraction of the first three principal components at syllable level for obtained speech features of the recorded emotions is presented. As seen in the table, PC1 of the emotion profiles for both speakers does not show significance for F2 and F3 features (for male speakers), and F1 and F4 features (for female speakers).

Table 7: Extraction of the first three components for syllable unit

Speech feature	Principal component						
	Male speaker				Female speaker		
	1	2	3	Speech feature	1	2	3
F2_Anger	-1.3316	-0.0416	-1.0427	F1_Anger	-1.3357	0.0016	-0.2396
F2_Fear	-0.9521	1.1708	0.0284	F1_Fear	-1.2507	0.4748	-0.0627
F2_Joy	-0.8108	1.1629	-0.2291	F1_Joy	-1.2218	0.4258	-0.1029
F2_Normal	-1.2004	0.0012	0.3795	F1_Normal	-1.3479	0.0366	0.0715
F2_Pride	-1.1719	-0.0120	0.3235	F1_Pride	-1.3278	0.0377	0.1261
F2_Sadness	-1.1450	-0.0459	0.1130	F1_Sadness	-1.3494	0.0554	0.1842
F2_Surprise	-1.0580	0.3108	0.9626	F1_Surprise	-1.2544	0.1512	0.3717
F3_Anger	-0.4310	-0.6811	-1.8223	F3_Anger	0.0579	-0.8558	-1.5995
F3_Fear	0.4597	1.4244	-0.3767	F3_Fear	0.5014	1.5222	-0.5718
F3_Joy	0.2978	1.3791	-0.2858	F3_Joy	0.4377	1.3996	-0.3625
F3_Normal	-0.2833	-0.5797	0.2876	F3_Normal	0.1706	-0.7887	-0.0768
F3_Pride	-0.2653	-0.5762	0.3173	F3_Pride	0.2055	-0.7534	0.1686
F3_Sadness	-0.1624	-0.6289	0.3214	F3_Sadness	0.2512	-0.7454	0.3720
F3_Surprise	-0.0294	-0.0537	1.5948	F3_Surprise	0.3319	-0.0061	2.0097
F4_Anger	0.5887	-1.3983	-2.5719	F4_Anger	0.7537	-1.2771	-2.2892
F4_Fear	1.8921	1.5552	-0.3047	F4_Fear	1.2656	1.9577	-0.6281
F4_Joy	1.7243	1.4241	-0.5394	F4_Joy	1.2669	1.8717	-0.3199
F4_Normal	0.8765	-1.3062	0.2383	F4_Normal	0.9035	-1.1886	-0.2251
F4_Pride	0.8189	-1.2561	0.2956	F4_Pride	0.8866	-1.0982	0.1778
F4_Sadness	0.9636	-1.3247	0.2936	F4_Sadness	0.9785	-1.1003	0.4498
F4_Surprise	1.2195	-0.5240	2.0171	F4_Surprise	1.0765	-0.1207	2.5466

The visualisation plots in Fig. 3 indicate that all the selected features separate into independent clusters. Hence, in male speakers, F3 and F4 features show high features variability with the most variance captured by PC1 (57%), while PC2 (29%) and PC3 (5%) captured the least variances. Similar observations go for female speakers with the most variance captured by PC1 (74%), while PC2 (19%) and PC3 (4%) captured the least variances. F2 and F1 features appear to show close similarities in the emotion profiles for

male and female speakers, respectively, but the bonding appear stronger in female speakers than male speakers. Hence F3 and F4 features constitute high variability emotion profiles, and are useful for investigating emotion feature variability in Ibibio.

**Fig. 1: Visualisation of sentence level principal components for male and female speakers****Fig. 2: Visualisation of word level principal components for male and female speakers**

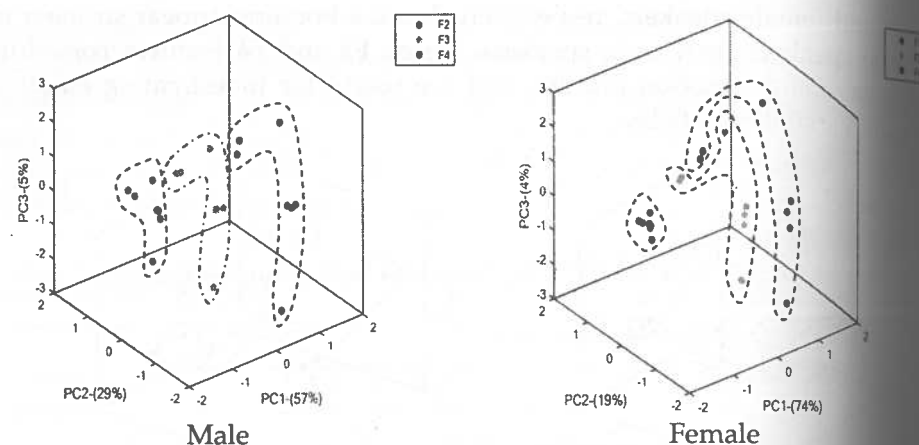


Fig. 3: Visualisation of syllable level principal components for male and female

7. Conclusion and Future Research Direction

In this paper, we have demonstrated the visualisation of acoustic-emotion profiles, the first of its kind, as far as we know, for African tone languages, using PCA. We found that only formant features constituted the PCDFs, which imply that vowels, a direct correlate of tone is most responsible and useful for discriminating variability profiles in ATLS. A deeper research to populate the literature for the advancement of emotion recognition in ATLS, and the support our claims using high quality recordings is expected in the future.

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Linguistic Landscape in Kano: The Place of Hausa¹

Sabi'u Alhaji Garba

Abstract
This paper looks at the language of advertisement signs in Kano, a major city of the Hausaland, with focus on Hausa language. The linguistic landscape of one of the main streets in the city, Sabon Titi, which spans from Tal'udu round about in Gwale LGA and traverse in front of the Emir's Palace up to Kofar Mata in Municipal LGA, has been analyzed. What is immediately noticeable is the high level of absence of Hausa, with English dominating the scene. Hausa is nearly absent from the linguistic landscape. The ubiquitous presence of English signage noticeable around Sabon titi road, where native Hausa make up 95 per cent of the population is alarming. Visitor(s) to Kano city may need to be reminded that the city is a Hausa one as in the sights of the visitor(s) are English signage all over on every shop, restaurant etc that welcome them. This does not reflect the Hausa culture and history. It is a poor and misleading representation of what Kano is all about, as the city is transforming from a traditional Hausa community into an English city. This is so despite Hausa language's prestige, its literary tradition, its relatively high literacy by the inhabitants of the city to whom it is a native language and its being used in many domains in the city: home, school, markets, media etc. This situation is due to various factors, including colonialism which facilitated English to be an official language, globalization and the changing attitude of the Hausa people toward their language. However, caution must be taken not to infer a direct relationship between the language of the LL and the language use in the area of study in other domains such as the homes, markets, village/city square, mosques and broadcast media, particularly radio, where Hausa dominates the scenes. Thus, it does not suggest that the residents of the area speak English more than Hausa, far from that. This was done by analyzing the data collected from the bottom-up linguistic landscape which involves private advertisement signs, shop signs, building names, bookshops, travel agencies, meat selling points, boutiques, saloons etc, quantitatively.

1

¹*This paper was earlier presented at the Hausa International Conference themed: The Hausa Nation: Past, Present and Future, organized by the Department of African Languages and Cultures, Faculty of Arts, Ahmadu Bello University, Zaria, Nigeria, held at the ABU Main Campus between 31st July And 4th August, 2017, but has not been published anywhere.

The study was anchored on the sociolinguistic theory of public signage as propounded by Spolsky (2009). To ensure a considerable presence of Hausa on signs, this study recommends that the effort towards that should be made to be a communal one. The community should make effort to work towards that. The business owners may be encouraged to adopt a Hausa commercial signage or even adopt bilingual signage rather than English-only signage that is presently dotting the space in Kano.

1.0 Introduction

The concept of linguistic landscape, according to Sutherland (2015:148), Barni et al (n.d:2), was first drawn by Landry and Bourhis (1997) in their seminal work on ethno linguistic vitality and signage in Canada where they refer to linguistic landscape (henceforth LL) as "Visibility of languages on objects that mark the public space in a given territory, region, or urban agglomeration". Akindele (2012:2) quoted Landry & Bourhis (1997:25) defining linguistic landscape as "the language of public road signs, advertising billboards, street names, place names, commercial shop signs, and public signs on government buildings combines to form the linguistic landscape of a given territory, region, or urban agglomeration". Ben-Rafael et al. (2006:14) in Akindele (2012:2) define the linguistic landscape as referring to 'any sign announcement located outside or inside a public institution or a private business in a given geographical location'. Landry and Bourhis (1997:25) and Ben-Rafael et al. (2006:14) are almost saying the same thing but in different wordings. From the foregoing, we can see LL as any sign, in written and visual forms, displayed in a particular place to point at a particular item with a view to attracting the attention of the people toward it for the purpose of advertisement, direction, notice, warning etc.

Linguistic landscape is basically divided into two: top-down and bottom-up (Ben-Raphael e.al. (2006), Malinowski (2009) and Shohamy et al. (2010) in Akindele (2012:7)). Top-down refers to "elements used and exhibited by institutional agencies which in one way or another act under the control of local or central policies" ... Bottom-up elements, on the other hand, are "utilised by individual, associative or corporative actors who enjoy autonomy of action within legal limits" (Ben-Rafael et al. 2006: 10). Top-down LL items, according to them, include those issued by national and public bureaucracies and include public sites, public announcements and street names. Bottom-up items on the other hand include those issued by individuals' social actors such as shop owners and companies, including names of shops, businesses, signs and personal announcements (Shohamy et al. (2010) in Akindele (2012:7)).

The paper, mainly paid attention to the bottom-up type of LL, looked at the position of Hausa in the linguistic landscape of a particular area in

Kano, a major city of the Hausaland. This was done by analyzing the language(s) of advertising signs, building names, billboards, shop signs, restaurants etc. The study was anchored on the sociolinguistic theory of public signage as propounded by Spolsky (2009).

From a sociolinguistic perspective, Spolsky proposes three relevant conditions that determine the choice of languages in a sign: 1) "write in a language you know"; 2) "write in a language which can be read"; 2) "write in a language which can be read by the people you expect to read it;" and 3) "write a sign in your own language or in a language with which you wish to be identified." (2009: 33).

2.0 Linguistic Landscape: A Brief

According to Huebner (2016:2), the Landry and Bourhis's seminal paper in 1997 made research in language signs to become an important branch of sociolinguistics, drawing increasingly more attention on the part of sociolinguists and other academics in different countries despite the fact that it dated back to the 1970's (Backhaus, 2007, p. 12; Spolsky, 2009, pp. 26-27). The Landry and Bourhis article inspired a number of subsequent papers using the term "linguistic landscape" which began making the conference circuit of the American Association for Applied Linguistics (Arlington Virginia 2003, Portland Oregon 2004) and the European Second Language Association (San Sebastian Spain 2004) panel presentations. Four idiosyncratic papers from these panels were first published in the *International Journal of Multilingualism* (Vol. 3:1, 2006) and in the same year reprinted as a monograph by Multilingual Matters (Gorter 2006). Whether or not the study of linguistic landscape represented "a new approach to multilingualism" (Gorter 2006) or simply an often neglected source of sociolinguistic data, these early papers contributed to our understanding of the symbolic construction of the public space through an examination of the use of language in multilingual signs, code-switching and hybrid varieties. At the same time these papers, including my own, were heavily quantitative, narrowly language-focused and struggling to define geographic territory, units of analysis and relative language prominence in multilingual signs (Huebner 2016:2).

As the number of conference papers and panels on linguistic landscape grew, it became apparent that a conference focusing specifically on LL was both feasible and desirable. In 2008, the first "Linguistic Landscape Workshop" was convened in Tel Aviv, resulting in a second publication dedicated to LL (Shohamy and Gorter 2009). Seven subsequent linguistic landscape workshops have been held at a variety of international sites on three continents: 2009 – Siena, Italy (Siena University for Foreigners), 2010 – Strasbourg, France (University of Strasbourg), 2012 – Addis Ababa, Ethiopia

(Addis Ababa University), 2013 – Namur, Belgium (University of Namur), 2014 – Cape Town, South Africa (University of the Western Cape), 2015 – Berkeley, California, USA (University of California), 2016 – Liverpool, England (Liverpool University (Huebner 2016:2)).

As at the time of writing, plans are being made for Linguistic Landscape Workshop 9 scheduled for Luxembourg in the spring of 2017. Since the first workshop, LL has become the object of serious academic research, resulting in several single authored and edited volumes, numerous articles in international journals, including its own disciplinary journal (*Linguistic Landscape: An International Journal*, John Benjamins Publishing Company, Amsterdam and Philadelphia), MA theses, PhD dissertations, and at least one dedicated web site. (See Robert Troyer's review in this volume for a listing of some of the primary resources in the area.) One can now find papers on linguistic landscape at professional meetings and conferences in sociolinguistics, anthropology, sociology and education. A 516 item bibliography compiled by Robert Troyer devoted to LL studies can be found at www.zotero.org > groups > linguistic landscape bibliography (Huebner 2016:2).

Reviewing some of the LL works will help us give a clue to understanding the field very well. Ben-Rafeal et al, (2006) compared patterns of LL in a variety of homogeneous and mixed Israeli cities, and in East Jerusalem. The groups studied were Israeli Jews, Palestinian Israelis and non-Israeli Palestinians from East Jerusalem, most of whom are not Israeli citizens. The study focused on the degree of visibility on private and public signs of the three major languages of Israel-Hebrew, Arabic and English. Their study revealed essentially different LL patterns in Israel's various communities: Hebrew-English signs prevail in Jewish communities; Arabic Hebrew in Israeli-Palestinian communities; Arabic-English in East Jerusalem. Further analyses also evince significant – and different – discrepancies between public and private signs in the localities investigated. All in all, LL items are not faithfully representative of the linguistic repertoire typical of Israel's ethno-linguistic diversity, but rather of those linguistic resources that individuals and institutions make use of in the public sphere. Tulp (1978) in Akindele (2012:2) examined the languages of commercial billboards in Brussels. The purpose was to demonstrate how language usage patterns on these signs have been contributing to the city's Frenchification. He assumed that the visibility of a language in a public space is vital for its perceived ethno-linguistic vitality. Tulp focused on three large billboards in and around Brussels. The areas selected included major tram, metro, and bus routes. The findings show that French dominates the linguistic landscape. Sutthinaraphan's (2016:68) work explored multilingualism in advertising signage on the Skytrain in Thailand. His finding showed that approximately 87 percent of the data were written in either English alone or bilingual Thai-English. In addition, the 13% written exclusively in Thai script contained

English borrowings. That the use of the English language is ubiquitous in an English as a Foreign Language (EFL) context like Thailand. This study intends to contribute to this development in Kano, Nigeria. Thus, this paper aims to begin the first steps in filling this gap by investigating the place of Hausa in the bottom-up type of LL in one of the main streets i.e. *Sabon Titi*, that span from *Tal'udu* Roundabout and traverse in front of the Emir's Palace up to *Kofar Mata*, in Kano, a major city of the Hausaland.

2.1 Language and Culture in Linguistic Landscape

The issue of language to be used in the LL is very central. Hence, researchers tried to proffer some guidelines on the choice of language(s) to be used in order to achieve the set goals as well as the benefits language(s) being used in the LL derive. Linguistic landscape signs, according to Barni et al (n.d.:4), describe the identity of a city and almost 'speaks the language' of its inhabitants at a moment in time'. What this suggests is that the language of the inhabitants of an area, territory or region should be the one to be used in the LL of that particular place. This may be why Landry & Bourhis, (1997 and Cenoz & Gorter, (2009:56) in Akindele (2012:3) averred that 'LL indicates the borders of the territory of linguistic group. Ben-Rafael et al. (2006:8) note that LL constitutes the very scene -made of streets, corners, circuses, parks, buildings-where society's public life takes place', and it serves as the emblem of societies, communities, and regions (Akindele 2012:3). However, this may not be generalized as many communities, regions do not have this opportunity as the LL in their areas are not written in their language(s). The case in point is Kano, the subject of the present study. This is so even with the submission of Shohamy (2006:115) in Akindele (2011:5) that 'the presence or absence of languages in public space communicates symbolic messages about the importance, power, significance, and relevance of certain languages or the irrelevance of others'. The languages used in public signs indicate what languages are locally relevant, or give evidence of what languages are becoming locally relevant (Shohamy 2010, Kasanga 2012 in Barni et al, n.d.: 4). Ben-Rafael et al. (2006) assert that the LL can be seen as a vehicle for the presentation of self and as a community identity marker. In Richmond, a Canadian city, according to Achiam (2015), the city inhabitants expressed concern on the fact that many signs are in languages other than English. This led to some public concern about the need to regulate signs to include English.

While the people of Kano City, especially the Hausa native speakers, are indifferent on the near absence of Hausa in the advertisements, other communities, such as Richmond City in Canada, are concerned with the absence of their language(s) in the advertisement as a result of dominating Chinese-only signs in the city. Hopper (2014) reports that, 'Last year, two activists appeared in front of Richmond City Council with a 1,000-signature petition and a plea to force local businesses to advertise in one of Canada's

official languages'. To show the seriousness attached to the concern of the inhabitants of Richmond, Hopper (2014) reports 'Richmond council candidate Carol Day and Michael Wolfe issued a statement saying they would address Chinese-only signage if elected, and pursue "potential steps to address the issue"'.

The ubiquitous presence of English signage noticeable around *Sabon Titi* road, where native Hausa make up 95 per cent of the population, is alarming. Visitor(s) to Kano city may need to be reminded that the city is a Hausa one as in the sights of the visitor(s) are English signage all over on every shop, restaurant etc that welcome them. One is greeted by English language in the signage and adverts. This does not reflect the Hausa culture and history. It is a poor and misleading representation of what Kano is all about. This is a phenomenon that should have drawn the attention, or even the ire, of the Hausaists or the language, culture's campaigners, who want to promote Hausa language and culture, as the city is transforming from a traditional Hausa community into an English city. The information signs on this road in a native Hausa neighbourhood are only passing information to the English-reading population. This can be said to have excluded the rest of the community for which these signs are meant for. The English signs placed on businesses are targeted Hausa clients. This has corroborated de Bres (2015:3) where he submits that 'the multilingualism of the advertisements fulfills symbolic (and fundamentally commercial) purposes rather than reflecting the linguistic realities of its target audience, in whose societies these languages do not perform a communicative function and many of whom may not understand the languages used at all'.

This notwithstanding, the use of city signs and urban symbols could tell a lot more about the culture of a place than history ever could and could also be used as a means for language learning and language comparison (Barni et al, n.d.:11). This was reinforced by Reh (2004:38) in Akindele (2012:2) who emphasized that the study of a linguistic landscape enables conclusions to be drawn regarding, among other factors, the social layering of the community, the relative status of the various societal segments, and the dominant cultural ideals'. Hewitt-Bradshaw (2014:160) notes that 'many texts in the landscape are identity texts, which provide indigenous sources of knowledge about self and community, and thus provide educators with opportunities to engage students in ways that allow them to read, understand, and analyse community texts, and, further, to question such texts in more socially responsive ways. In this sense, LL can be viewed as language in use that represents individual, collective, and national identities. Through the study of the language landscape that surrounds them, students learn to understand their history and culture, of which their indigenous language is a part'. It is in view of this, as shown by Akindele (2012:3), that, 'Some state and regional authorities have included in their language policy

rules about the languages to be used on signage. In Thailand, it is obligatory by law to use at least Thai, still English is prominent on many signs (Huebner 2006 in Akindele (2012:9). Regulations related to LL go side by side with a language policy for the use of languages in education, the media, social and economic life or other domains Akindele (2012:3). However, in Nigeria, such regulations do not exist; and if they exist, they are not observed. Hence, one sees language such as English, Hausa, Ajami, Arabic etc on shops signs, buildings, restaurants etc in Kano, Nigeria, with English taking considerable part of the LL.

3.0 Kano and its Language Situation

Kano is no match for any other Hausa 'state'. Ahmed and Daura (1970:8) note that "Kano, has, for centuries, been the most urbanized and sophisticated of the Hausa City-States". Bello (1992:3) notes that "Kano is the largest single Hausa city in Northern Nigeria". It is the most important urban agglomeration in northern Nigeria (Wolff 1991:22) as well as the traditional commercial navel of Hausaland (Wolff 1991 and Sani 2009:5).

Kano drew many people from far and near, Arab, European, African and Nigeria indigenous people, which has had an important influence on its language situation. Traditionally, Kano has been a Hausa phone area. Arabic has been a language of religion since the coming of Islam in Hausaland, English mainly functions as an official language since independence. Hausa has been a spoken language before the writing system in Roman alphabets was introduced before the 20th century (Yahaya 1988), *Ajami*, Hausa writing in Arabic alphabet (Yahaya 1988 and Birnin Tudu 1990), has been a written language since its debut before the 17th century (Yahaya 1988) and Arabic has also been a spoken language, especially in religious affairs, as well as a written one to some extent. Even though English is the official language, Hausa has been the language of the law, especially at lower/area courts, English language of administration in principle with Hausa being the one in practice. Hausa is the language of the media (broadcast), and used across the city on a daily basis in many domains such as markets, schools, mosques, shopping, political and government discussion. Taiwo (1976:408) corroborates this assertion that "Among the Nigerian languages, the status of Hausa is relatively high in the Hausa-speaking areas and it is deliberately promoted. The emir usually speaks Hausa in his emirate even when he is fluent in English and his audience is English-speaking. Hausa is freely spoken in the offices and the shops, in some of which articles are labelled in Hausa. Road notices in towns are in Hausa". Shuaib (2007) points at how Emir Ado Bayero of Kano, for instance, spoke Hausa to the Queen of England and President of United State of America on their separate visits to his palace. This has been the practice till date. The present Sarkin Kano, Muhammadu Sanusi II, is keying into this as he responds to

visitors/audience in Hausa and a Council member interprets in English or Arabic to the visitors/audience (Garba, 2016).

To show the vitality of Hausa in radio programmes in Nigeria and in Kano in particular, Garba (2013:9) quotes the Nigeria Broadcasting Commission (2011) in its content analysis of stations' programs schedules domiciled in Kano and Jigawa States for the fourth quarter of 2011, which shows that amongst the Arabic, Hausa, Fulfude, English, Ebra and Hindu languages, Hausa language stands out with the highest airtime. To cite an example, Hausa has the amount of airtime in the following radios. Rahama Radio, Kano, 87%; Pyramid Radio Madobi, Kano, 74%; Freedom Radio, Kano, 55%; Radio Kano FM 41.2%; Radio Kano AM 88.2% and Radio Jigawa, Dutse, 82%. English, however, is the language chosen for LL. This is happening even with the increasing status of Hausa, the native language of the area under research, as a written language. This was facilitated by the standardization it has achieved over the years. Hausa has been progressively standardized over the 19th and 20th century which has now resulted in a standard variety with an official orthography, a monolingual dictionary and many bilingual ones and grammar including a reference grammar. Hausa is increasingly being used in schools, the media both print and broadcast which also utilize written platforms and particularly the new media. Although the status of Hausa as one of the major Nigerian languages, with more speakers and most widely used among the country's major languages, is not yet designated as an official language. In written context it exhibits/displays similarities to major world languages, but it is presently, according to the LL data gathered, not a major language of advertisement signs in Kano, a major centre of Hausaland.

4.0 Methodology

4.1 Data Collection

The data were collected in 2016 on the streets of Kano city. This selection was based on my personal observations on its homogeneity as it is almost one hundred per cent resided by the native Hausa speakers, except pockets of some non-Hausa resident communities such as Yoruba and other Northern tribes. The choice of the research area is spurred by the purpose of this study to unearth the position of Hausa language in the linguistic landscape of *Sabon Titi* road. The signs placed by the shops/businesses owners provide information on their goods and services and to call the attention of their prospective customers. Contents of commercial shops' sign, advertisements, names on buildings found on the street were collected with the assistance of a locally trained field assistant. A total of 360 contents on signage were collected and examined for language(s) used and the relative prominence of

the language(s) used on the signs. The items were gathered and classified according to the frequency of the language(s) used in the signs.

4.2 Data Analysis

In the analysis, attention was paid to the presence or absence of some languages: native Hausa language, Nigeria's indigenous language(s), Arabic and English. The frequency of the language used provides vitality of specific languages in Kano. The tables below provide the findings.

4.3 Language Used and Language Distribution in Signs

Table 1: Overview of all languages used in all of the signs

Languages	Number of Signs	%
English only	335	93.05%
Hausa only	13	3.6%
English and Hausa	10	2.7%
English and Arabic	2	0.5%
Total	360	100

The table indicates that English only constitutes the highest number of LL in the study area. It is followed by Hausa, a native language of the area, and Arabic a foreign language. In terms of occurrence of bilingual signs, English and Hausa are the highest while English and Arabic followed. There was no occurrence of Hausa and Arabic or any other indigenous Nigerian language(s). The area under study is mainly residential and shopping one dominated by bottom-up contexts.

Table 2: Distribution of Languages in Monolingual Signs

Languages	Number of signs	%
English	335	96.3%
Hausa	13	3.7%
Total	348	100

The above table indicates that English constitutes the highest number of monolingual signs in the study area, and followed by Hausa, but with a very large, unbelievable margin. However, the monolingual signs have an attachment of prefix of names suggestive of Hausa such as: Yusuf Barbing Saloon, As-sabah Computer Centre, Alfijir Electrical & Electronic, A. M. Investment: Dealer in all kind of recharge card, Ja'iz Tailoring and Sales of Unisex, Haidar Stores, Dandago Healthcare Patient Medicine Shop, Mandawari Medical Centre, Al-Amir Restaurant. The reason for placing them in monolingual signs is that the attached names are just mere business

names but the goods and services being advertised are in English, hence, classifying them as monolingual signs.

Table 3: Distribution and placement of Languages in Bilingual Signs

Languages	Number of Signs	%
English and Hausa	10	83.3%
English and Arabic	2	16.6%
Total	12	1000

The above table shows that LL in the study area is dominated by the bilingual signs of English and Hausa and remotely followed by English and Arabic. This can be explained in terms of the fact that there are more English-Hausa bilingual than English-Arabic speakers. Meanwhile, in all the bilingual signs, English comes first and is mostly written in bold bigger than the two languages: Hausa and Arabic. For instance, Well Care- *LafiyaJari*, Askin Berbing, *AskinAska*; A.B.K Communication: *Ana ba da sarin kati*; Sa'ad bin Abi Wakas Islamic Medicine: *Rukiya ta Shari'ah*, Al'Ansar: we sell *Fura natural*, etc. just like in Akindele (2012), the placement of the languages seem to be suggestive of Nigeria's language policy which recognizes English as the official language and Hausa a national language.

5.0 Findings and Discussion

The findings showed that the LL in the study area exhibits three main languages in monolingual and bilingual signs: English, Hausa and Arabic. However, the use of English dominated the data collected. The LL in the study area reflects the effects of colonization, and current trends which seems to put English language as the major language of the world, which brought about a decrease in the use of Hausa, at least in written form, as determined by the study. On colonization, this corroborates Salawu's (2012) assertion that "African languages, generally, are suffering neglect due to the historical fact of colonization...". This study confirms Akindele's (2012) submission that English dominates the landscape of Anglo African countries today. The dominant presence of English in the data obtained in this study has corroborated Piller (2003: 175) in de Bres (2015:12) where he notes: "The strong presence of English in the data relates to the global spread of English, which is now 'near-universal' in advertising around the world. English is present in advertisements to varying degrees, from slogans in advertisements mainly in other languages to full text advertisements in English". This is why (Shohamy, Ben-Rafael & Barni, 2010; Jaworski & Thurlow, 2011 and Blommaert, 2013) in Sutthinaraphan (2016:53) remark that 'Linguistic landscape studies have regularly shown the important role that English plays as an international language in the world today'. This fact is reflected in virtually all studies of linguistic landscapes world-wide (Sutthinaraphan

2016:53). Amidst this world-wide dominant posture of English, Akindele (2012:9) notes that, 'English is more of an index of globalization than a means of communication. This is so because only a small fraction of the population speaks English in official contexts and in business sectors as study in Gaborone revealed'. This, however, is not only limited to Botswana where Akindele (2012) conducted his study, but applicable to this study area. This is because; Fafunwa (2009) in Alyebo (2012) admits that, "over 50% of Nigerians are illiterate". This means, they are not able to read or understand any other language other than their native language. The point being made here is that, more than half of Nigeria's population neither understands nor speaks English. Thus, the English dominated LL in this study may not serve its communicative purpose as only a small fraction of the population speak English in official context and in the business sector, as well. Hence, the signs in *Sabon titi* should not be seen as a reflection of the reality of language use in Kano.

From the above findings and discussions, we can deduce that the owners of the businesses in the area under study did not take into cognizance some of the conditions determining the choice of languages in a sign as proposed by Spolky (2009:33). They did not write in the language they know. They did not write in the language which can be read by the people they expect to read and they did not write in their own language, but only wrote in the language they wish to be identified with i.e. English.

The near absence of Hausa in the LL of the study area has denied the language and culture of so many advantages being derived from the LL. This is because, Barni et al, (n.d.:11) averred that 'City signs provide an easy, visual and clear way to promote language and culture while they also provide excellent material for language learning in 'real life'...'. Landry & Bourhis (1997:143) in Akindele (2012:7) state that "...absence of the in-group language from the linguistic landscape can lead to group members devaluing the strength of their own language community; weaken their resolve to transmit the language to the next generation, and sap their collective will to survive as a distinct language group". Here, Hausa as an in-group language seems to be near absent in the LL of the area under study in Kano, just as was found out by Akindele (2012) in Gaborone, Botswana. The colonization and globalization have resulted in a proliferation of English signage noticeable around *Sabon titi* road, where native Hausa make up 95 per cent of the population. This is a phenomenon that should have drawn the attention, or even the ire, of the Hausaists or the language, culture's campaigners, who want to promote Hausa language and culture, as the city is transforming from a traditional Hausa community into an English city. Similarly, this may not be unconnected with the status of English as a global language (Crystal, 1997), English is widely regarded as having become the global language (Graddol, 2000:2).

In order to ensure the quest for a considerable presence of Hausa on signs, this study recommends that the effort towards that should be made to be a communal one. The community should make efforts to work toward that. The business owners may be encouraged to adopt a Hausa commercial signage or even adopt bilingual signage rather than English-only signage that is presently dotting the space in Kano.

6.0 Conclusion

This paper has beamed its search light on the language use in written advertisement/signs and found out that the city is moving towards English-only written signs, based on the data obtained from the bottom-top linguistic landscape of *Sabon titi* in Kano City. This is a result of colonization, ineffective language policy and planning and globalization. While the dominance of Hausa was expected in the LL of the area in question, the results revealed a considerable presence of English in the bottom-up LL and a near absence of Hausa, which is the native language of the area under study. The result has shown a shifting balance from the language with a longer history in Hausaland which was the main traditional written language, *Ajami*, to English as a language of written signs. However, caution must be taken not to infer a direct relationship between the language of the LL and the language used in the area of study in other domains such as homes, markets, village/city square, mosques and broadcast media, particularly radio, where Hausa dominates the scene. Thus, it does not suggest that the residents of the area speak English more than Hausa, far from that. The study suggests the waning of Hausa culture and language, albeit in written form, right in the heart of Hausaland. The study revealed the absence of any indigenous Nigerian language, not even Fulfulde, as no single sign was seen in any other indigenous Nigerian language apart from Hausa. This is understandable as the area does not have substantial non-Hausa residents.

Further research should focus on other Hausa cities or even areas in Kano to see if similar situations like *Sabon titi* in Kano can be found. Future research may also tilt towards investigating reasons concerning the choice of language(s) in the signs by the shop owners, and the type of clientele that patronize them. Top-down LL may also be paid attention to as the present study only looked at the bottom-up LL in the area in question.

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Humour in French and Igbo Versions of Achebe's *Things Fall Apart*

Ihechi Obisike Nkoro

Abstract Language, Literature and Translation are necessary for national development. African natural multilingualism compounded by colonial and religious factors has ensured that African literature can be expressed in African and non-African languages. No society can experience true development if it neglects its literary artists who through aesthetic use of language inform, instruct and entertain in such a way that the ideas expressed by them if properly harnessed, turn the weaknesses of the society into strengths that lead to development. The focus of this study is on humour in *Things Fall Apart* and its French and Igbo translations. *Le monde s'effondre* (1966), the first French version of *Things Fall Apart* translated by Michel Ligny and the Igbo version *Ihe Aghasaa* translated by Izuu Nwankwo (2008) will be the versions for the study. Our method of study will be analytical and comparative as humour shall be investigated in the source text and the two target texts. Our theoretical framework will be based on a communicative approach to translation in order to understand how Achebe's French and Igbo translators reproduced the humour in the original work in their translations. Our secondary sources for the study will include studies on translation notably Nida (1991, 2006), Simpson (2010), Ajunwa (2014), Baker (2014), studies on literary appreciation and humour such as Azodo (2014), Okoh (2015), Okugbe & Ekundayo (2015) and Mkpa (2017). The study reaffirms the entertainment and leisure aspect of literature and its implications for national development as it projects Achebe's original witty message and its rendering by his Igbo and French translators in their efforts to multiply Achebe's readership.

Keywords: Achebe, humour, translation, French, Igbo, National development

Introduction

Humour, entertainment and leisure are indispensable ingredients in keeping the spirit, soul and body together. Every human endeavour is often geared towards meeting physical, mental or emotional needs by harnessing properly the flora and fauna in a given environment. Literary creativity seeks to educate, instruct, entertain and create beauty through the artistic use of language. Obi (2014: 103-104), points out that functions performed by fiction and other literary modes include giving us pleasure and using language in especially powerful ways, to tell us something and to delight us. World literature exists because the literatures of different lands and cultures are

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Abstr**act**
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Introduction

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exported to other lands and cultures through translation. The global impact of every literary work is multiplied whenever that literary work is translated into another language. According to Bellos (2011:283), "A relatively uncontentious way of saying what translation does is this: it provides for some community on an acceptable match for an utterance made in a foreign tongue." Writing "On African Cultures, Literatures and Languages": an Interview with Akachi Adimora Ezeigbo, Azodo (2014:367) notes that translation is "way forward in the development of African languages..." The study sets out to evaluate humour in Achebe's *Things Fall Apart* and its reproduction in the French version *Le monde s'effondre* translated by Michel Ligny (1966) and the Igbo version translated by Izuu Nwankwo (2008).

Humour and Entertainment

Chambers 21st Century Dictionary (2004) states that the verb, 'entertain' means among other things, "to provide amusement or recreation for someone while the verb 'amuse' is 'to make someone laugh.'" Furthermore, a joke is defined in this Dictionary as "a humorous story or 'anything said or done in jest' while humour is defined as 'the quality of being amusing.'" In the same vein, Emezue (2012:86) presents a joke as any creative writing, the aim of which is to create humour and provoke laughter. Baruah & Jyoti (2015:194) note that the primary function of riddles is to obtain entertainment while Okugbe and Ekundayo (2015:111) indicate that "Nigerians use pidgin tropes to pass social comments, convey wisdom, criticize, express feelings and create humour". In the same vein, Egya (2010: 18) shows in his study of *A Harvest of Laughters*, that Remi Raji's 'metaphors of optimism for the suffering masses couched in several decibels of laughter are tender, healing and visionary'. Furthermore, (McGraw & Wamer (2011:1), writing on the importance of humour research, opines that "humor is everywhere, for example, laughter is one of the first things you do as a newborn, and, if all goes well, it will be one of the last things you do before you die."

Again, McGhee (2007), writing on how humour contributes to health, says "your sense of humor not only enriches life; it also promotes physical, mental and spiritual health." (http://www.holisticonline.com/Humor_Therapy/humor_mcghee_article.htm). Indeed, recent studies by Adams (2017) and DiSalvo (2017) highlight the therapeutic values of laughter based on scientific facts while Prados-Torreira (2017) draws attention to literary humour as a literary device that enables writers entertain as well as instruct readers on events in the society.

From the Bible, we read: "A cheerful heart is good medicine, but a crushed spirit dries up the bones." (Proverbs 22:17, NIV) and "a time to weep and a time to laugh" (Ecclesiastes 3:4, NIV). In addition, Mkpa (2017:54) presents humour as the "quality of being amusing, comical or funny" and

states that most effective teachers interject their lessons with humour. Literary artists know the recreational and therapeutic importance of humour or laughter and work assiduously to ensure that reading any literary work becomes a pleasurable activity. In what follows, humour and laughter will be used interchangeably as we evaluate the extent to which humour created by Achebe in *Things Fall Apart* is reproduced in the French version *Le monde s'effondre* and the Igbo version *Ihe Aghasaa*. It is noteworthy that 'humour' and 'humor' appear in literature relevant to the study but 'humour' is used in our essay except in citations.

Language, Humour, Translation and National Development

Writing on 'Languages in National Development...' Oyetade (2015:6), points out that "language is what has made possible the development and growth of culture." According to Onuekwusi (2013:11), "it is in literary creativity that man preserves historical and social facts, the remembrance of which may task human memory, through seeming entertainment". Citing Peggy Noonan, American presidential speechwriter, Metcalf (2013:90) writes that 'humour is the shock absorber of life; it helps us take the blows'. It is our view that Achebe's literary humour and other written thoughts geared towards entertainment and teaching of morals will have an increased domestic and national multiplier effect when translated into more indigenous Nigerian languages.

Achebe in French and Igbo Translations

Okoh (2015:5) notes that Achebe is a true colossus who has exerted a great pioneering influence on modern African literature. Okon & Enang (2014:44), among others, note that *Things Fall Apart* alone, which has sold more than 20 million copies worldwide, has been translated into more than 50 languages, including Talan, Spanish, Slovene, Russian, Hebrew, French, Czech and Hungarian." It is noteworthy that Igbo is also one of the world languages into which *Things Fall Apart* has been translated. Our discussion hereafter will be limited to French and Igbo translations of *Things Fall Apart*. *Things Fall Apart* was first translated into French in 1966 by Michel Ligny. Studies by Iheanacho (1997), Aire (2002), Akakuru and Mkpa (1997), Chima (2012), Maduka (2006), Molley (2014) and Nkoro (2016) depict that *Things Fall Apart* and its French version *Le monde s'effondre* have contributed immensely to the development of translation studies, translation criticism, literary criticism and comparative literature. In 2008, Izuu Nwankwo translated *Things Fall Apart* into Igbo. It is noteworthy that the writer has not yet seen any studies on this Igbo version. The absence of comparative studies on the Igbo version motivated the writer to embark on the present study. Although translating humour, joke and pun from one European language into another, features prominently in studies such as Bellos (283-286), Simpson (2010:218), our

study expands this horizon through the inclusion of the Igbo version of *Things Fall Apart*, that is *Ihe Aghasaa*. In what follows, we shall try to show how the humour created by Achebe in *Things Fall Apart* is reproduced in the French and Igbo versions chosen for the study.

Sources of Humour or Laughter in *Things Fall Apart* and their Translation in *Le monde s'effondre* and *Ihe Aghasaa*

Writing on prose translation, Ajunwa (2014:103-104) recognizes narrative techniques such as proverb, pun and metaphor as literary techniques and stresses that the major concern of the literary translator will be to weave the target language, as much as possible, using the same literary techniques present in the theme. Furthermore, Bassnett (2014:108) points out the need to recognize that texts move as contexts change and can never remain static. Again, Vandaele (2010:149), in a study on translating humour, states that 'humor is known to challenge translators.' From a reader-response perspective, we observe that in many instances where Achebe's Characters laughed hilariously, the reader ends up laughing hilariously. Presented here after are some of the ways through which Achebe used words to create humour or laughter in *Things Fall Apart* and how his French and Igbo translators attempted to reproduce the humour or laughter in the source text, in the target texts. These ways are: proverbs, metaphor, comic actions, jocular language, entertainment and leisure, analogy, contrasts and pun or word play. In the presentation, TFA stands for *Things Fall Apart*, LMSF refers to *Le monde s'effondre* while AGHASAA stands for *Ihe Aghasaa*.

1) Figurative language as source of laughter and its translation in French and Igbo

i) TFA: Amalinze the Cat (p.3, Chapter One).

LMSF: Amalinze le Chat (p.9, Chapitre Premier).

AGHASAA: Amalinze onye a na-akpo Nwaologbo (p.2, Isi Nke Mbụ).

ii) TFA: Nwoye... remembered how he had laughed... proper name for a corn-cob with a few scattered grains was Eze Agadi nwayi..., or the teeth of an old woman (p.28, Chapter Four).

LMSF: Nwoye...se rappelait même comme il avait ri...le nom approprié d'épis de maïs ne portant que quelques grains éparpillés était eze-agadinwayi, ou les dents d'une vieille femme (p.47, Chapitre IV)

AGHASAA: p.36 = Nwaoye... chetakwara etu o siri chja ochi ubochi... ezigbo aha a na-akpo oka enweghi mkpuru hie nne bu eze-agadi-nwaanyi (p.36, Isi Nke Anọ).

iii) TFA: Maduka vanished into the compound like lightening...everybody agreed that he was as sharp as a razor (PP.56-57, Chapter Eight)

LMSF: Maduka disparut dans le domane en un éclair...tout le monde s'accorda pour dire qu'il était comme un rasoir. (p.87, Chapitre VIII).

AGHASAA : Mmaduka fepuru ka amuma igwe...ha niile kwenyekwara na ya bu nwata na-atu nkọ ka aguba (P.72, Isi Nke Asatọ)

iv) TFA: Those who knew Amadi laughed. He was a leper, and the polite name for leprosy was 'the white skin' (p.59, Chapter Eight).

LMSF: Ceux qui connaissaient Amadi éclatèrent de rire. C'était un lépreux, et le nom poli pour la lèpre était 'la peau blanche' (p.91, Chapitre VIII)

AGHASAA: Ndi maara Amadi wee dapu n'ochi. Amadi bu ekpenta, ihe a na-akpokwa ekpenta ka o ghara ise okwu bu «oria ochi» (p.77, Isi Nke Asatọ).

2) Proverbs as source of humour and their translation in French and Igbo

i) TFA: Unoka.. the sun will shine on those who stand before it shines on those who kneel under them (p.6, Chapter One).

LMSF: Unoka...le soleil brillera sur ceux qui sont debout avant de briller sur ceux qui sont - à genoux au dessus d'eux (p.14, Chapitre Premier).

AGHASAA: Ndi okenye kwuru na anwu na-eburu uzọ mukwasị ndi otọ tupu onweta ndi sekpu anị n'okpuru fa (p.7, Isi Nke Mbụ)

ii) TFA: When the moon is shining, the cripple becomes hungry for a walk (p.8, Chapter Two).

LMSF: Quand la lune brille, l'envie d'aller se promener démange les infirmes (p.18, Chapitre II).

AGHASAA: Onwa tiwe ije aguwa ngwurọ (p.10, Isi Nke Abụọ).

iii) TFA: A toad does not run in the daytime for nothing (p.16, Chapter Three)

LMSF: Un crapaud ne court pas en plein jour pour rien (p.30, Chapitre III)

AGHASAA: Awọ anaghị agba ọsọ efie na nkịti (p.20, Isi Nke Atọ).

iv) TFA: When mother-cow is chewing grass its young ones watch its mouth (p.56, Chapter Eight)).

LMSF: Quand la mère vache rumine, ses petits observant sa bouche (p.87, Chapitre VIII).

AGHASAA: Nne ewu na-ata agbara ụmụ ya ana-ene ya anya n'ọnyị. Ọọ gi ka Mmaduka neere anya (p.73, Isi Nke Asatọ).

3) Comic actions, jocular language and their translation in French and Igbo

i) TFA: Unoka was able to give an answer between fresh outbursts of mirth (p.6, Chapter One).

LMSF: A la fin, Unoka parvint à donner une réponse entrecoupée de nouvelles explosions de gaieté (p.14, Chapitre Premier).

AGHASAA: N'ikpeazu Ụnọka gbalisiri ike inye ya ụsà, ma ọchị na-enukwa ya enu (p.6, Isi Nke Mbụ)

ii) TFA: As soon as Unoka understood what his friend was driving at, he burst out laughing... (p.6, Chapter One)

LMSF: Des que Unoka eut compris ou son ami voulait en venir, il éclata de rire... (p.13, Chapitre Premier)

AGHASAA: Ozigbo Unoka ghọtara ebe enyi ya na-aga, ọ dapuru n'ochi... (p.6, Isi Nke Mbụ)

iii) TFA: Unoka...fresh outbursts of mirth (p.6, Chapter One).

LMSF: Unoka... il éclata de rire (pp.13-14, Chapitre Premier)

AGHASAA: P.6= Ụnọka...ma ọchị ka na-enukwa ya enu (p.6, Isi Nke Mbụ)

iv) TFA: Obiako has always been a strange one... "Ask my dead father if he ever had a fowl when he was alive". Everybody laughed heartily... (p.16, Chapter Three).

LMSF: Obiako a toujours été un drôle de corps... «Demandez à mon père défunt s'il a jamais eu un poulet à lui quand il était en vie. Tous rirent de bon coeur (p.30, Chapitre III).

AGHASAA: E nwesiri ka Obiakọ si eme... "Jụọ nna m nwurụ anwụ ma ọ dị ọkụkọ ọbuna o nwere mgbe ọn ndụ? » Onye ọbula nọ n'ebe ahụ dapuru n'ochi belu ọọsọ Okonkwọ onye nke jichara eze ya... (21, Isi Nke atọ).

4) Entertainment and Leisure (times, seasons, Festivals,) and their translation in French and Igbo

According to Uwadiogwu (2006: 2) "leisure time is free time whereas recreation refers to all activities people do that involve the use of discretionary time (leisure time). Recreation is a wholesome activity which is taken up for pleasure and nothing for pleasure." In addition, Akas (2016:203), notes that indigenous dance culturally provides a way for the whole community to meet together to enjoy themselves and evaluate themselves and their community while being entertained through dance movements. Presented hereafter are instances of entertainment and leisure (times, seasons, Festivals) in the original English texts and their rendering in French and Igbo versions.

i) TFA: Carefree Season (p.23, Chapter Four).

LMSF: ... la saison sans souc (p.40, Chapitre IV)

AGHASAA:... mgbe a ka na-ezu ike ọrụ ubi gara aga (p.30, Isi Nke Anọ).

ii) TFA: ... children singing... (p.28, Chapter Four).

LMSF: p.p.47=... les enfants ...en chantant (p.47, Chapitre IV)

AGHASAA: ... Ụmụaka... na-agụ egwu (pp.36-37, Isi Nke Anọ).

iii) TFA: The feast of the New Yam was approaching and Umuofa was in a festival mood (p.29, Chapter Five).

LMSF: La fête de la Nouvelle Igname approchait et une atmosphère de réjouissances emplissait Umuofa (p.49, Chapitre V)

AGHASAA: Emume iri ji ọhụrụ na-akpudewe nso, Ụmụọfịa niile na-akwadebekwa (p.38, Isi Nke Ise).

iv) TFA: ...the crowd roared and clapped (p.37, Chapter Six).

LMSF: ... la foule rugit et battit des mains (p.61, Chapitre VI).

AGHASAA: ... ụzụ tọọ... (p.48, Isi Nke Isii).

5) Analogy

i) TFA: Unoka.. He always said that whenever he saw a dead mnn's mouth he saw the folly of not eating what one had n one's lifetime (pp.3-4, Chapter One)

LMSF: Unoka... Il disait toujours que chaque fois qu'il voyait la bouche d'un mort il voyait la folie de ne pas ce qu'on possédait pendant qu'on était en vie (p.10, Chapitre Premier).

AGHASAA: Ụnọka... Ihe ọ na-ekwukari bụ na ọ na bụ ya lee onye nwurụ anwụ anya n'ọnụ na ihe ọ na-ahụ bụnzuzu nke dị na mmadụ ihapụ iri ihe ọ kpatara na ndụ (p.3, Isi Nke atọ)

ii) TFA: Looking at a king's mouth', said an old man, 'one would think he never sucked his mother's breasts (p.21, Chapter Four).

LMSF: "Quand on regarde la bouche d'un roi, disait un vieillard, on croirait qu'il n'a jamais sucé le sein de sa mère." (p.37, Chapitre IV)

AGHASAA: Otu agadi nwoke si na 'e lebe eze anya n'ọnụ ọ dị ka ọ ñughị ara nne ya' (p.27, Isi Nke Anọ).

iii) TFA: He was like the man in the song who had ten and one wives and not enough soup for his foo-foo (p.42, Chapter Seven).

LMSF: il etait comme l'homme de la chanson qui avait dix et une femmes et pas assez de soupe pour son foo-foo (p.68, Chapitre VII).

AGHASAA: Onye ahụ dika onye ahụ a na-agụ n'egwu onye nwere nwunye iri na otu mana o nweghị ofe zuuru ya iji loo ụtara (p.55, Isi Nke Asaa)

iv) TFA: It is like Dimaragan who would not lend his knife for cutting up dog-meat because the dog was taboo to him, but offered to use his teeth (p.55, Chapter Eight).

LMSF: C'est comme Dmaragana, qui refusait de preter son couteau pour couper la viande de chien parce que le chien était tabou pour lui, mais qui offrait de se servir de ses dents (p.86, Chapitre VIII).

AGHASAA: Ihe dika Dimaragana na-asọ anụ nkita, ma na o ji eze ekere ya ụmụaka (p.71, Isi Nke Asatọ).

v) TFA: ... These court messengers... They were called kotma, and because of their ash-coloured shorts they earned the additional name of Ashy-Buttocks (p.139, Chapter Twenty).

LMSF: p.211= ces messagers de la Cour. On les appelait kotma, et à cause de leurs shorts couleur de cendre, ils méritèrent le nom supplémentaire de Fesses-Cendrées (p.211, Chapitre XX).

AGHASAA: ... ndị oje ozi ụlọikpe ndị a... A na-akpọ ha kọtuma, n'ihì n'ikadintuntụ ha na-eyi, e jikwa maka ya akpọ ha ndi Ike Ntuntụ (p.174, Isi Nke Iri Abụọ).

6) Contrasts

i) TFA: ...Jigida and fire are not friends (p.56, Chapter Eight).

LMSF: ...la jigida et le feu ne sont pas amis (p.88, Chapitre VIII)

AGHASAA: ...ọkụ na Jigida adịrọ na mma (p.73, Isi Nke Asatọ)

ii) TFA: You grew your ears for decoration and not hearing (p.56, Chapter Eight)

LMSF: Tu t'es fait pousser des oreilles comme ornement, pas pour entendre (p.88, Chapitre VIII)

AGHASAA: ... Ntị gi bụnụ nke e ji chọọ gi mma ọ bụrọ nke e ji anụ ife (p.73, Isi Nke Asatọ)

iii) TFA: Male and female crime (p.99, Chapter Thirteen)

LMSF: Ce crime était de deux especes, mâle et femelle (p.152, Chapitre XIII)

AGHASAA: Ọchụ dị uzọ naabọ, nke oke na nke nwunye (p.128, Isi Nke Iri Na Atọ).

iv) TFA: Egonwanne... His sweet tongue can change fire into cold ash (p.159, Chapter Twenty Four).

LMSF: Egonwanne... Sa langue mielleuse peut changer le feu en cendre froide (p.243, Chapitre XXIV).

AGHASAA: Egonwanne... Ire uto ya nwere ike me ọkụ ka ọ ghoro ntụ juru oyi (p.200, isi Nke iri Abụọ Na Anọ).

7) Pun or Word play and its translation in French and Igbo

i) TFA: Many people laughed at his dialect... Instead of saying "myself" he always said "my buttocks" (p.116, Chapter Sixteen).

LMSF: Beaucoup riaient de son dialecte ... Au lieu de dire « moi-meme » il disait toujours « Mes fesses » (p.174, Chapitre XVI).

Aghasaa: Ọtụ ụ ndị chiri ọlu Igbo ya ọchi... Kama ikwu "mụ onwe m" ihe ọ na-ekwukari bụ "ike m" (p.146, Isi Nke iri Na Isii).

ii) TFA: "Your buttocks understand our language", said someone light-heartedly and the crowd laughed (p.116, Chapter Sixteen).

LMSF: "vos fesses comprennent notre langage", dit quelqu'un d'un ton léger...et la foule éclata de rire (p.175, Chapitre XVI).

AGHASAA: Otu onye ji njakiri si, «Ike unu na-aghota asusu anyi» Igwe mmadu ahụ dapu n'ochi (p.147, Isi Nke iri Na Isii).

iii)TFA: "your buttocks said he had a son", said the joker (p.118, Chapter Sixteen)

LMSF: «vos fesses ont dit qu'il avait un fils», dit le plaisantin (p.177, Chapitre XVI).

AGHASAA: 149 = "Ike gi si ayi ngaa na o nwere opara," ka onye njakiri mbu ahụ kwuru (p.149, Isi Nke iri Na Isii).

iv) TFA: "So he must have a wife and all of them must have buttocks." (p.118, Chapter Sixteen).

LMSF: "il doit donc avoir une femme et eux tous doivent avoir des fesses." (p.177, Chapitre XVI)

AGHASAA: "Ya mere ọ ga inweriri nwunye, ha dum ga inwesikwanu ike (p.149, Isi Nke iri Na Isii).

Discussion

Our discussion of the data presented above will be guided by the communicative approach to translation which according to Nida (1991:25, 2006:14) considers the paralinguistic and extralinguistic features of the source and target texts and makes our world linguistically and culturally understandable. The data show an appreciable attempt by the French and

Igbo translators of Achebe to reproduce the humour and laughter in the source text in their translations by using equivalent realities. In numbers 1-6 of the data (metaphor, proverbs, comic actions, analogy, contrasts, entertainment and leisure), laughter is reproduced in the target texts essentially through identical linguistic realities except for the proverb "When mother cow..." where an equivalent reality 'ewu' is used in Igbo. The mental photographic picture created through the humorous use of words is successfully reproduced in the target texts in the above examples. However, No 7, that is the use of pun or word play, shows as pointed out by Ozbot (2016:293), certain information that could be savoured by a "domestic audience" could be lost in translation. Indeed, the word play on Igbo words 'ike m' (my buttocks) and the dialectal rendering of 'mụ, /mụ onwe m' (I, myself) as "ike m" which means 'my buttocks' in standard Igbo can only be appreciated fully by a domestic audience. The English source text and the French translation could be helped with notes explaining this pun caused by the use of the Igbo homonyms explained above, that is, words that have the same written or spoken form but different meanings (Agbede 2015:255).

Conclusion

The purpose of the study is to examine the entertainment and leisure aspect of translated literature and its implications for national development. Specifically, humour is evaluated in Achebe's *Things Fall Apart* and its reproduction in the French version *Le monde s'effondre* translated by Michel Ligny (1966) and the Igbo version translated by Izuu Nwankwo (2008). It is observed that Achebe created human in the source text through the use of Figurative language, proverbs, Comic actions, jocular language, times, seasons, Festivals, analogy, contrasts and puns or wordplay. The French and Igbo translators attempted to recreate Achebe's humour in their translation through by adapting the same mechanisms to the target language and culture. Hence, our study shows that Achebe's contributions to the relaxation of his original English readers have also been extended to his French and Igbo readers. Indeed, we need to increase our humour or laughter dosage by reading original and translated literature as a natural antidote to daily stress. Indeed, humour or laughter creation must grow from the individual to the local community and from the local community to the national and international communities through domestic and intercultural writings and translations.

Though translation like most human activities involves a measure of loss especially in the aspect of translating certain sociolinguistic realities, the study shows that there may also be a gain even in translating humour. For instance, whereas the French translator like the author used literal translation in certain cases to create humour emerging from word play based on Igbo dialectology resulting in loss of phonic effects, the Igbo translator recreated

such humour precisely in the Igbo version. Considering the entertaining and pedagogical importance of humour, we recommend further research on humour translation by Sociolinguists, Anthropologists and other Social Scientists.

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Harmony by Avoidance: An Emergent Account of Ikoma Tongue Root Harmony

Diana Archangeli & Douglas Pulleyblank

Abstract
Ikoma, a Bantu language of Tanzania, exhibits a tongue root harmony system where a salient property of the system is to avoid potentially disharmonic sequences by removing the problematic vowels from the domain of harmony: Since the strictest part of the harmony system involves non-high vowels, potentially disharmonic mid vowels raise to high in prefixes. The harmonic system shows various intricacies when root properties, prefix properties and suffix properties are given a unified analysis. Our proposal for Ikoma is couched within an Emergent Phonology model, where grammatical generalizations are established by a data-driven consideration of co-occurrence patterns that hold between phonological sequences and between morphological items and the phonological sequences adjacent to them.

1 Introduction

Ikoma (Bantu, E.45; Tanzania) is generally considered to be part of a dialect cluster with Nata and Isenye (Lewis et al. 2015). The impetus for the present study of tongue root harmony is twofold. First, while sequences of mid vowels typically agree in tongue root values, Ikoma (Higgins 2011) exhibits an intriguing "avoidance strategy" for achieving forms that do not violate tongue root harmony. In many cases where the tongue root value of one morpheme might conflict with the tongue root value of an adjacent morpheme, Ikoma achieves harmony not through matching tongue root values but by using a vowel that is outside the domain of harmony, due to its height value, thereby avoiding a disharmonic sequence. Second, a detailed consideration of the patterns shows Ikoma to have a system that is quite different from that of the closely related Nata, despite there also being striking similarities (Johannes [Gambarage] 2007, Gambarage 2013, Gambarage & Pulleyblank 2017 on Nata). The Ikoma pattern warrants an independent treatment.

The avoidance strategy pattern is illustrated in 1. Roots with advanced vowels appear with a mid advanced prefix while roots with mid retracted vowels appear with a high advanced prefix, thereby avoiding a disharmonic advanced-retracted sequence of mid vowels.¹

¹The C# designation indicates noun class membership. Square brackets indicate the morphological stem. An acute accent indicates high tone; the absence of an accentual diacritic indicates low tone.

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1. Avoiding disharmony by height alternations (Higgins 2011:p.140)

advanced root		retracted root	
o-mo-[sino]	'widow' (C1)	o-mu-[sɛsɛ]	'slave' (C1)
o-ro-[réme]	'tongue' (C11)	o-ru-[yɔhɛ]	'eyebrow' (C11)

Where the noun stem begins with an advanced vowel, the class prefix is mid advanced; where the noun stem begins with a retracted vowel, the class prefix is high (advanced). Of interest, a rule or constraint model that results in a mid retracted prefix vowel with a mid retracted root (*o-mo-[sɛsɛ], *o-ro-[yɔhɛ]) might be considered preferable to one that results in the attested forms, yet in Ikoma (and Nata), the prefix vowel appears as high, effectively removing it from the phonological domain of harmony between mid vowels.

In this paper, we examine the disharmony avoidance strategy along with a number of other patterns that come together to form the complex system that Ikoma exhibits. We present our analysis in terms of a bottom-up, "emergent" approach to phonological patterns as presented in Archangeli & Pulleyblank (2013, 2015, 2016, 2018); see also Archangeli et al. (2012). The central hypothesis of Emergent phonology is that an innate "Universal Grammar" plays a minimal role in formulating a phonological analysis. Rather, in a highly bottom-up endeavor, learners observe language forms, identify similarities, track frequencies, and generalize (see works cited above). Lexical representations consist of sets corresponding to surface forms of morphs, not of abstract, single representations. This necessitates a mechanism to select among the various morphs for a given concatenation; in this paper, we show that much of the selection is driven by conditions that hold of roots as well as of concatenations, conspiring to avoid sequences that combine retracted mid vowels with advanced vowels. We turn first to relevant background information before exploring the disharmony avoidance patterns.

2 Background

The patterns we consider in this paper involve the co-occurrence patterns of vowel height and tongue root position in roots, stems, and words. Thus, there are two general properties of Ikoma that are useful for our purposes here: the morphological structure of words and the vowel inventory.

Nouns and verbs both have a "prefix-stem" structure. This is shown throughout with square brackets around the stem. Nouns have an additional "pre-prefix", which we refer to as a 'determiner' (DET), following Gambarage

(in prep).² Within the stem, verbs have one or more suffixes. One type augments the meaning of the verb (e.g. CAUSATIVE, AGENTIVE). Additionally, Ikoma shares the ubiquitous Bantu "final vowel", the verbal marker [a]. These structures are shown in 2.

2. Ikoma noun & verb morphology

- a. nouns: determiner [class prefix [stem root]]]
 b. verbs: [prefix [stem root - (suffix*) - (a)]]

The noun structure, with class prefixes, is illustrated in 3. For simplicity, we show only stem brackets (and not word brackets) in our data figures.

3. Ikoma noun prefixes

High advanced prefix, any stem vowel		Low prefix, any stem vowel	
e-ri-[yíha]	'cooking stone' (C5)	a-ma-[yíha]	'cooking stones' (C6)
e-ri-[fere]	'hoe' (C5)	a-ma-[fere]	'hoes' (C6)
e-ri-[βɛɣa]	'shoulder' (C5)	a-ma-[βɛɣa]	'shoulders' (C6)
e-ri-[fáakɔ]	'skin' (C5)	a-ma-[fáakɔ]	'skins' (C6)
e-ri-[tɔ́ŋgɔ]	'tribe' (C5)	a-ma-[tɔ́ŋgɔ]	'tribes' (C6)
e-ri-[yóri]	'price' (C5)	a-ma-[yóri]	'prices' (C6)
e-ri-[túre]	'steer' (C5)	a-ma-[túre]	'steers' (C6)

In terms of its inventory, Ikoma has seven vowels, all of which are oral.

4. Ikoma vowel inventory

i	U	high advanced
e	O	mid advanced
ɛ	ɔ	mid retracted
a		low retracted

As seen in 4, the high vowels are systematically advanced, the low vowel is systematically retracted, and the mid vowels may be either advanced or retracted.³ Higgins (2011) argues for the appropriateness of these feature values based on acoustic investigation.

²This morpheme, the properties of which are not crucial here, is referred to by various names in the literature, including 'augment', 'pre-prefix' and 'initial vowel' (Meeussen 1967, Katamba 2003).

³Consistent with our emergentist model, the features referred to, such as "retracted tongue root" and "high", are themselves emergent. We adhere to familiar names, but do not subscribe to the universalist hypothesis for distinctive innate features. See Mielke (2005, 2008), Archangeli & Pulleyblank (2018).

With this background, we are in position to set the stage for our discussion of harmony by avoidance. We begin with the co-occurrence patterns of vowels within roots, especially tongue root values in mid vowel sequences.

3 Root-internal restrictions

There are restrictions on the distribution of vowels within roots (Higgins 2011, p. 122). Retracted mid vowels do not occur with advanced vowels, illustrated by the examples in 5 and shown schematically in 6.

5. Ikoma root/stem vowels – examples

i...i	a.	o-ro-[ríyí]	'wickerwork'	o...e	q.	o-ro-[βohe]	'grinding stone'
i...e	b.	o-mo-[símbe]	'prostitute'	o...o	r.	o-yo-[yoro]	'leg'
i...o	c.	a-ha-[yíro]	'place'	o...a	s.	e-ke-[βónda]	'tobacco pipe'
i...a	d.	o-mo-[yíha]	'tendon'	ε...ε	t.	o-ru-[hémbε]	'horn'
u...i	e.	e-ye-[kúndi]	'fist'	ε...ɔ	u.	e-yi-[séntɔ]	'cup'
u...u	f.	aŋ-[yúβu]	'hippo'	ε...a	v.	e-ri-[βεya]	'shoulder'
u...e	g.	o-yo-[túmbe]	'large chair'	ɔ...ε	w.	o-ru-[yɔhe]	'eyebrow'
u...o	h.	a-[túyo]	'herd'	ɔ...ɔ	x.	a-[kóro]	'heart'
u...a	i.	a-[suná]	'mosquito'	ɔ...a	y.	a-n-[tʃóka]	'snake'
e...i	j.	o-mo-[remi]	'farmer'	a...i	z.	e-yi-[táti]	'eyelid'
e...u	k.	e-ri-[yeyu]	'molar tooth'	a...u	aa.	e-ki-[hamú]	'chin'
e...e	l.	a-ma-[fere]	'hoes'	a...e	bb.	e-yi-[saré]	'twin'
e...o	m.	e-ke-[mero]	'throat'	a...o	cc.	e-kj-[áro]	'village'
e...a	n.	e-ri-[tema]	'liver'	a...ε	dd.	a-ma-[sáahε]	'blood' (long V)
o...i	o.	a-[moni]	'pupil'	a...ɔ	ee.	a-[sakó]	'basket'
o...u	p.	o-mu-[βóhu]	'prisoner'	a...a	ff.	e-ri-[ráka]	'larynx'

6. Ikoma root-internal vowel sequences

V1 \ V2	i	u	E	O	ε	ɔ	a
I	a	-	B	C	-	-	d
U	e	f	G	H	-	-	i
E	j	k	L	M	-	-	n
O	o	p	q	R	-	-	s
ε	-	-	-	-	t	u	v
ɔ	-	-	-	-	w	x	y
A	z	aa	bb	Cc	dd	ee	ff

Higgins (2011) points out that the patterns given in 6 are somewhat different when long vowels are taken into consideration. Although short retracted

vowels [ε, ɔ] do not appear before high advanced vowels, as indicated in 6, long retracted vowels may occur in this context, 7.

7. Long retracted mid vowels before high vowels

- ku-[hɔrɛɛri] 'appease'
- ki-[ɪɔɔhu] 'smooth'
- o-βu-[rɔɔti] 'prophecy'
- e-ri-[yɔɔti] 'tax'

Although the examples appear to be highly limited, it seems that long retracted vowels may also appear after high vowels.

8. Long retracted mid vowels after high vowels

- kw-[ihɛɛβa] 'think'
- am-[iihɛɛβɔ] 'plans'

Overall, three types of conditions explain the gaps in 6. First, there is an absence of mid-mid vowel sequences where the mid vowels have different tongue root values. Both advanced-retracted and retracted-advanced sequences are prohibited.

9. *[ATR, mid] C₀[RTR, mid] (abbreviated: *e/o...ε/ɔ)

Penalize a sequence with an advanced mid vowel followed immediately or in the next syllable by a retracted mid vowel.

10. *[RTR, mid] C₀[ATR, mid] (abbreviated: *ε/ɔ...e/o)

Penalize a sequence with a retracted mid vowel followed immediately or in the next syllable by an advanced mid vowel. These conditions hold of both short and long vowels. Second, we have an absence of mid retracted vowels adjacent to high vowels.

11. *[RTR, mid] C₀[high] (abbreviated: *ε/ɔ...i/u)

Penalize a sequence with a short retracted mid vowel followed immediately or in the next syllable by a high vowel.

12. *[high] C₀[RTR, mid] (abbreviated: *i/u...ε/ɔ)

Penalize a sequence with a high vowel followed immediately or in the next syllable by a short retracted mid vowel. These conditions involving high vowels govern only short mid vowels. Finally, we have a more limited condition governing the absence of a sequence where a high front vowel is followed by a high back vowel.

13. *[high, front] C₀[high, round] (abbreviated: *i...u)

Penalize a sequence with a high front vowel followed immediately or in the next syllable by a high back vowel.

Taken together, these conditions account for the pattern of gaps seen in root-internal vowel sequences. Of particular interest, these conditions play a major role in explaining various patterns of alternations that occur with stem-level and word-level affixation, shown in the next sections.

4 Harmony by avoidance in prefixes

In this section, we consider cases where prefixes have two surface forms, one mid and the other high. Identifying two forms for a single set of morphosyntactic features motivates the learner to determine when to use which form. In Ikoma, the distribution is in part governed by purely phonological phonotactic conditions, and in part governed by conditions that involve the morphology, either morphotactic conditions combining reference to both phonology and morphology or default conditions governing unconditioned choice of a particular form of a morpheme. We begin our discussion by examining prefix patterns with nouns, before turning to verbs, whose prefixes behave much like the noun prefixes, but where suffix interactions also give evidence of disharmony avoidance.

4.1 Nouns

There are both non-alternating and alternating prefixes in Ikoma. Non-alternating prefixes, either high or low, are illustrated above in 3. On the other hand, prefixes involving mid vowels present two variants, one mid and the other high, illustrated in 14. The mid variant patterns with advanced root vowels and the high variant patterns with retracted root vowels.

14. Alternating prefix examples (Higgins 2011, p. 140)

Mid advanced prefix Advanced stem vowel		High (advanced) prefix Retracted stem vowel	
o-mo-[sino]	'widow' (C1)	o-mu-[sɛsɛ]	'slave' (C1)
o-mo-[remi]	'farmer' (C1)	o-mu-[ʎaβo]	'medicine man' (C1)
o-ro-[réme]	'tongue' (C11)	o-ru-[ʎɔhɛ]	'eyebrow' (C11)
e-me-[ʎóndo]	'farms' (C4)	e-mi-[tʃaré]	'rice' (C4)
e-ye-[túmbe]	'chair' (C7)	e-ki-[βára]	'grassland' (C7)

The observed pattern of alternation is consistent and widespread in the language: prefixes with a mid advanced vowel have a counterpart with a

high advanced vowel: {mo, mu}_{CL.1}, {me, mi}_{CL.4}.⁴ This lexical redundancy defines a set of 'morphs' (a 'morph set') which serves to represent the relevant 'morpheme'. For example, either member of the morph set of {mo, mu} represents noun class 1, just as either of {me, mi} represents noun class 4. The lexical redundancy governing this set of surface morphs is given in 15.

15. Morph Set Relation: MSR-mid-implies-high

$\exists M_i, M_i = \text{a class prefix}, M_i \ni \text{mid}_i \# \rightarrow \exists M_j, M_j \ni \text{high}_i \#$

If a class prefix morph set includes a morph ending in a mid vowel then it also includes a morph ending in an otherwise identical high vowel.

example {mo}_{CL.1} → {mo, mu}_{CL.1}

A Morph Set Relation such as MSR-mid-implies-high explicitly expresses multi-member morph sets as a productive pattern in the language; when a new mid prefix is encountered, a high counterpart is automatically generated.

Phonotactics and disharmony avoidance. Consider now the cases seen in 14, where a class prefix occurs before a stem beginning in a retracted vowel, such as {sɛsɛ}_{SLAVE}. Because SLAVE belongs to noun class 1, and there are two CLASS.1 prefix morphs, {mo, mu}_{CL.1}, creating the prefixed form gives two possibilities, the attested o-mu-[sɛsɛ]_{SLAVE} (C1) and the unattested *o-mo-[sɛsɛ]. Just as the condition *e/o...ɛ/ɔ, (9, *[ATR, mid] C₀ [RTR, mid]) rules out sequences of root vowels that put an advanced mid vowel before a retracted mid vowel, so does it rule out such a sequence involving a prefix. We show this via an assessment table.⁵

16. Assessment of {o}_{DET}-{mo, mu}_{CL.1}-{sɛsɛ}_{SLAVE}

	DET-CL.1-SLAVE	*e/o...ɛ/ɔ
→ a.	o-mu-[sɛsɛ]	
b.	o-mo-[sɛsɛ]	*!

⁴Recall from 3 that this relation is not reciprocal. For example, the high vowel prefix {ri}_{CL.3} in 3 does not have a mid vowel counterpart.

⁵The assessment table bears an intended resemblance to Optimality Theory tableaux (Prince & Smolensky 1993) as well as the somewhat different approach taken under harmonic serialism (McCarthy 2010). Differences include: (i) the top left cell is occupied by the morphosyntactic features to be realized; (ii) the top row shows conditions that are motivated by surface forms in the language (there is no universal constraint set); (iii) the lefthand column shows all and only the combinations produced by the morph sets being combined. Note that there is not an infinite set of candidates -- the total number of candidates is the product of the number of morphs found in each component morph set.

In constraint-based models, harmony is often treated as the consequence of either a requirement that segments agree for a feature feature (Baković 2000) or a prohibition against opposite values for the same feature (Pulleyblank 2002), the latter being the strategy followed here.⁶ Such constraints typically result in sequences with similar feature values, e.g. sequences of mid retracted or mid advanced vowels. This is not the case in Ikoma. Rather, once the mid advanced prefix is eliminated by the harmony condition, as shown in 16b, harmony itself is no longer a factor because only a high prefix morph remains, o-mu-[sɛsɛ] 'slave', 16a. The core sequences for harmony involve mid vowels, so by choosing a high vowel prefix form, the prefix is in essence exempted from harmony. Thus, harmony is achieved by shrinking the relevant domain, avoiding sequences of mid vowels that could potentially be disharmonic.

This case illustrates an important difference between the bottom-up approach taken here and the top-down approach of OT. According to the classical version of 'Gen' (Prince & Smolensky 1993) as well as the somewhat different approach taken under harmonic serialism (McCarthy 2010), candidate outputs are generated for an underlying form and assessed for optimality. Given an input like /o-mo-[sɛsɛ]/, candidates such as ...mu-[sɛsɛ] (changing the single feature [high]) and ...mo-[sɛsɛ] (changing the single feature [ATR]) would both be generated. The problem therefore becomes how to guarantee the optimality of the former (involving [high]) rather than the latter (involving [ATR]).⁷ The optimality-based approach is top-down in the sense that a postulated abstract underlying form gives rise to a set of postulated outputs from which the actual output is chosen. Under the emergentist assumptions we explore here, only actually occurring morph-forms are considered. In this case, there are two attested surface forms for the relevant class prefix, [mo] and [mu]; a form like ...mɔ-[sɛsɛ] is therefore not considered at all because {mɔ} is not part of the class prefix morph set. The overgeneration of forms by Gen is prevented under Emergence by requiring that productively 'generated' forms are the result strictly of combining the morphs found in morph sets and morph sets only contain morphs directly corresponding to surfaced forms. Patterns within morph sets are characterized by morph set relations (like MSR-mid-implies-high, 15). The prohibition on mid advanced followed by mid retracted is therefore sufficient for selecting the correct form because *...[mɔ-sɛsɛ] is not an option when combining occurring morphs.

⁶See Sasa (2009) for a review of approaches to harmony in Optimality Theory.

⁷See Higgins (2011) for details, and Gambarage & Pulleyblank (2017) for discussion of this approach in both Ikoma and the closely related Nata.

Low vowel roots and a restricted phonotactic. In one class of cases, the analysis we have begun to sketch here fails in its current form. In cases where a stem begins with a low vowel, the *e/o...ɛ/ɔ condition is irrelevant since the key sequence does not involve a sequence of two mid vowels. As such, we would expect surface forms such as *e-me-[tʃarɛ] 'rice' and *e-ke-[βara] 'grassland' (14) rather than the actually attested forms e-mi-[tʃarɛ] and e-ki-[βara]. That is, there is nothing in the *e/o...ɛ/ɔ phonotactic that motivates the presence of a high vowel in the prefix when the following noun has a low vowel in the first syllable. While it is possible that the phonotactic could be altered in a purely phonological way, an altered phonotactic is not clearly warranted. For example, as seen in 5 and 6, low vowels can freely co-occur with advanced mid vowels in noun roots, both in a mid-low sequence (e.g. e-ri-[téma] 'liver') and in a low-mid sequence (e.g., e-ʔi-[sarɛ] 'twin'). Similarly in verbs, low vowels may occur with advanced vowels. The canonical verbal suffix -a for example, follows both retracted and advanced vowels in verb roots, for example ʔu-[ʔɛʔ-a] 'carry' and ko-[reh-a] 'pay'.⁸

It seems therefore that we need a phonological condition prohibiting the appearance of a mid vowel prefix specifically when preceding a root containing an initial low vowel. (See Gambarage & Pulleyblank 2017 for relevant discussion in Nata).

17. *[mid] [ROOT C₀[low] (abbreviated: *e/o [a])

Penalize a sequence with a mid vowel prefix followed immediately or in the following syllable by a low vowel.

18. Assessment of {e}_{DET}-{me, mi}_{CL.4}-{βara}_{GRASSLAND}

	DET-GRASSLAND-CL.4	*e/o...ɛ/ɔ	*e/o [a]
→ a.	e-mi-[βara]		
b.	e-me-[βara]		*!

The role of default. Where the root is advanced (mid or high), neither the mid vowel phonotactic nor the mid-low phonotactic is relevant, yet the two prefix morphs do not appear in free variation. We propose that in such cases, the default form of the morph is selected (Mascaró 2007, Bonet et al

⁸The alternation between [ʔ] and [k] in the infinitive prefix reflects the Ikoma version of 'Dahl's Law', Davy & Nurse 1982, a prohibition on voiceless velars before voiced obstruents; see Higgins 2011, p. 57-62 on Dahl's Law in Ikoma. Further examples are seen elsewhere, for example in 21, 22. Under the Emergent model sketched here, the infinitive would have four morphs: {ʔu, ʔo, ku, ko} INFINITIVE. For our purposes here, we simplify figures by ignoring the Dahl's Law effects.

2013). For Ikoma prefixes, the default is the mid advanced form, assigned by a morph set relation because it is a general property of prefixes. The condition Default (Def) penalizes non-default morphs. It must be ranked below both phonotactics, otherwise the default morph is erroneously selected for all verb roots regardless of vowels. We indicate the default morph in a morph set via underlining: {mo, mu}_{CL.1}, etc.

19. Default (Def) Penalize a non-default morph.

20. Assessment of {o}_{DET}-{mo, mu}_{CL.1}-{sino}_{WIDOW}

	WIDOW-CL.1	*e/o...ε/ɔ	*e/o [a	Def
a.	o-mu-[sino]			*!
→ b.	o-mo-[sino]			

From noun patterns to verb patterns. Prefixes in verbs behave much the same way as in nouns, with surface forms resulting from the options made available by morph set relations, and the choice between morphs governed by phonotactics and default considerations. For example, the infinitive prefix has both high and advanced mid prefixes and the prefix pattern is fully comparable to that seen for nouns. Verbs, however, introduce a new complication that we now turn to: certain verb roots have multiple morphs. So a means of selecting not only the correct prefix morph but also the correct root morph is required. This selection is determined by the following suffix.

4.2 Prefixes in verbs with alternating roots

Perhaps the first thing to note when considering alternations in verb roots is that most roots do *not* alternate. Indeed, the only root vowel that alternates is the front mid vowel in verbs. The alternation is illustrated by comparing the form of the verb root 'carry' in the infinitive and in the agentive and passive:

21. Alternations in verb roots

gloss	Infinitive	Agentive	passive
'carry'	ɣu-[ɣεɣ-a]	o-mu-[ɣεɣ-i]	ɣu-[ɣεɣ-u]

The observed alternation is found only in verbs with a front mid retracted vowel. All other vowels, including the back mid retracted vowel, show no verb root vowel alternations, as can be seen in a full paradigm of cases.

22. Roots with low- and high-vowel suffixes

	gloss	infinitive	agentive	passive
nonalternating	'weed'	ɣo-[tʃiβ-a]	o-mo-[tʃiβ-i]	ɣo-[tʃiβ-u]
	'dig'	ɣo-[tuk-a]	o-mo-[tuk-i]	ɣo-[tuk-u]
advanced	'pay'	ko-[reh-a]	o-mo-[reh-i]	ko-[reh-u]
	'weave'	ko-[rok-a]	o-mo-[rok-i]	ko-[rok-u]
nonalternating	'inherit'	ɣu-[ɣaβ-a]	o-mu-[ɣaβ-i]	ɣu-[ɣaβ-u]
retracted	'do'	ɣu-[kɔɾ-a]	o-mu-[kɔɾ-i]	ɣu-[kɔɾ-u]
alternating	'carry'	ɣu-[ɣεɣ-a]	o-mu-[ɣεɣ-i]	ɣu-[ɣεɣ-u]

Three points are important. First, an explanation is needed for why there is alternation at all. Second, an explanation is needed for why some front vowels alternate but retracted back vowels do not (o-mu-[kɔɾ-i], *o-mu-[kɔɾ-i]). Third, an explanation is needed for the height of the prefix immediately preceding the mid advanced root variant. In nonalternating instances of a mid advanced root vowel (e.g. {reh}_{PAY}), the prefix vowel is mid advanced (e.g. o-mo-[reh-i]); in need of an explanation therefore is why the prefix vowel is high when the root is alternating (e.g. o-mu-[ɣεɣ-i], *o-mo-[ɣεɣ-i]).

Our account of these points involves the establishment of a multi-member morph set, a phonotactic constraint already referred to, a root-determined selection property, and, when all else fails, an appeal to Default. We consider these four points in turn.

Alternation: Morph sets with multiple members. As seen in 15, a morph set relation represents a systematic relation between multiple members of a morph set, thereby characterizing alternation within the Emergence model. Observing that Ikoma has two closely related morphs when a verb root contains a mid front retracted vowel, a crucial aspect of the analysis is to establish the relevant MSR: Any verb root morph set containing a mid front retracted vowel also contains a morph with a mid front advanced vowel.

23. Morph Set Relation: MSR-CεC-implies-CεC ***preliminary*** (cf. 25)

$\exists M_i, M_i = \text{Verb}, M_i \ni \dots \epsilon_i C \# \rightarrow \exists M_j, M_j \ni \dots \epsilon_j C \#$

If the morph set of a verb includes a morph whose final vowel is mid front retracted [ε] then it also includes an otherwise identical morph whose final vowel is advanced [e].

example {ɣεɣ}_{V; CARRY} → {ɣεɣ, ɣeɣ}_{V; CARRY}

As with the previously examined morph set relation, we assume that such redundancies reflect the learner's generalization from a potentially small set of cases involving morph set pairs to predict the existence of an

advanced form for a verb where only the retracted form has been encountered. This enables the learner to predict and use novel forms.

No alternation: noMSR. The MSR-C&C-implies-CeC accounts for the alternation with front mid vowel roots. That this MSR is not generalized to include retracted back vowels captures the absence of alternations with back mid vowel roots (see assessments in 33, 44). Such roots have only one morph, e.g. {kɔr}_{po}. Consequently, there is no "alternative choice"; there is simply no verb root alternation.

Note that this account covers the facts but does not explain the existence of the front-back asymmetry. Higgins (2011, p. 223) notes that "Front-back asymmetries are quite common in Bantu vowel height harmony in verbal extensions. Though ... the Ikoma pattern ... [is] perhaps difficult to explain..., the fact that such patterns exist should not come as too much of a surprise." We have no additional insight to add on this point. The crucial point in terms of the model is that unless there is an MSR to generate a second morph, alternative morphs will only be posited if they are actually encountered by the learner. We do not assume the kind of OT-style "Gen" (Prince & Smolensky 1993) that automatically creates candidates such as [...kor...] for an underlying form /...kɔr.../; as a result, there is no need for conditions to eliminate sequences containing the putative morph * [...kor...].

Assessing alternatives: Phonotactics. Given a verb root with two morphs, the learner must determine when to use each one. We consider the agentive first, where the advanced verb root morph appears before the advanced high suffix vowel.

Recall that when considering vowel distribution in roots (see 5, 6), we observed a systematic absence of vowel sequences involving a retracted mid vowel preceding a high vowel, encoded as the condition in 11, *ε/ɔ...i/u. This same condition plays a role in assessing morph combinations. In 24, we provide the relevant assessment table, showing the key role of *ε/ɔ...i/u in eliminating options 24a,c. (Anticipating our discussion of 29, we treat the retracted verb morph as the default.)

24. Assessment of {mu, mo}_{CL.1}-{yεy, yeɣ}_{CARRY}-{i}_{AGENTIVE}

CARRY-AGENTIVE-CL.1		*ε/ɔ...i/u	*e/o...ε/ɔ	*e/o [a]	Def
a.	o-mu-[yεy-i]	*!			*
(→) b.	o-mu-[yeɣ-i]				**!
c.	o-mo-[yεy-i]	*!	*!		
d.	o-mo-[yeɣ-i]				*

As can be seen from 24, this analysis successfully accounts for the advanced form of the root when preceding a high vowel suffix. As is also clear, however, some further condition is required to identify the correct form of the prefix, so that 24b will be selected over 24d, despite Default.

Idiosyncratic yet systematic patterns: Morphotactic selection. As shown in the assessment table in 24, *ε/ɔ...i/u eliminates the retracted root morphs in 24a, c when an advanced high suffix follows. However, we also see that the advanced root morph occurs with a high prefix, despite the default preference for a mid vowel prefix morph 24d. That is, the advanced mid verb root morph in the poly-morph sets idiosyncratically -- yet systematically -- prefers a preceding high vowel. Since this is general, it can be assigned by a slight modification of MSR-C&C-implies-CeC (23).

25. Morph Set Relation: MSR-C&C-implies-CeC ***final*** (cf. 23)

∃ M_i, M_iVerb, M_iε...ε_iC \# → ∃ M_j, M_jε...ε_jC \#, M_jεHIGH-V

If the morph set of a verb includes a morph whose final vowel is mid front retracted [ε] then it also includes an otherwise identical morph (i) whose final vowel is advanced [e], and (ii) that selects for a preceding high vowel.

example {yεy}_{V; CARRY} → {yεy, yeɣ_{HI}}_V; CARRY

Once this selection preference is in place, the correct surface form is identified.

26. High Selection (*abbreviated*: Hi Sel)

Penalize a sequence where a designated morph is preceded by a nonhigh vowel. Selection in general is the means by which Emergence formalizes idiosyncratic behavior of specific morphs or morph sets. In many cases (such as this one), the selection requirements themselves are phonological in nature, but because these requirements attach to specific morphs or morph sets we refer to them as *morphotactics*.

27. Assessment of {mu, mo}_{CL.1}-{yeɣ, yeɣ_{HI}}_{CARRY}-{i}_{AGENTIVE}

CARRY-AGENTIVE-CL.1	*ɛ/ɔ...i/u	*e/o...ɛ/ɔ	*e/o [a]	Hi Sel	Def
A o-mu-[yeɣ-i]	*!				*
→ B o-mu-[yeɣ _{HI} -i]					**
C o-mo-[yeɣ-i]	*!	*!			
D o-mo-[yeɣ _{HI} -i]				*!	*

Interestingly, Ikoma has other contexts in which roots idiosyncratically prefer the high prefix over the mid advanced alternative, 28. Some monosyllabic noun roots with the vowel [u] require a high vowel in the prefix, 28a, while other such roots appear with the expected mid vowel prefix, 28b.

28. Idiosyncratic high prefixes

a. high prefix

o-mu-[kú]	'son-in-law'
o-mu-[tú]	'head (sg)'
e-mi-[tú]	'head (pl)'
o-βu-[ku]	'be engaged'

b. mid prefix

o-mo-[nu]	'mouth'
o-ɣo-[tú]	'ear'
o-βo-[tu]	'flour'
o-ro-[ku]	'firewood'

(from [ko-rwatseru oβu-ku])

For the roots in 28b, nothing special needs to be said; the mid-advanced version of the class prefix is the expected form. For the monosyllabic u-roots, Hi Selection is a property of this idiosyncratic set of roots which are themselves phonologically characterized.

When all else fails: Default. We now turn to evidence for treating the retracted morph as the default morph in such verb roots. As shown in 29, the infinitive pattern supports this analysis.

29. Assessment of {ɣo, ɣu}_{INFINITIVE}-{yeɣ, yeɣ_{HI}}_{CARRY}-{a}_{FINAL.VOWEL}

INFINITIVE-CARRY-FV	*ɛ/ɔ...i/u	*e/o...ɛ/ɔ	*e/o [a]	Hi Sel	Def
→ a. ɣu-[yeɣ-a]					*
b. ɣo-[yeɣ-a]		*!			**
c. ɣu-[yeɣ _{HI} -a]				*!	*
d. ɣo-[yeɣ _{HI} -a]					

A sequence like 29b is ruled out because the mid vowel sequence is disharmonic; a sequence like 29d is ruled out because it violates the Hi

Sel morphotactic condition. This leaves two possibilities, both of which have a high vowel prefix (resulting minimally in one Default violation): ɣu-[yeɣ-a] (29a), ɣo-[yeɣ_{HI}-a] (29c). Since all phonotactic and morphotactic conditions are satisfied by both, the choice must be due to Default. Default in verb roots is completely general. Consequently, this too can be assigned by MSR rather than learned for each individual verb.

30. Morph Set Relation-Verb root default

∃ M-set_i, M-set_i=Verb, M-set_i∩M-set_j, M-set_i∩...ε... → M_j

If the morph set of a verb includes a morph with a mid front retracted vowel [ɛ] then that morph is the default morph.

Example {yeɣ, yeɣ_{HI}}_V; CARRY → {yeɣ, yeɣ_{HI}}_V; CARRY

Summary: The analysis presented here accounts for the distribution of alternating prefix morphs and the alternating verb root morphs shown in 22. We appeal to morph set relations to express regular alternations; phonotactics then determine, in large part, which morph to use in a given context. In certain cases, an anomalous form is systematically used; this is characterized by morphotactic selection. When both phonotactics and morphotactics fail to make a selection, the default form is employed. While these principles account for much of the Ikoma patterns, the discussion is not complete without considering the patterns that arise when verbs are followed by multiple suffixes.

5. Harmony by avoidance in suffixes

Suffixes with mid vowels alternate, as shown in 31. They may occur in final position, as in the subjunctive, or followed by a final vowel, as with the applicative and applicative-causative. We consider final alternating vowels of the subjunctive first.

31. Alternating and non-alternating roots and suffixes

final vowel	Subjunctive	applicative	appl-caus	gloss
[a]	{e, ɛ}	{ɛr, er}	{ɛr, er}-[i]	
I ɣo-[tʃiβ-a]	to-[tʃiβ-e]	ɣo-[tʃiβ-ɛr-a]	ɣo-[tʃiβ-er-i]	'weed'
U ɣo-[tuk-a]	to-[tuk-e]	ɣo-[tuk-ɛr-a]	ɣo-[tuk-er-i]	'dig'
E ko-[reh-a]	to-[reh-e]	ko-[reh-ɛr-a]	ko-[reh-er-i]	'pay'
O ko-[rok-a]	to-[rok-e]	ko-[rok-ɛr-a]	ko-[rok-er-i]	'weave'
A ɣu-[ɣaβ-a]	to-[ɣaβ-e]	ɣu-[ɣaβ-ɛr-a]	ɣu-[ɣaβ-er-i]	'inherit'
ɔ ɣu-[kɔr-a]	tu-[kɔr-ɛ]	ɣu-[kɔr-ɛr-a]	ɣu-[kɔr-er-i]	'do'
ɛ ɣu-[yeɣ-a]	to-[yeɣ-e]	ɣu-[yeɣ-ɛr-a]	ɣu-[yeɣ-er-i]	'carry'

5.1 Final alternating mid vowel suffix

There are three properties to explain about the final {e, ε}_{SUBJUNCTIVE} paradigm. First, the suffix is typically advanced; it is retracted only following roots with mid retracted [ɔ]. Second, the prefix appears with its mid vowel morph whenever the suffix itself is advanced. Finally, the mid front alternating root appears with its advanced morph, not its retracted morph.

Default and morph choice. We account for the first two properties by identifying the more common morph as the default, {e, ε}_{SUBJUNCTIVE}, coupled with the phonotactic conditions on the distribution of retracted mid vowels. With this assumption, Default is sufficient to make the suffix selection with advanced roots, shown with the high-vowel root {tuk}_{DIG} in 34. (Anticipating our analysis slightly, we include the ranking of *e/o...ε/ɔ and *ε/ɔ...i/u above *ε/ɔ...e/o).

32. Assessment of {γo, γu}_{INFINITIVE}-{tuk}_{DIG}-{e, ε}_{SUBJUNCTIVE}

INF-DIG-SBJTV	*ε/ɔ...i/u	*e/o...ε/ɔ	*ε/ɔ...e/o	*e/o [a	Hi Sel	Def
- a. o-[tuk-e].						
B γo-[tuk-ε]						*!
C γu-[tuk-e]						*!
D γu-[tuk-ε]						**!

In contrast, the prohibition against mixing tongue root values in sequences of mid vowels results in selecting a form with maximal Default violations when the root has a retracted back mid vowel, 33d.

33. Assessment of {γo, γu}_{INFINITIVE}-{kɔr}_{DO}-{e, ε}_{SUBJUNCTIVE} **preliminary** (cf. 38)

INF-DO-SBJTV	*ε/ɔ...i/u	*e/o...ε/ɔ	*ε/ɔ...e/o	*e/o [a	Hi Sel	Def
A γo-[kɔr-e]		*!	*			*
B γo-[kɔr-ε]		*!				*
C γu-[kɔr-e]			*!			**
→ d γu-[kɔr-ε]						

Mid Selection and the distribution of the advanced prefix morph. When the root has a low vowel, we discover the need for a further Selection condition. The conditions thus far erroneously predict *γu-[γaβ-e], 34c, instead of the attested γo-[γaβ-e], 34a.

34. Assessment of {γo, γu}_{INFINITIVE}-{γaβ}_{INHERIT}-{e, ε}_{SUBJUNCTIVE} **preliminary** (cf. 36)

INF-INHERIT-SBJTV	*ε/ɔ...i/u	*e/o...ε/ɔ	*ε/ɔ...e/o	*e/o [a	Hi Sel	Def
(→) a. γo-[γaβ-e]				*!		
b. γo-[γaβ-ε]				*!		*
← c. γu-[γaβ-e]						*
d. γu-[γaβ-ε]						**!

The special property of the SUBJUNCTIVE is that (except with a back mid retracted root) it occurs with a mid vowel prefix -- even when the phonotactics would be expected to select a high vowel prefix. We characterize this with a selection restriction on the suffix, {e, ε}_{MID__SUBJUNCTIVE}, and a corresponding condition, Mid Selection.

35. Mid Selection (abbreviated: Mid Sel)

Penalize a sequence where a SUBJUNCTIVE stem is preceded by a high vowel. The pattern with low roots shows that Mid Selection must outrank both *e/o [a and High Selection.

36. Assessment of {γo, γu}_{INFINITIVE}-{γaβ}_{INHERIT}-{e, ε}_{MID__SUBJUNCTIVE}

INF-INHERIT-SUBJUNCTIVE	*ε/ɔ...i/u	*e/o...ε/ɔ	Mid Sel	*ε/ɔ...e/o	*e/o [a	Hi Sel	Default
→ a. γo-[γaβ _{HI} -e _{MID}]					*	*	
b. γo-[γaβ _{HI} -ε _{MID}]						*	*
c. γu-[γaβ _{HI} -e _{MID}]				*!			
d. γu-[γaβ _{HI} -ε _{MID}]				*!			

We expect the advanced morph in alternating roots. Consider now the poly-morph verb roots. As 37 demonstrates, the conditions motivated above serve to account for this more complex case as well. All forms except for the attested γo-[γeγ-e] are eliminated by the combination of Mid Selection and *e/o...ε/ɔ: because the SUBJUNCTIVE selects for a mid vowel, any cases with a high prefix vowel are ruled out; because the only mid vowel option is advanced, this forces the advanced root morph. This again shows that Mid Selection must outrank High Selection; compare 37d, e.

37. Assessment of $\{\gamma o, \gamma u\}_{\text{INFINITIVE}} - \{\gamma e \gamma, \gamma e \gamma\}_{\text{CARRY}} - \{e_{\text{MID}}, \epsilon\}_{\text{MID}} - \{\epsilon\}_{\text{SUBJUNCTIVE}}$

		* $\epsilon/\gamma \dots i/u$	* $e/o \dots \epsilon/\gamma$	Mid Sel	* $\epsilon/\gamma \dots e/o$	* $e/o [a$	Hi Sel	Default
INF-CARRY-SUBJUNCTIVE								
a.	$\gamma o - [\gamma e \gamma - e_{\text{MID}}]$		*!		*			*
b.	$\gamma o - [\gamma e \gamma - \epsilon_{\text{MID}}]$		*!		*			*
c.	$\gamma u - [\gamma e \gamma - e_{\text{MID}}]$			*!				**
d.	$\gamma u - [\gamma e \gamma - \epsilon_{\text{MID}}]$			*!				**
→ e.	$\gamma o - [\gamma e \gamma_{\text{HI}} - e_{\text{MID}}]$						*	*
f.	$\gamma o - [\gamma e \gamma_{\text{HI}} - \epsilon_{\text{MID}}]$		*!				*	**
g.	$\gamma u - [\gamma e \gamma_{\text{HI}} - e_{\text{MID}}]$			*!				**
h.	$\gamma u - [\gamma e \gamma_{\text{HI}} - \epsilon_{\text{MID}}]$		*!	*!				***

We must now ask why the mid prefix vowel does not surface when the root has a retracted back mid vowel, as in $\{k\gamma r\}_{\text{DO}}$. In this case, the $o \dots \gamma$ sequence is prohibited by $*e/o \dots \epsilon/\gamma$ and the high prefix is prohibited by Mid Selection. The lower ranked $*\epsilon/\gamma \dots e/o$ decides in favor of $\gamma u - [k\gamma r - \epsilon]$. This shows that Mid Selection is subordinate to $*e/o \dots \epsilon/\gamma$.

38. Assessment of $\{\gamma o, \gamma u\}_{\text{INFINITIVE}} - \{k\gamma r\}_{\text{DO}} - \{e, \epsilon\}_{\text{SUBJUNCTIVE}}$ ****final**** (cf. 33)

		* $\epsilon/\gamma \dots i/u$	* $e/o \dots \epsilon/\gamma$	Mid Sel	* $\epsilon/\gamma \dots e/o$	* $e/o [a$	Hi Sel	Default
INF-DO-SUBJUNCTIVE								
a.	$\gamma o - [k\gamma r - e_{\text{MID}}]$		*!		*			*
b.	$\gamma o - [k\gamma r - \epsilon_{\text{MID}}]$		*!					*
c.	$\gamma u - [k\gamma r - e_{\text{MID}}]$			*	*!			**
→ d.	$\gamma u - [k\gamma r - \epsilon_{\text{MID}}]$			*				**

A quick review of the assessments in 36 and 37 show that this added ranking does not affect the outcome in those cases. Confirmation of the analysis presented thus far is found with alternating mid vowel suffixes which are followed by either low or high vowels, the topic of the next section.

5.2 Alternating nonfinal suffixes

We turn now to the applicative and applicative-causative paradigms, illustrated in 31. These paradigms are interesting since, as we have already seen, alternating vowels behave differently when followed by low and high vowels. The low final vowel appears with the simple applicative; in contrast, the causative itself is a high vowel, [i], so the applicative-causative ends with a high vowel.

When the low final vowel follows the applicative, the applicative surfaces as advanced only when following an advanced mid vowel root (e.g. 43 below). With a high vowel root, none of the phonotactics are relevant when the following vowel is [a] (nor are the morphotactics). Default therefore decides between the various possibilities in favor of the default retracted suffix morph. (Note that were the advanced suffix morph the default, it would be selected, counter to the evidence). This is shown in 39.

Low vowel roots, as seen in 40, are comparable as far as the suffixes are concerned, but behave differently in their prefixes. With the low vowel root in 40, $*e/o [a$ forces the prefix vowel to be high. This contrasts with the high vowel root in 39, where there is no pressure for a prefix vowel to be other than default (mid advanced).

39. Assessment of $\{\gamma o, \gamma u\}_{\text{INFINITIVE}} - \{tuk\}_{\text{DIG}} - \{\epsilon r, er\}_{\text{APPLICATIVE}} - \{a\}_{\text{FINAL.VOWEL}}$

		* $\epsilon/\gamma \dots i/u$	* $e/o \dots \epsilon/\gamma$	Mid Sel	* $\epsilon/\gamma \dots e/o$	* $e/o [a$	Hi Sel	Default
INF-DIG-APPLIC-FV								
→ a.	$\gamma o - [tuk - \epsilon r - a]$							
b.	$\gamma o - [tuk - er - a]$							*!
c.	$\gamma u - [tuk - \epsilon r - a]$							*!
d.	$\gamma u - [tuk - er - a]$							*!*

40. Assessment of { γo , γu }_{INFINITIVE}–{ $\gamma\text{a}\beta$ }_{INHERIT}–{ er , er }_{APPLICATIVE}–{ a }_{FINAL.VOWEL}

	* $\epsilon/\text{ɔ}...\text{i}/\text{u}$	* $\text{e}/\text{o}...\epsilon/\text{ɔ}$	Mid Sel	* $\epsilon/\text{ɔ}...\text{e}/\text{o}$	* $\text{e}/\text{o} [\text{a}]$	Hi Sel	Default
INF-INHERIT-APPLIC-FV							
a. $\gamma\text{o}-[\gamma\text{a}\beta-\text{er}-\text{a}]$					*!		
b. $\gamma\text{o}-[\gamma\text{a}\beta-\text{er}-\text{a}]$					*!		*
→ c. $\gamma\text{u}-[\gamma\text{a}\beta-\text{er}-\text{a}]$							*
d. $\gamma\text{u}-[\gamma\text{a}\beta-\text{er}-\text{a}]$							**!

With the (nonalternating) back retracted root vowel, the requirements that mid vowels do not disagree in tongue root values (* $\text{e}/\text{o}...\epsilon/\text{ɔ}$, * $\epsilon/\text{ɔ}...\text{e}/\text{o}$) force the prefix to be high and the applicative suffix to be retracted.

41. Assessment of { γo , γu }_{INFINITIVE}–{ $\text{k}\text{ɔ}\text{r}$ }_{DO}–{ er , er }_{APPLICATIVE}–{ a }_{FINAL.VOWEL}

	* $\epsilon/\text{ɔ}...\text{i}/\text{u}$	* $\text{e}/\text{o}...\epsilon/\text{ɔ}$	Mid Sel	* $\epsilon/\text{ɔ}...\text{e}/\text{o}$	* $\text{e}/\text{o} [\text{a}]$	Hi Sel	Default
INF-DO-APPLIC-FV							
a. $\gamma\text{o}-[\text{k}\text{ɔ}\text{r}-\text{er}-\text{a}]$		*!		*			*
b. $\gamma\text{o}-[\text{k}\text{ɔ}\text{r}-\text{er}-\text{a}]$		*!					*
c. $\gamma\text{u}-[\text{k}\text{ɔ}\text{r}-\text{er}-\text{a}]$				*!			*
→ d. $\gamma\text{u}-[\text{k}\text{ɔ}\text{r}-\text{er}-\text{a}]$							*

With the front mid vowel roots, which have both advanced and retracted morphs, the same requirements prohibiting disagreement in tongue root values eliminate most of the possible morph combinations. For the three combinations that respect the mid vowel phonotactics (42c,f,h), consideration of Default values selects 42c.

42. Assessment of { γo , γu }_{INFINITIVE}–{ $\gamma\text{e}\gamma$, $\gamma\text{e}\gamma$ }_{CARRY}–{ er , er }_{APPLICATIVE}–{ a }_{FINAL.VOWEL}

	* $\epsilon/\text{ɔ}...\text{i}/\text{u}$	* $\text{e}/\text{o}...\epsilon/\text{ɔ}$	Mid Sel	* $\epsilon/\text{ɔ}...\text{e}/\text{o}$	* $\text{e}/\text{o} [\text{a}]$	Hi Sel	Default
INF-CARRY-APPLIC-FV							
a. $\gamma\text{o}-[\gamma\text{e}\gamma-\text{er}-\text{a}]$		*!					
b. $\gamma\text{o}-[\gamma\text{e}\gamma-\text{er}-\text{a}]$		*!		*			*
→ c. $\gamma\text{u}-[\gamma\text{e}\gamma-\text{er}-\text{a}]$							*
d. $\gamma\text{u}-[\gamma\text{e}\gamma-\text{er}-\text{a}]$				*!			**
e. $\gamma\text{o}-[\gamma\text{e}\gamma_{\text{HI}}-\text{er}-\text{a}]$		*!					*
f. $\gamma\text{o}-[\gamma\text{e}\gamma_{\text{HI}}-\text{er}-\text{a}]$							**!
g. $\gamma\text{u}-[\gamma\text{e}\gamma_{\text{HI}}-\text{er}-\text{a}]$		*!					**
h. $\gamma\text{u}-[\gamma\text{e}\gamma_{\text{HI}}-\text{er}-\text{a}]$				**!			

The advanced suffix morph is selected only with advanced mid roots. As in the cases just seen, the prohibition on mid advanced vowels preceding mid retracted vowels rules out any option that has a retracted suffix morph. Default then selects between the final two possibilities, 43b, d.

43. Assessment of { γo , γu }_{INFINITIVE}–{ rok }_{WEAVE}–{ er , er }_{APPLICATIVE}–{ a }_{FINAL.VOWEL}

	* $\epsilon/\text{ɔ}...\text{i}/\text{u}$	* $\text{e}/\text{o}...\epsilon/\text{ɔ}$	Mid Sel	* $\epsilon/\text{ɔ}...\text{e}/\text{o}$	* $\text{e}/\text{o} [\text{a}]$	Hi Sel	Default
INF-WEAVE-APPLIC-FV							
a. $\gamma\text{o}-[\text{rok}-\text{er}-\text{a}]$							
→ b. $\gamma\text{o}-[\text{rok}-\text{er}-\text{a}]$							*
c. $\gamma\text{u}-[\text{rok}-\text{er}-\text{a}]$		*!					*
d. $\gamma\text{u}-[\text{rok}-\text{er}-\text{a}]$							**!

In the case where the applicative combines with the causative, the final causative suffix being a high advanced vowel, the pattern changes. In all cases, the high vowel prevents a preceding retracted morph, due to the high-ranked * $\epsilon/\text{ɔ}...\text{i}/\text{u}$. With the nonalternating roots, this leads to harmony when the root is mid advanced (ko-[reh-er-i], ko-[rok-er-i]) and to harmony by vacuous avoidance when the root is high or low ($\gamma\text{o}-[\text{t}\text{ɕ}\text{i}\beta-\text{er}-\text{i}]$, $\gamma\text{o}-[\text{t}\text{u}\text{k}-\text{er}-\text{i}]$, $\gamma\text{u}-[\gamma\text{a}\beta-\text{er}-\text{i}]$). In the case of the front mid vowel alternating root, since the applicative suffix must be advanced, the advanced root morph is

chosen for reasons of harmony (γu -[$\gamma e \gamma$ -er-i]). Of particular interest, however, is the pattern that results with a back mid retracted root, γu -[$k \gamma r$ -er-i], a root with no advanced alternant.

44. Assessment of $\{\gamma o, \gamma u\}_{\text{INFINITIVE}} - \{k \gamma r\}_{\text{DO}} - \{\epsilon r, e r\}_{\text{APPLICATIVE}} - \{i\}_{\text{CAUSATIVE}}$

DO-APPLIC-CAUS		* $\epsilon/\gamma \dots i/u$	* $e/o \dots \epsilon/\gamma$	Mid Sel	* $\epsilon/\gamma \dots e/o$	* e/o [a]	HiSel	Def
a.	γo -[$k \gamma r$ - ϵr -i]	*!	*!					
b.	γo -[$k \gamma r$ -er-i]		*!		*			*
c.	γu -[$k \gamma r$ - ϵr -i]	*!						*
→ d.	γu -[$k \gamma r$ -er-i]				*			**

As seen in 44, there is no fully harmonic way to satisfy the conflicting requirements on a mid vowel imposed by the high vowel to its right (advancement) and the retracted root vowel to its left (retraction). The result is a disharmonic form with a retracted mid vowel preceding an advanced mid vowel, in order to best satisfy the conditions given the options available.

5.3 The inersive: a 3-way alternation

There is a class of non-productive suffixes discussed in Higgins (2011), the inersive. The inersive has six morphs, three possible vowels ([o, γ , u]) and two possible consonants ([r, k]). The vowel choice is systematic; the consonant choice is not. The inersives are illustrated in 45; there are no clear cases involving a verb root with the front mid [ϵ , e] alternation.

45. Inversive vs. Inversive-causative

	Inversive	gloss	Invers-caus	Gloss
i, e, o	{-or, -ok, -ur, -uk, - γr , - γk }-[a]		{-or, -ok, -ur, -uk, - γr , - γk }-[i]	
	γw -[itf-or-a]	'be full'	γw -[itf-or-i]	'fill'
	γo -[se β -ok-a]	'sprout'	γo -[se β -ok-i]	'cause to sprout'
	ko-[hor-or-a]	'come from'	γo -[so β -or-i]	'husk'
u, a	ko-[hup-ur-a]	'uncover'	γo -[hup-ur-i]	'cause to uncover'
	γu -[γar -uk-a]	'return'	γu -[γar -ok-i]	'return (s.t.)'
γ	γu -[$\gamma \gamma r$ - γk -a]	'be straight'	γu -[$\gamma \gamma r$ -ok-i]	'straighten'

We suggest that the preferred default vowel is [u] given its appearance after [a] and [u] roots. However, after [i] roots we find [o], not [u]. This is consistent with the prohibition against root-internal [i...u] sequences, discussed in 13. When [u] is not available, the next best suffix vowel is [o], and this is what appears after [i] roots. A prohibition of mid vowels followed by [u] -- presumably related to the common pattern of Bantu height harmony (Hyman 1999) -- leaves the selection of [o] or [γ] after mid roots to the tongue root sequence prohibitions. Interestingly, in the case of an inersive-causative with an [γ] root, the high ranking of * $\epsilon/\gamma \dots i/u$ prefers the advanced form of the suffix, resulting in the disharmonic sequence found in words like γu -[$\gamma \gamma r$ -ok-i] 'straighten', already seen in the APPLICATIVE-CAUSATIVE in 44.

5.4 Summary

In this section, we have explored the vowel distribution patterns in polymorphemic forms. In these cases, we observed the interplay of default with phonotactics and morphotactic selection. For the most part, the necessary phonotactics also serve to characterize well-formed roots in Ikoma. Harmony is achieved between roots and alternating mid vowel suffixes by the requirements on mid vowel sequences; we see harmony-by-avoidance with the prefixes only, due to the nature of the two prefix morphs (one high and one mid advanced). In only one set of forms does a disharmonic sequence arise, when a non-alternating [γ] root is followed by both an alternating suffix and a terminal high vowel suffix. The high ranking of * $\epsilon/\gamma \dots i/u$ requires the advanced suffix morph, while the lack of an advanced root morph means there is no harmonic choice to be had.

6 Distribution of determiners in Ikoma and Nata

We conclude here by raising one final example that is interesting for comparative and historical reasons, one of the cases where Ikoma is interestingly different than the closely related Nata. It is this kind of example that demonstrated the need to examine Ikoma independently of Nata. The example involves selection of the determiner morph preceding class prefixes, in the combination DETERMINER-CLASS-noun.

In Ikoma, class prefixes may be either invariant (3) or variable (14). We know from patterns of root-internal co-occurrence (6) that $i \dots \epsilon$ sequences are disfavored. For example, the presence of a condition like * $i/u \dots \epsilon/\gamma$ (12) has no effect on a prefix-stem sequence because neither the noun nor the class prefix has an alternative form, e.g., e-ri-[$\beta e \gamma a$] 'shoulder' (C5). On the other hand, as examined in some detail above, many noun class prefixes

exhibit mid and high variants, where the choice depends on the tongue root value of the initial stem vowel: o-mo-[sino] 'widow' vs. o-mu-[sɛsɛ] 'slave', both nouns of class 1. These were the core cases of harmony by avoidance. But what about the properties of the determiner, the morph that precedes the class prefix?

For determiners, both height and backness are predictable: the determiner is low before a low vowel, front before a front vowel and back before a back vowel. In Ikoma, the determiner is also invariably nonhigh.⁹ Interestingly, there can never be pressure for a nonlow determiner to be other than mid advanced -- class prefixes are advanced, whether high or mid, and since a determiner precedes a class prefix we expect the determiner's mid vowel to be advanced preceding an advanced vowel. Consequently, the determiner is realized as [o-] or [e-] for both advanced and retracted nonlow roots. The examples considered here have all involved consonant-initial noun stems; we turn now to nouns that are vowel-initial, schematically, V+CV+[VCV...]. If there are no V/∅ alternations (to resolve the V+V sequence), we expect unremarkable harmony patterns. However, in Ikoma, we find that the class prefix morph has a C^G alternative, the 'G' indicating a glide, which is selected to avoid the V+V sequence. This gives rise to a word in which the determiner occurs in a syllable immediately preceding the root vowel. Consider relevant examples in Ikoma involving labialized and palatalized class prefixes.

46. Class prefixes involving labialization or palatalization: Ikoma

Labialized

- a. o-mw-[ɬho] 'nephew' (C1)
b. o-mw-[átani] 'neighbor' (C1)

Palatalized

- c. e-kj-[ónde] 'genet' (C7)
d. e-kj-[áro] 'village' (C7)

These sequences are unproblematic for advanced roots (46a,c). However, we see the juxtaposition of advanced prefix and retracted root vowels in (46b, d), counter to the general prohibition on advanced mid vowels adjacent to retracted vowels. In a theory that views harmony as the result of a rule that changes surface forms, we might expect the determiner to be automatically subject to harmonic restrictions with the root vowel. In contrast, in a theory that views all patterns of alternation to be determined by the composition of morph sets, there would be no a priori expectation for change in the determiner.

As seen in these examples, where class prefixes exhibit the harmony by avoidance strategy (cf. e-me-[yóndo] 'farms' (C4) vs. e-mi-[tsaré] 'rice' (C4), e-ye-[túmbe] 'chair' (C7) vs. e-ki-[βára] 'grassland' (C7), in example 14) the

⁹For discussion of the similar, though not completely identical, pattern in Nata, see Johannes (2007).

determiner in Ikoma is invariant. This is unproblematic in our account: the morph set for the determiner simply includes {e} while the morph sets for the class prefixes include both mid and high vowels.

Such a pattern, however, is not tension-free: there is bottom-up pressure for MSRs and phonotactics consistent with the observable data and top-down pressure for learned items to conform to phonotactics. The result of glide formation is a series of derived disharmonic sequences, cases where mid advanced vowels precede retracted vowels, a non-conforming sequence given phonotactics that hold elsewhere. The possibility arises, then, of learning a more general form of the MSR-mid-implies-high (15) to include all prefixes (such as determiners), not just class prefixes. This more general MSR is exactly what we observe in the closely related Nata. The determiner is mid (advanced) when the root is advanced (47a, c), but avoids disharmony by surfacing as high when the root vowel is retracted (47b,d). Hence Nata resolves the tension of potentially disharmonic sequences through a more general prefix morph set relation. Selecting the appropriate determiner morph follows from the same sort of phonotactic considerations as seen in Ikoma.

47. Class prefixes involving labialization or palatalization: Nata

Labialized

- a. o-mw-[iiká] 'pressure/gas' (C3)
b. u-mw-[ɛɛrí] 'month/moon' (C3)

Palatalized

- c. e-kj-[uumbá] 'room' (C7)
d. i-kj-[ɔ́ɔ́ndɛ] 'honey badger' (C7)

Ikoma, however, shows evidence of additional sub-generalization. Because the secondarily articulated consonants of the noun class prefixes are systematically preceded by advanced mid vowels, without regard for the following vowel's tongue root value and as a result of there not being a high determiner, a subpattern is observable whereby the sequence [e/o Cⁱw...] is possible, to the exclusion of *[i/u Cⁱw...]. Where the labialized or palatalized consonant is at the left edge of a root, we indeed find a mid advanced prefix, even when the root vowel is retracted.

48. Roots beginning with labialization or palatalization: Ikoma

o-mo-[ɣje] 'town'

o-mo-[βjémi] 'hunter'

As noted by Higgins (2011), such roots take advanced mid noun class prefixes, even when the result is disharmonic with respect to the nonhigh vowel sequence. Such cases suggest that the minor morphologically-conditioned regularity, following from the determiner in Ikoma having no high alternant, has worked its way into the phonological grammar, with the prohibition on high vowels before secondarily articulated consonants outranking the general phonotactic. That is, *[i/u Cⁱw...] >> *e/o...ɛ/ɔ.

7 Conclusion

The leading idea behind the analysis of Ikoma vowel distribution that we have presented is that complex patterns of alternation can be understood by the combination of two data-driven strategies.

First, the identification of skewed patterns in phonological strings can give rise to phonotactic constraints. These phonotactic constraints are taken by the learner to govern word shapes and to govern choices between competing morph possibilities. In Ikoma, we saw that constraints corresponding to skewings in root vowel co-occurrence patterns play a role in determining alternations in the vocalic properties of both prefixes and suffixes, in 9-13. These phonotactics also contribute a top-down pressure during acquisition for new lexical items to conform to the patterns of the language (Martinet al. 2013), which can in turn lead to language change (Blevins 2004). We sketched a small part of the comparison between Ikoma and Nata, suggesting how such change might come about.

Second, as words and sub-word constituents are identified by the learner, they too are assessed for skewings in their combinatorial possibilities. When morphs are concatenated, there are several possible types of patterns, each of which is illustrated in Ikoma.

- a. *Phonotactics are observed.* The morph sets contain sufficient appropriate morphs that it is possible to select a sequence of morphs that satisfies all phonotactics.

Example: $\gamma u - [k\alpha r - \epsilon r - a]_{\text{INFINITIVE-DO-APPLICATIVE-FINAL VOWEL}}$ (41).

- b. *Phonotactics are not observed due to morph set limitations.* Where the morph sets contain a single morph, or a very limited set of morphs, the result may be that every possible combination of morphs violates some phonotactic.

Example: $\gamma u - [k\alpha r - u]_{\text{INFINITIVE-DO-PASSIVE}}$ (see 22) is the only possible root-suffix combination, despite $*\epsilon/\alpha \dots i/u$ (11).

- c. *Phonotactics are not observed due to ranking with other phonotactics.* Where there are sufficient combinations of morphs, there may be competing phonotactics; selection of any one form necessarily entails violation of some phonotactic.

Example: $\gamma u - [k\alpha r - \epsilon r - i]_{\text{INFINITIVE-DO-APPLICATIVE-CAUSATIVE}}$ violates $*\epsilon/\alpha \dots e/o$ yet is the best choice (see 44: every other combination violates a higher-ranked phonotactic)

- d. *Phonotactics are not observed due to a higher ranking morphotactic.* For some morphs, there are skewings in the distribution of adjacent sounds. These sub-patterns are phonological but not generalizable; they are instead specific to particular morphs or morph sets.

Example: $\gamma o - [\gamma e \gamma_{\text{HL}} - \epsilon_{\text{MID}}]_{\text{INFINITIVE-CARRY-SUBJUNCTIVE}}$ appears with the mid vowel prefix because it is a subjunctive form, formalized as Mid Selection and illustrated in 37. (A high prefix generally appears with this root).

As shown here, by tracking frequency distributions between vowels of different types, formalising skewed distributions as cooccurrence restrictions, making explicit relations between corresponding sets of surface morphs, and governing the choice of alternating morphs by cooccurrence restrictions, a grammar can go a very long way in accounting for the sorts of patterns observed in occurring harmony systems, whether those patterns are general or restricted.

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Constraints on Verbs in Series and the Coding of Syntactic Adjuncts

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Introduction

Verbs in series continue to attract linguistic attention as a syntactic phenomenon (Foley and Olson 1985, Sebba 1987, Baker 1989, Watters 2000, Crowley 2002, Aikhenvald and Dixon 2006) and as one form of complex predicate (Amberber, Baker and Harvey 2014). Generally ignored in this discussion is the semantic nature of verbs in series and their related configurations. As a consequence, semantic restrictions governing serial verb constructions remain largely under-described and under-utilized.

For this paper, we consider both syntactic and semantic properties of verbs in series in order to highlight construction constraints. Our results are illustrated using southern Nigeria's Emai (Edoid/West Benue Congo, Williamson and Blench 2000). Relatively strict SVO, Emai exhibits lexical and grammatical tone, little segmental inflection and few prepositions. Our analysis incorporates data gathered as a result of text collection (Schaefer and Egbokhare 1999), dictionary construction (Schaefer and Egbokhare 2007) and reference grammar description (Schaefer and Egbokhare 2017).

Our illustrations are consistent with classic serial verb properties (Aikhenvald and Dixon 2006): a verb sequence sharing tense, aspect and polarity under a single intonation contour and a single predicate with no overt marking of syntactic dependency between verbs.

Emai manifests a robust system of serial verb constructions whose internal relations reveal restrictions on order and co-occurrence. To characterize these relations among intransitive verbs, we utilize semantic constructs articulated in association with Sorace's (2000, 2004) aspectual/thematic (AT) hierarchy. For transitive verbs, we rely on Levin and Rappaport Hovav's (1995, 2005, 2010) notion of manner/result complementarity. Both call attention to a basic distinction between two verb types: manner/process vs result/transition. Employing this distinction, we identify several basic constraints on Emai serial verb constructions. However, co-participant verbs in series fail to abide these constraints and thus any

alignment with manner or result. To address this issue, we compare co-participant verbs and the verb *za* in non-canonical constructions coding locative adjuncts. The resulting similarities suggest that co-participant verbs and locative adjunct verb *za* are neither manner nor result exponents. We propose, instead, that they represent a third verb type whose syntactic function is restricted to the coding of grammatical adjuncts.

Each of the following sections takes up one of the preceding themes. Intransitive verbs in series in Section 2; transitive verbs in series in 3; co-participant and locative adjunct verbs in Section 4; and conclusions in 5.

2 Constraints on Intransitive verbs

Sorace (2000, 2004) developed an aspectual thematic (AT) hierarchy to account for auxiliary variation (BE ~ HAVE) among perfective constructions in Standard Average European. She unified two hierarchic schemas. One is an aspectual or transition hierarchy reflecting degrees of telicity; it is illustrated by the increasing measure of telic status for the English verbs *be>remain>rot>arrive*. The second pertains to a thematic or process hierarchy characterizing degrees of agentivity; it is shown by the decreasing agentiveness of the verbs *work>run>shiver*. Linking these two are anti-transitive verbs like *melt* that share the agentive and telic properties of each hierarchy.

Sorace's unified AT hierarchy incorporates the process and transition sub-hierarchies into one, as indicated immediately below.

CNM	COM	UCA	ATSEXS	COS	CHS	CLO
work	run	shiver	melt	be	remain	rot arrive

CNM=controlled non-motion	ATS=antitransitive	EXS=existence state
COM=controlled motion		COS=continuative state
UCA=uncontrolled activity		CHS=change of state
		CLO=change of locative state

We now consider Emai intransitive verbs in series. Our aim is to assess how the AT hierarchy may enhance our understanding of constraints governing intransitive verbs that occur in serial verb constructions.

Relative to Sorace's AT hierarchy, Emai intransitive verbs in series exhibit several constraints. The principal class constraint is process verbs precede transition verbs. For example, controlled non-motion *gua* 'heap'

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precedes change of location *vade* 'come' (1), and controlled motion *la* 'run' precedes change of location *vare* 'come' (2).¹

- (1) òjè ò ó gùà vádé.
Oje SCC heap come
'Oje is heaping (yams) and coming.'
- (2) òjè lá varé vbì iwè.
Oje PRP.run come LOC house
'Oje ran to the house. /Oje came running to the house.'

Verb transposition would be ungrammatical.

- (3) *òjè vádé gùà.
Oje coming heap
'Oje is coming and heaping (yams).'

Second, process verbs regardless of order never co-occur in series. Controlled non-motion *ta* 'talk' and controlled motion *gbe* 'dance' are unacceptable in series (4). Similarly, a verb series consisting of controlled motion *la* 'run' and controlled non-motion *jé* 'laugh' is ungrammatical (5).

- (4) *éíí ívèkàhàn ò ó tà gbé vbì òsíé'.
the youths SCC talk dance LOC entertainment
'The youths are talking and dancing at the event.'
- (5) *òjè ò ó là jé.
Oje SCC run laugh
'Oje is running and laughing.'

A third constraint bears on the order of intransitive transition verbs. Some transition types co-occur. For instance, change of state *daa* 'raise' precedes existence state *muzan* 'stand.'

- (6) òjè dáá múzán.
Oje PRP.raise stand
'Oje stood up.'

¹Orthographic conventions for Emai are consistent with those in Schaefer and Egbokhare (1999, 2007, 2017), where *o* represents a lax mid back vowel, *e* a lax mid front vowel, and *vb* a voiced bilabial approximant. With respect to tone, acute accent marks high, grave accent signals low, and acute accent followed by an apostrophe designates high downstep. Abbreviations for grammatical morphemes used throughout this paper include: C=continuous, F=factative, LOC=locative, PAP=past perfect, PRP=present perfect, SC=subject concord.

As well, co-occurrence is permissible for intransitive transition verbs denoting a change of location. The verb *o* 'enter' can precede verb *raale* 'leave.'

- (7) òjè ó vbì ékéín imè ráálè.
Oje PRP.enter LOC inside farm move.away
'Oje entered the farm and left.'

However, verbs of change of location never precede any other transition verb type. For example, change of location *re* 'arrive' fails to precede existence state *dia* 'sit.'

- (8) *òjè ré díá vbì àgá.
Oje PRP.arrive sit LOC chair
'Oje arrived and sat in the chair.'

Summing up, we see that Sorace's AT hierarchy allows us to articulate three principal constraints for Emai intransitive verbs in series. They are: 1) process precedes transition; 2) process does not precede process; and 3) transition precedes transition with the caveat that change of location precedes only change of location.

3 Constraints on transitive verbs

Co-occurrence constraints of a like nature affect Emai transitive verbs in series. To characterize these, we employ the Levin and Rappaport Hovav (2010) constructs Manner and Result.

Result verbs characterize event change quite differently from Manner verbs (Beavers 2013). Result forms express scalar change. A scale is a set of degrees indicating values of measurement on a particular dimension along with an associated ordering relation for those values. Result verbs convey scalar change along a property or path, or of volume or existence. Examples include English *break*, *cool*, *enter*, *build*, *eat* and *drink*.

Manner verbs express non-scalar change. They convey complex changes with no privileged scale of change. Manner verbs represent a complex sequence of separate changes that collectively define an action. They do not add up to a single cumulative change along any single dimension. Examples include English *run*, *scrub*, and *sweep*.

These two verb types, Manner and Result, are frequent partners in a single serial verb construction. They are also found in other complex predicate types, such as resultative constructions that exist in some languages. English, for instance, shows the resultative complex predicates

sweep clean and *smash flat*, where *sweep* and *smash* represent Manner, while *clean* and *flat* characterize Result.

In Emai, serial constructions show sequences of transitive verbs. However, as exponents of Manner and Result, they are highly constrained. Transitive Manner *sua* 'push' in series can precede transitive Result *ye* 'move toward,' as in (9). But Result *ye* can never precede Manner *sua* (10).

- (9) òjè súá ìmátò yé èkó.
Oje PRP.push car move.toward Lagos
'Oje has pushed the car toward Lagos.'

- (10) *òjè yé èkó súá ìmátò.
Oje PRP.move.toward Lagos push car
'Oje moved toward Lagos and pushed the car.'

Transitive Manner verbs in series are also highly constrained. A Manner verb like *laa* 'carry in turns, take turns carrying' followed by another Manner verb, e.g. *la* 'chew,' is unacceptable in a serial construction.

- (11) *yàn á làà éánmí lù.
they C carry.in.turn meat chew
'They took turns carrying meat and chewing it.'

Result verbs, on the other hand, do co-occur in series. Such is the case with transitive verbs of location change. In (12), *shan* 'move through' and its direct object co-occur with *ye* 'move toward' and its object.

- (12) òjè shán égbóà yé ìwè.
Oje PRP.move.through backyard move.toward house
'Oje moved through the backyard toward the house.'

To sum up the preceding examples with transitive verbs in series, we have observed three basic constraints utilizing the constructs Manner and Result. First, Manner + Result exemplars co-occur in verb series (9); second, Manner + Manner exponents fail to combine (11); and third, Result + Result associate in a serial sequence (12).

4 Discussion

We direct attention now to some problematic facets of other serial verb constructions vis-à-vis the constructs Manner and Result. In (13), Manner *de* 'buy' combines with Result *e* 'eat,' the latter a verb characterizing incremental change along a dimension of consumption. However, in 14 and 15,

respectively, we see that each of the Manner verbs *nwu* 'carry' and *lie* 'collect' fail to co-occur with *e* 'eat.'

- (13) òjè dé émà é.
Oje PRP. buy yam eat
'Oje bought yam and ate it.'

- (14) *òjè nwú émà é.
Oje PRP. carry yam eat
'Oje carried yam and ate it.'

- (15) *òjè líé ítùú é.
Oje PRP. collect mushroom eat
'Oje collected mushrooms and ate them.'

In response to proposed serial verb examples like (14) and (15), we consistently receive feedback that the subevents represented by the separate verbs are difficult to relate contextually. They lack a sufficiently close association, apparently one of purpose or intention. That is, buying something can be viewed as intentionally or purposively related to eating that something. But neither carrying nor collecting some entity can be so viewed relative to eating that entity. This lack of association would suggest that intentionality must play some role in selecting verbs for at least the type of verb series construction shown in (13).

Co-participant verbs in series present a different kind of problem. They are found in a serial construction where one verb phrase aligned with an event co-participant precedes another verb phrase that conveys the core of the complex predicate, its basic set of argument entailments. Co-participant verbs in series also manifest strict precedence.

In Emai there are three co-participant constructions. In (16), the verb complex *de baa* 'join' and its subject co-participant precede the verb *sua* 'push.' In (17), the verb *kpaye* 'accompany' and its subject co-participant precede *ta* 'speak.' And in (18), the verb *kpaye* 'replace, take up a place on behalf of someone' and its subject co-participant precede verb *e* 'eat.'

- (16) ólí ómòhè dé báá élí ívèkhan súá ìmátò.
the man PRP. reach join the youths push car
'The man joined the youths to push the car/pushed the car with the youths.'

- (17) ólí ómòhè ò ó kpayè ójé tà étà.
the man SCC accompany Oje speak word
'The man is speaking with Oje.'

- (18) *ólí ómòhè kpáyé òlólò é ólí émàè.*
 the man PRP.replace Ololo eat the food
 'The man took Ololo's place and ate the food / ate the food on behalf of Ololo.'

How do the verbs in these constructions align with the categories Manner and Result? We take the first example with *de baa* 'join' and *sua* 'push' to develop an initial impression of the dilemma that arises. We could view *de baa* as a realization of Manner in construction with *sua*, which we previously saw in (9) behaved like a Manner verb. But this would violate the Manner + Manner constraint evident for serials comprised of verbs that are intransitive (5) or transitive (11).

Alternatively, we could view *de baa* as a Result verb in series with *sua*. Recall, however, that previously *sua* behaved as a Manner verb. Such a pairing would violate the prohibition on Result + Manner that characterized verb series combinations that were transitive (10) or intransitive (3). Assuming Result+Result or Manner+Result for this verb series is not feasible either, since both would require that *sua* exemplify Result. Examples like (9), which we reviewed prior, indicate that *sua* cannot be so identified.

None of the alternatives available to us seems able to characterize co-participant verbs as an exponent of Manner or Result. Perhaps something in the semantic function of co-participant constructions is being ignored. All identify a situation where the co-participant assumes a location associated with an argument of the core verb. Co-participant joiner co-locates with the joinee or assumes its place to complete an event.

This semantic function highlights a connection between the co-participant relation and locative relations more generally. Emai, like other languages, distinguishes between locative arguments and locative adjuncts, or between inner locatives and outer locatives. Syntactically coding this distinction in Emai is the verb *za* and its precedence relation relative to another verb in series. The difference between locative arguments and adjuncts becomes evident when we compare the syntactic shape of canonical locative constructions to their non-canonical counterparts. Exemplifying the latter, for example, are constructions for contrastive focus and content interrogatives (Schaefer and Egbokhare 2014).

In canonical constructions, both locative types, adjunct in (19a) vs argument in (19b), are syntactically marked by the postverbal preposition *vbi*.

- (19) a. *ólí ómòhè gbé ólí ófé vbi ímè.*
 the man PRP.kill the rat LOC farm
 'The man has killed the rat on the farm.'

- b. *ólí ómòhè ó vbi iwè.*
 the man PRP.enter LOC house
 'The man has entered the house.'

In non-canonical constructions, whether contrastive focus or content interrogative (20a-b), a locative adjunct requires that its predication include the verb *zain* series. In addition, *za* must precede the core verb found in the canonical predicate. Without *za*, a locative adjunct in either focus or interrogative position would be ungrammatical.

- (20) a. *ímè lí ólí ómóhé zá' gbéófè.*
 farm PF the man PAP.be.loc kill rat
 'It was on the farm that he killed a rat.'
 b. *ébé' ólí ómóhé zá' gbéófè?*
 where the man PAP.be.loc kill rat
 'Where did the man kill a rat?'

By way of contrast, a locative argument in a non-canonical construction disallows the verb *za* in series.

- (21) a. *ólí íwé nà lí ólí ómóhé ó'-ì / *zá' ò.*
 the house this PF the man PAP.enter-F PAP.be.loc enter
 'It was this house that the man entered.'
 b. *ébé' ólí ómóhé ó'-ì? / *zá' ò?*
 where the man PAP.enter-F PAP.be.loc enter
 'Where did the man enter?'

In other constructions, *za* designates a source argument relative to a goal argument (22a). Nonetheless, *za* never occurs as sole verb in a simple predication (22b).

- (22) a. *òjè zá vbi áfúzé' shánsé vbi òkè.*
 Oje PRP.move.loc LOC Afuze walk move.as.far.as LOC Oke
 'Oje walked from Afuze to Oke.'
 b. *òjè zá vbi ímè ráálè / *zá vbi ímè.*
 Oje PRP.move.loc LOC farm move.away PRP.move.loc LOC farm
 'Ojemoved away from the farm.'

It is the verb *za* in series and its precedence relation that appears pertinent to disentangling relations that underlie co-participant constructions. In both, we have a verb in a precedence relation relative to another verb in series. In neither instance, does the argument associated with the verb holding precedence serve as an argument of the core verb. Noun

phrases associated with co-participant verbs and the verb *za* are outliers; they are external to the core verb. In short, both are adjuncts. As such, co-participant verbs and *za* are not governed by the same constructs and constraints as those governing core verbs. We propose, therefore, that verbs coding co-participants are neither Manner nor Result exponents. Rather, they realize a third verb type, grammatical adjunct for the moment that has a syntactic function not unlike other adjunct marking verbs such as *za*. Neither a co-participant verb nor locative adjunct verb *za* introduces an event participant that serves as argument of a core verb.

5 Conclusion

In the preceding, we examined constraints affecting transitive and intransitive verbs in series in the Edoid language Emai. We identified verb combinations that were admissible as well as those that were not. The resulting constraints were framed in terms of the verb types Manner (process) and Result (transition). Verb series predications coding an event co-participant, however, challenged these constraints. Common to their use was a co-locate function for the co-participant relative to core verb participants. Based on this semantic function, we compared Emai locatives in canonical and non-canonical structures. In non-canonical constructions, Emai syntactically distinguished between locative adjuncts and locative arguments. Locative adjuncts were coded by verb *za* and its precedence relation relative to another verb in series. These syntactic conditions mirrored those of co-participant predications. As a consequence, we proposed that noun phrases associated with co-participant verbs were adjuncts and that the verbs themselves served a syntactic function related to the grammatical coding of adjuncts. We also noted that verbs marking co-participants were exponents of neither Manner nor Result. We suggested, therefore, that co-participant forms reflected a third verb type that, for the moment, we identified as grammatical adjunct. No verbs of this third type introduce an event participant that serves as a serial predication argument. We are thus hopeful that future attention to other serial predications may clarify this initial hypothesis and provide needed insight into the syntactic and semantic relations internal to serial verb constructions.

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