Ghana Journal of Linguistics

Vol. 12 No. 1 2023

A PUBLICATION OF THE LINGUISTICS ASSOCIATION OF GHANA
P. O. Box LG 61, Accra, Ghana
E-mail: linguisticsgh@gmail.com

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The Ghana Journal of Linguistics is published by the Linguistics Association of Ghana, P.O. Box LG 61, Legon, Accra, Ghana.
GJL Email: gjl@laghana.org | GJL Website: https://gjl.laghana.org
LAG Email: info@laghana.org | LAG Website: https://www.laghana.org

ISSN 2026-6596

GHANA JOURNAL OF LINGUISTICS

Volume 12 Number 1

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Mailing address: Editor-in-Chief, P.O. Box LG 1149, Legon, Accra, Ghana.

Email: gjl@laghana.org

ISSN 2026-6596

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http://dx.doi.org/10.4314/gjl.v12i1.1

SOCIOLINGUISTIC ASPECTS OF THE SPOKEN VERSION OF HAUSA IN GHANA

Mohammed Sadat

Although Hausa is not an indigenous Ghanaian language, it plays an important role in Ghana's sociolinguistics landscape. It is the lingua franca for many people living in the zongos. Zongos are located in every major city in Ghana and they are occupied by different ethnic groups who use Hausa for their daily communications. It is widely used on national televisions, radio stations and market centers. It is also the medium of instruction in the Islamic Schools (makarantu) However, there is dearth of research on the features of the Ghanaian version of the Hausa language and its relation to the social contexts in which it is spoken. This explorative paper examines sociolinguistics aspects of Hausa spoken in Ghana. It first discusses its historical and social contexts of the usage of the Hausa language and further examines its linguistic features in comparison with Standard Hausa. This comparison is done by drawing on data gathered from speakers of the Ghanaian version of Hausa and Standard Hausa speakers who hail from Nigeria. The paper finds that the Hausa spoken in Ghana has peculiar features making it unique from the one spoken in Nigeria.

Keywords: Hausa; zongo; sociolinguistics; language; speakers; Ghana.

Historical Background

The Hausas were among the early settlers in Ghana before the colonisation. Zoch (2011) established that by 14th century, the first Mande and Hausa settlements were found at the coast (Elmina) and in the hinterland (Kumasi). She added that from 1600 there was emergence of more trading posts along the southern route from Hausaland to Gonja (Salaga) and these people were interested in trading in kola and gold. Moreover, Dakubu (1997b) established that the Hausa community in Accra dates from the middle of the nineteenth century. This presupposes that the Hausas were in Ghana long before Ghana's independence.

Dakubu (1997b) describes the Hausa language in Ghana as a lingua franca and attributes its emergence in this role to extensive trading activities of native Hausa immigrants from Nigeria and widespread use of it as the language of soldiers in military camps set up by the

British. The combinations of these factors have yielded three different categories of Hausa speakers in Ghana (Dakubu 1997b: 15). The first group use Hausa as first language and language of ethnic identity within Hausa communities in Ghana. The second group use Hausa as a second language and lingua franca among non-Hausa members of different ethno-linguistic groups, including between native Hausa and non-native Hausa. The third group use Hausa, although not of Hausa origin or claiming Hausa identity, but use Hausa as their first language (L1).

The first cohort of native Hausa speakers came from Nigeria. They were traders who arrived either at what is now the northern part of Ghana and settled in places like Salaga, Yendi, Yeji etc. Some settled at places like Shukura, Sabon Zongo, Cowlane etc, which are currently considered to be within the southern part of Ghana. Huber (1999) maintains that due to the extensive trading activities by these Hausas in especially the northern part, the Hausa language has been their L1 of several generations of people there. Hausa trading activities have since existed in major market centers such as Salaga in the north, Kumasi in Ashanti and Kete-Krachi in the Volta Region, to mention but a few. The marketplaces are thus the principal domains in which members of the second category (Those who use Hausa as a second language and lingua franca among) of Hausa speakers as categorized above initially emerged. Evidence of this can be seen in the Salaga market and Nima market where Hausa is still the dominant lingua franca.

According to Gillespie (1955), another cohort of native Hausa speakers who came to the Gold Coast (Ghana's name during the colonial era) were well-trained soldiers who were brought in by the British colonial masters to reinforce the military power of their West African Frontier Forces (WAFF). Those soldiers were tasked to train recruits from Ghana. Because the Ghanaian recruits came from different ethnic groups and hardly had a language in common, they naturally learned the language of the Hausa trainers as their target language. However, what they learned (imperfectly) and used in the barracks was a different version known as "Hausan Soja". After serving in the military, Ghanaian soldiers, who thus fall in the second category of Hausa speakers, returned home speaking their version of Hausa. This is what Anyidoho and Dakubu (2008: 145) said:

> Colonial language policy is also the reason why Hausa is an inter-ethnic lingua franca. When the colonial regime established a local police force, and later an army division to fight in its wars, it recruited mainly men from the savannah regions extending from today's northern Ghana to Nigeria. Hausa was deliberately promoted as the language to be used with and within the lower ranks (Gillespie 1955). Hausa is still maintained as a language of inter-ethnic communication in towns among people originating from outside southern Ghana, especially from areas to the northeast. For Ghanaian speakers, Hausa is certainly not a language of ethnic identity, any more than English is. However, for many it does signify a kind

> of Ghanaian identity, or rather an urban identity related to 'Ghana' as a modern, urban idea associated with national government and the inter-regional, inter-ethnic institutions it sponsors (p. 145).

Hausas played a very critical role in the administration of the colonial masters. In order to augment the force in Gold Coast, The Hausa, an ethnic group from northern Nigeria, were considered a solution because of their apparent 'higher intelligence and more martial habits' (Gillespie, 1955: 9). The Hausas were brought as trainers because the colonial masters believed in them; they were tried and tested already in Nigeria and it was proving that they were loyal to the course of the colonial masters. In view of their loyalty, Anderson and Killingray (1991, p. 7) argue that, 'the trustworthy stranger to police the other stranger was the man required'. According to Tankabe (2008), although the numbers of the trainers were insufficient, the Hausas made an immediate impact in the establishment of colonial forces.

Despite the important role Hausa plays in the sociolinguistics of Ghana, there is very scanty work on its linguistic features and none in the social context. This paper explores the current state of Hausa spoken in Ghana by discussing the historical and social contexts of use. Secondly, the paper examines the linguistic features of the spoken version of Hausa in Ghana and compares it with the Standard Hausa (Kano). The rest of the paper discusses social context and the linguistic features of the Hausa spoken in Ghana in comparison with Standard Hausa. The paper first discusses the phonological differences between the two varieties and further compares their variation at the morphological and syntactic levels. The paper also discusses lexical distinctions between the Ghana Hausa and the Nigeria Hausa. Throughout the discussion, the cardinal objective is to demonstrate that the Ghana variety of Hausa is a simplified and structurally reduced version of the Nigeria one.

Geographical Location and Status of the Hausa in Ghana

The spoken version of Hausa in Ghana plays a very significant role in the sociolinguistic context of Ghana. The language plays various roles within the linguistic landscape in the country and it is mostly spoken in the zongos. Dakubu (1997b) notes that by the beginning of the 20th century, virtually all the major towns of any commercial significance in southern Ghana had what becomes known as zongo communities. Zongo in Hausa means 'camping place of caravan'. The word is pronounced 'zango' in the Standard Hausa. Therefore, the term zongo is a Ghana Hausa lexicon. It is a place that is predominantly occupied by Muslims who are mostly from the northern Ghana and outside the shores of Ghana. Most settlers in the zongos engage in trading activities and the Hausa variety spoken in Ghana is the medium of transaction.

According to Zoch (2011), the trading activities were necessitated because of the kind of items used in the trade; therefore, the Hausa traders settled in trading towns along the trade routes which led to the establishement of the zongos. By the beginning of 19th century, the community of Hausa in Kumasi lived in the centre of the town along the avenue between the main market and the Asantehene Palace. The early Hausa scholars performed magical and religious service for the Asantehene (King of Ashantes). Zoch (2011) added that some acted as court scribes, ambassadors, political and martial advisors of the Asantehene because these Hausas had been educated in Hausaland. This relationship has been maintained till now and it has given the Kumasi zongo chief a "chair" in the Asantehene Palace. Kumasi zongo was established in1905 close to the city centre and near the Asantehene Palace.

Zongos accommodate all kinds of people from different parts of the ecountry and outside the country. 'The moment a Hausa migrant settled down in a zango he ceased to be a foreigner socially; most of the non-Hausa incomers who settled in Hausa zangos became Hausa subsequently' (Adamu, 1978: 16). Most zongo inhabitants are people from northern Ghana, Muslim Hausa-speakers from southern Ghana, and immigrants from other parts of West Africa. In describing the settlers of zongos, she said "second and third generation immigrants develop a "zongo identity" which is independent of ethnicity (Schildkrout 1978: 14). Working in the informal economy is the norm for most zongo residents. Given their linguistic diversity and the fact that their main vocations were trade related, Hausa readily emerged as their lingua franca. It is observed that what is spoken in the zongos is an amalgamation of the Hausa spoken originally in market places and the 'Hausan Soja' which ex-soldiers learned in the barracks. The hybrid has been nicknamed '*Gaananci*', which literally means 'Ghana Hausa'. In the zongos, one can find native Hausas, i.e. descendants of the original migrants. One can also find immigrants from different places who speak their own languages and use Hausa as their lingua franca just as one can find a third group, members of the third category above, who though non-native, use Hausa as their L1.

Huber (1999:137) attests to the fact that Hausa is widely spoken as second language in Ghana, but it is hard to estimate the number of its first and second language speakers. He gave a rough estimate that not more than 2% of Ghanaians speak Hausa as a mother tongue, but estimates that in the immigrant quarters of the urban centres up to 70-80% have some degree of competence in the language. The 1948 census indicated that Hausa constituted the largest single non- Gold Coast community in Accra, at 3.4% of the total population (Dakubu 1997b:130).

More recent works point to an upsurge in the number of speakers of the Ghanaian version of Hausa and these speakers see themselves as native speakers. Hausa is the lingua franca in the zongo communities and it is used in almost all the zongo activities such as preaching,

outdooring, announcements, and advertisements on the radio and television stations. And even more fundamental, it is the fact that there has for years been intermarriages between the native Hausa speakers and Ghanaians, thus merging the first two categories of speakers identified *(*Dakubu, 1997b) as previously mentioned. Tijani (2006), who highlighted the significance of the intermarriages, cited herself as one of the products of the intermarriages and said that as per her language socialization, she sees Ghana Hausa as her mother tongue. She added that Ghana Hausa has now reached a point where because of the large number of speaking populations in zongos, people sometimes refer to the speakers as native Hausas. This is for example the impression about zongo dwellers in the Ashanti Region of Ghana, especially in Kumasi**.**

Although no institution in Ghana teaches Hausa as a subject of study, it plays a key role as medium of instruction in one of two types of schooling systems in zongo communities, Arabic schools. Every zongo has two kinds of schools: English schools and Arabic schools. The English schools are the public schools controlled by the Ghana Education Service while the Arabic schools, popular known as '*makarantu*', are privately owned by the various religious sects. These Arabic schools outnumber the English schools and they are run in the evenings and at the weekends, i.e. when English schools are not in session. The medium of instruction in these Arabic schools is the Ghanaian variety of Hausa. Every Arabic item is translated and spoken in the Ghanaian variety of Hausa. Surprisingly, no material is written in Hausa for use in those institutions. A similar situation pertains in the mosques. The mosques in the zongos use Ghana Hausa to interpret their Arabic-based sermons and teachings for easy understanding of the worshippers. Either the Imam uses only Hausa or uses Hausa with any other second dominant language of the locality. For instance, in Ashanti Region, some mosques use Hausa while others use Hausa and Twi. In Accra, it is either Hausa or Hausa and English/Ga. In Hohoe in the Volta Region, Hausa and Kotokoli are used in the mosques in the zongos.

As already noted, Ghana Hausa is one of the languages used in advertisement on radio and television. Television stations like Ghana Television (GTV), Metro, Haske, Gaskia and Gaskia Plus, Islamic Library TV and Baina TV have programmes in Ghana Hausa. Also, Radio stations in Accra such as Ghana Broadcasting Corporation (GBC), Radio Universe, Marhaba FM and Amanie FM have programs that are aired in Ghana Hausa. In Kumasi, the following radio stations also broadcast programmes in Hausa, Haske, Otec FM, and Zuria FM and Alpha Radio. Gaskia FM in Techiman has programmes in Ghana Hausa while Diamond FM in Tamale also broadcast programmes in Ghana Hausa. In Fact, Zuria FM of Kumasi and Marhaba FM in Accra transmit almost all their programs in Ghana Hausa. Due to this, these two radio stations are very popular among the zongo communities. The Accra based Marhaba FM reaches as far as the Eastern Region and part

of the Volta Region, thus commanding a very large audience and patronage during their phone-in programmes.

Due to the wide listenership of Ghana Hausa and strong ties between BBC Hausa news and some of the local stations, BBC Hausa news and current-affairs programme is now available on Marhaba 99.3 FM in Accra. This partnership agreement between BBC World Service and Marhaba FM was signed on 26th January, 2012. In addition to the daily BBC Hausa programmes such as BBC **Shirin Safe** (morning show) and BBC **Shirin Yamma** (evening show), there is BBC Hausa sports bulletins broadcast on Monday to Friday. Marhaba 99.3 FM also rebroadcasts BBC Hausa weekly programmes such as the English Premier League commentary, **Amshoshin Takardun Ku** (Listeners' Letters) and **Haifi Ki Yaye Da** BBC Hausa (women's magazine focusing on motherhood and childcare) (ModernGhana.com, 2012). BBC is delighted to extend their service to Hausa-speakers in Ghana (NewsGhana.com, 212). This is a clear indication of the wide listenership of Hausa in Ghana.

Methodology

Research approach and design

This is a descriptive qualitative study to examine aspects of sociolinguistics of Hausa spoken in Ghana. This approach was chosen because it offers the choice of a straight description of a phenomenon. It typically involves individual and/or focus group interviews with minimal to semi-structured interview guides (Sandelowski, 2000).

Data collection procedure

The data for this study were collected from both primary and secondary sources. The primary data were gathered through interview, observation, sermons, radio and television broadcasting. The interview was conducted purposefully among six participants who are Ghana Hausa speakers on one hand and six participants who are speakers of Nigeria Hausa on the other. All the participants were more than 30 years and each group was made up of 3 (three) males and three (3) females. The interview solicited among other things the lexicons, pronunciations, and constructions in the two varieties of Hausa equivalent word. For instance, a word was mentioned in English and the participants were asked to provide the Hausa version. Three renowned zongo chiefs were also interviewed for the history of Hausa in Ghana. These chiefs were chosen because they were the longest-serving chiefs among the zongo chiefs. The recorded version of the interview was transcribed and the participants were made to confirm the transcription.

A visit was also made to five selected mosques in five zongos where Ghana variety of Hausa is used for preaching. The interviewees were all made aware that they were participating in a research activity. The proceedings were then recorded. Again, observation was conducted in five Islamic schools where Ghanaian variety of Hausa is used as a medium of instruction. Some videos and pictures were recorded. Recordings were also made on Hausa programmes on sports, health, politics, civic education and agriculture on Ghana Television, Metro TV, Marhaba FM and Zuria FM. These data collection sources offered this study a wide range of data for analysis. The secondary sources were from sociolinguistic books on pidgin, creole, contact language, bilingualism and multilingualism and social identity.

Data Analysis and presentation

This section discusses the various linguistics features of Ghanaian variety of Hausa and compares it with Standard Hausa. The comparison is done at the level of phonology, morphology, lexical and metaphorical extension. The recordings were transcribed and the needed data for the study were analyzed and presented. Below are detailed analyses of the study.

Phonology

At the phonological level, the Ghanaian variety of Hausa exhibits features that are similar to that of pidgins. Pidgins have certain unique features that make them stand out from the Standard language. These features are what Sebba (1997) referred to as design features of pidgins and creoles. The features manifest in the form of lack of phonological complexity, lack of morphological complexity, lack of syntactic complexity, vocabulary reduction, and semantic transparency. Lack of phonological complexity has to do with the reduced number of phonemes and uncomplicated syllable structure of pidgins. In other words, speakers of pidgin avoid the use of complicated sounds. These sounds include unfamiliar vowels and consonant. This presupposes that that pidgin speakers always speak the simplest of sounds. Even though, not all simplified languages are pidgins, Holm (2000) considers pidgins as always-simplified compared to the lexifier language. Moreover, Amuzu (2010) maintains that pidgins always have fewer phonemes than the source language and this is triggered by the attempt of the speakers to avoid complex phonemes of the source language.

In relation to vowel sounds, Amuzu (2010) lists among others the following diphthongs (**ei, ai, eə, əʊ.** etc) as those vowel sounds the speakers of pidgin avoid. He added that these diphthongs are normally replaced with the nearest monophthongs that are present in their mother tongue. In the Ghanaian variety of Hausa, the speakers avoid complex and difficult

vowels sounds of the Standard Hausa. The common one in the Ghana Hausa is /**ai**/ changes to **/e/** as in 1-3 below. Ghana Hausa examples are 'As' while the Standard Hausa are Bs. The words we are comparing are the boldfaced.

(1)

a. Ya-yi aiki-n dede [Ghana Hausa]
3.SG.SUBJ.COMPL-do work-DET correctly
'He has done the work correctly'

b. Ya-yi aiki-n daidai [Standard Hausa]
3.SG.SUBJ.COMPL-do work-DET correctly
'He has done the work correctly'

(2)

a. Kwame be da kudi [Ghana Hausa]
Kwame NEG-SG with money
'Kwame does not have money'

b. Kwame baya da kuɗi [Standard Hausa]
Kwame NEG-SG with money
'Kwame does not have money'

(3)

a. Adiza na zuwa da mewa [Ghana Hausa]
Adiza PROG come with millet
'Adiza is coming with a millet'.

b. Adiza tana zuwa da maiwa [Standard Hausa]
Adiza PROG come with millet
'Adiza is coming with a millet'.

There is also alternation between **/i/** and **/e/.** The Ghana Hausa speakers use /i/ to replace /e / in wordfinal position as 4-6.

(4)

a. Suna-n **kani**-na Ali [Ghana Hausa]
name-DET younger brother-POSS Ali
'My younger brother's name is Ali'

b. Suna-n **ƙane**--na Ali [Standard Hausa]
name-DET younger brother-POSS Ali
'My younger brother's name is Ali'

(5)

a. Jamal da Abu sun-ba-ni sabo-n **zani** [Ghana Hausa]
Jamal CONJ Abu 3PLR-give.3SG new-DET cloth
'Jamal and Abu gave me the new cloth'

b. Jamal da Abu sun-ba-ni sabo-n **zane** [Standard Hausa]
Jamal CONJ Abu 3PLR –give. 3SG new-DET cloth
'Jamal and Abu gave me the new cloth'

(6)

a. **komi** na-da lokaci-n shi [Ghana Hausa]
everything IMPERF-with time-DET 3SG OBJ
'Everything has its appointed time'

b. **komai** na-da lokaci-n sa [Standard Hausa]
everything IMPERF-with time-DET 3SG OBJ
'Everything has its appointed time'

It is seen in the above examples that Ghana Hausa speakers change /e/ with /i/ as in the following words: **kane →kani** ('younger brother'), **zane →zani** ('cloth, wrapper') and /i/ with /ai/ as in **komi →komai** ('everything', nothing) etc.

There are also a number of consonants in the Standard Hausa which the Ghana Hausa speakers avoid because of their complex nature. Dakubu (1997a) established that in the Ghana Hausa **/b/ /s/** and **/d/** are fused with / **ɓ/ /s'/** and /**ɗ**/. According to Dakubu (1977a), this has resulted into fusion of sounds therefore there is no distinction between the initial consonants of the following words: ***bata'*** 'a line' and ***ɓata***'to spoil'. Therefore, the absence of the above sounds in Ghana Hausa makes it difficult to distinguish between the following words:

(7) **bari** 'to leave' → **ɓari** 'dropping'
(8) **fada** 'palace' → **faɗa** fall into'
(9) **daka** 'to pound' → **ɗaka** 'in a hut'
(10) **kafa** 'to establish →**ƙafa** leg'
(11) **baki** 'mouth' → **baƙi** 'new comers'

Pidgin speakers avoid complex consonants of the target language. This is in line with the discussion that pidgin avoids more complex sound by replacing them with the simple ones. We have five consonants in the Standard Hausa that are avoided in Ghana Hausa. These consonants are:

(12) **/ɓ/** voiced bilabial glottal
(13) **/ɗ/** voice alveolar glottal
(14) /**s'**/ voiceless alveolar glottal
(15) /**ƙ'**/ / voiceless velar glottal
(16) **/ʔ/** glottal stop

(17) Voiced bilabial glottal **/ɓ/** is replaced with voiced bilabial plosive /**b/**.

a. Ya-boye baya-n itace [Ghana Hausa]
3SGCOMPL-hide back-DET tree
'He has hidden behind the tree'

b. Ya-ɓoye bayan itace [Standard Hausa]
3SGCOMPL-hide back-DET tree
'He has hidden behind the tree'

(18) Voice alveolar implosive/ ɗ/ is replaced with voiced alveolar plosive /d/

a. Yaro-n nan ya dauki ruwa-n [Ghana Hausa]
Boy-DET that 3SG COMPL take water-DET
'The boy took the water'

b. Yaro-n nan ya ɗauki ruwa-n [Standard Hausa]
Boy-DET that 3SG COMPL take water-DET
'The boy took the water'

(19) Voiceless alveolar affricate / **ʦ** / is replaced with voiceless alveolar fricative /**s/**

a. Akwai sauro gari-n ga [Ghana Hausa]
There mosquito town-DET here
'There is mosquito in this town'

b. Akwai ʦauro gari-n ga [Standard Hausa]
There mosquito town-DET here
'There is mosquito in this town'

(20) Voiceless velar ejective **/ƙ/** is replaced with voiceless velar stop **/k/**

a. Gida-n nan na da kofa uku [Ghana Hausa]
House-DET DET IMPERF with gate three
'The house has three gates'

b. Gida-n nan na-da ƙofa uku [Standard Hausa]
House-DET DET IMPERF-with gate three
'The house has three gates'

It is seen from 17-20 that these glottal sounds **/ ɓ/ / ɗ/ /ƙ'/ /ʦ/** are replaced with **/b, d, k, s/.** Moreover, in the Standard Hausa, there are some words that contain glottals. However, this glottal is dropped in Ghana Hausa. This can be seen in the following words.

	Standard Hausa	Ghana Hausa	
(21)	**sa'a**	**saa**	'luck'
(22)	**wa'zi**	**wazi**	'preaching
(23)	**u'ba**	**uba**	'father'

The illustrations in 24 and 25 show the absence of the glottal:

(24)

a. Sakina tana-da saa ciki-n aiki-n ta [Ghana Hausa]
Sakina IMPERF-with luck inside-DET work-DET 3SG
'Sakina is lucky in her work'

b. Sakina na da sa'a a cikin aikinta [Standard Hausa]

(25)

a. Waazi–n nan na -da gundura [Ghana Hausa]
Preaching-DET that IMPERF-with boring
'The preaching is boring'

b. wa'zi-n nan yana-da gundura [Standard Hausa]
Preaching-DET that IMPERF-with boring
'The preaching is boring'

Moreover, Ghana Hausa speakers replaces /h/ with labiodental fricative /f/ as in 26-28.

(26)

a. Aljifu-n Samed ya yage [Ghana Hausa]
pocket-DET Samed 3SG COMPL tear
'Samed's pocket is torn'

b. Aljihu-n Samed ya yage [Standard Hausa]
pocket-DET Samed 3SG COMPL tear
'Samed's pocket is torn'

(27)
a. Malam na-da yara fudu [Ghana Hausa]
malam IMPERF-with child PLR four
'The teacher has four children'

b. Malam yana-da yara huɗu [Standard Hausa]

(28)
a. Lafiya ke **komi** [Ghana Hausa]
Health COP/HAB everything
'Health is everything'

b. lahiya ke komai [Standard Hausa]
Health COP/HAB everything
'Health is everything'

In the above examples, the speakers of Ghana Hausa use /f/ for /h/:

	Standard Hausa	Ghana Hausa	
(29)	**Huɗu**	**fudu**	'four'
(30)	**Aljihu**	**aljifu**	'pocket'
(31)	**lahiya**	**lafiya**	'health'

There are also instances where Ghana Hausa speakers replace a trilled **[r]** with a lateral **/l/** as we can see in the examples 32 and 33:

(32)
a. Halshi-n yaro-n ya kumbura [Ghana Hausa]
tongue-DET boy-DET 3SG COMPL swell
'The boy's tongue has swollen'

b. Harshe-n yaro-n ya kumbura [Standard Hausa]
tongue-DET boy-DET 3SG COMPL swell
'The boy's tongue has swollen'

(33)

a. Mei-gona-n ya halbi sunsu [Ghana Hausa]
owner-farm-DET 3SG COMPL shoot bird
'The owner of the farm shot at a bird'

b. Mai-gona-r ya harbi tsunsu [Standard Hausa]
owner-farm-DET 3SG COMPL shoot bird
'The owner of the farm shot at a bird'

Syllable structure and vowel insertion

Amuzu (2010) mentions that pidgins have processes in which they use to simplify complex structure: prothesis, epenthesis and paragogue. Among these processes, epenthesis and paragogue are common to Ghanaian version of Hausa. Epenthesis is the process of inserting a vowel in the middle of consonants cluster in order to break the cluster. Instead of CCV, we may have CVCV as in examples 34 - 36. The examples indicate that Ghana Hausa breaks the consonant cluster by inserting vowels between the consonants.

	Ghana Hausa	Standard Hausa	
(34)	**guluma**	**gulma**	gossip
(35)	**gulubi**	**gulbi**	River
(36)	**girigiza**	**girgiza**	shake

Paragogue has to do with the insertion of a vowel at the end of the last syllable. This according to Amuzu (2010) pidgin speakers prefers an open syllable. In Ghana Hausa, this strategy is done on the English loan words used in Ghana Hausa. However, this is not the case in the Standard Hausa because the Hausa has lexicon for such words. This is due to insufficient amount of vocabulary in Ghana Hausa, which one of the features of a pidgin. Example:

	Ghana Hausa	Standard Hausa	
(37)	**basuko**	**keke**	bicycle
(38)	**beleti**	**santara**	belt
(39)	**mankishi**	**ashana**	matches
(40)	**watshi**	**agogo**	watch

Morpho-phonological: final vowel deletion

Vowel deletion is another peculiar characteristic in Ghana Hausa. Amuzu (2010) states three types of deletion that occur in pidgin: syncope, apocope and aphesis. Syncope is when

a consonant is dropped at the end of syllable. However, in Ghana Hausa a vowel is dropped at the end of a syllable. This occurs when a vowel appears between a nasal and any other sound. The vowel is deleted in a rapid speech. Even though, such condition is also applicable to Standard Hausa but it is more rampant in Ghana Hausa. This is seen in the following example: 41- 44.

	Standard	Ghana	
(41)	**ba na so**	**ban so**	I don't like
(42)	**ba na ji**	**ban ji**	I cannot hear
(43)	**sanu da zuwa**	**sanda zuwa**	You are welcome
(44)	**kwana biyu**	**kwan biyu**	It has been a while

Credit to Dakubu (1977a)

Labialization of consonants before /a/

Ghana Hausa speakers labialize some consonants before /a/

	Standard Hausa	Ghana Hausa	
(45)	**sale**	**swale**	peel
(46)	**ɗaci**	**dwaci**	bitter taste
(47)	**taɾi**	**twari**	cough
(48)	**zari**	**zwari**	greed

This also is applicable in western dialects of Hausa e.g., Sakkwatanci in Nigeria and Kuruhuyanci (dialect of Kurfey) in Niger (Bello, 2015 & 2020).

Palatalization

The most conspicuous feature of Ghana Hausa that is missing in the Standard Hausa is the palatalization of the velar sounds before /i/

	Standard Hausa	Ghana Hausa	
(49)	**aboki**	**aboci**	friend
(50)	**sarki**	**sarcí**	king
(51)	**aiki**	**aici**	work
(52)	**doki**	**doci**	horse
(53)	**gida**	**jida**	house
(54)	**giwa**	**jiwa**	elephant
(55)	**girma**	**jirma**	to grow up

Morpho-syntactic

In terms of the structure of words, pidgin speakers will always want to speak the simple form in order to avoid complexity. This is what Sebba (1997) referred to as lack of morphological complexity. In Ghana Hausa, the speakers use one lexicon to refer to both masculine and feminine. This illustration is discussed below.

Copula: ce/ne (Gender marker)

There are two genders in Hausa: masculine and feminine. Every noun or pronoun in Hausa whether concrete or abstract is either masculine or feminine. Consequently, the English neuter- gender pronoun 'it' has no equivalent in Hausa. All nouns in Hausa whether animate or inanimate take either the masculine personal pronoun or feminine personal pronoun. Howeiday (1959) says the main distinction between the masculine and the feminine nouns is that the feminine nouns end with 'a' but with few exceptions. Hausa has special particles for nouns and these particles make distinction between masculine and feminine nouns. In Ghana Hausa, these distinctions are totally absent for nouns which do not have a notion of classification by sex. Every noun is considered masculine except those with female sex. Dakubu (1977a) says in Hausa a number of names of animals are feminine gender although they refer to either sex, but in Ghana Hausa, they are masculine and occur with the masculine specifying particle /ne/ instead of the feminine /c/. The illustration is seen in 56.

	Standard Hausa	Ghana Hausa	
(56)	**angulu ce**	**angulu ne**	'it is a vulture'

Moreover, inanimate nouns are considered feminine in Standard Hausa but in Ghana Hausa they are considered masculine as in 57 - 99.

	Standard Hausa	Ghana Hausa	
(57)	**Makaranta ce**	**makaranta ne**	'it is a school'
(58)	**Bango ce**	**bango ne**	'it is a wall'
(59)	**kofa ce**	**kofa ne**	'it is a door'

/n/, /r/ as genitive or determiner

The morpheme /n/ plays a very important role in Hausa. The /n/ has different functions in Ghana Hausa. This section deals with those functions one after the other. The most common one is signaling the relationship between nominals. The /n/ is sometimes considered as a determiner. Every Hausa noun is considered as elliptically containing the

indefinite article. However, in Standard Hausa, it is expressed in two different ways: /**r**/ and /**n**/. The /**n**/ is used for singular masculine and all the plural nouns while the /r/ is used for feminine nouns. In the case of Ghana Hausa /**n**/ is used for all instances. The use of /**r**/ as an article for feminine is conspicuously missing in Ghana Hausa. The use of /n/ in all instances does not only occur with animate nouns. Inanimate nouns also use /n/ in all occurrences.

Here are some illustrations in 60-63:

(60)

a. Kujera-n malam ya sufa [Ghana Hausa]
Chair-DET teacher 3SG old
'The teacher's chair is old'

b. Kujera-r malam ta t sufa [Standard Hausa]
Chair-DET teacher 3SG old
'The teacher's chair is old'

(61)

a. Riga-n na-da sada [Ghana Hausa]
Shirt-DET IMPERF -with expansive
'The shirt is expensive'

b. Riga- r tana-da tsada [Standard Hausa]
Shirt-DET IMPERF -with expansive
'The shirt is expensive'

(62)

a. Mata-n Musa na gida [Ghana Hausa]
wife-DET Musa IMPERF house
'Musa's wife is at home'

b. Mata-r Musa na gida [Standard Hausa]
wife-DET Musa IMPERF house
'Musa's wife is at home'

(63)

a. Gida-n Musa ne [Ghana Hausa]
house-DET Musa COP
'It is Musa's House'

b. Gida-n Musa ne [Standard Hausa]
house-DET Musa COP
'It is Musa's House'

The use of /n/ in all instances clearly do not distinguish masculine from feminine in Ghana Hausa. Dakubu (1977a) observed that in Ghana Hausa the feminine suffix /re/ seems to have been replaced in all occurrences by /-n/ as in 64-66.

	Standard Hausa	Ghana Hausa	
(64)	**mata- r- sa**	**mata-n- shi**	his wife'
(65)	**yarinya-r-ta**	**yariya-n-ta**	'her daughter'
(66)	**umma-r –mu**	**umma-n-mu**	'our mother'

Possessive pronoun

Both Ghana Hausa and the Standard Hausa have the same possessive pronouns with the exception of third person singular masculine pronoun. While Standard Hausa uses **sa** Ghana Hausa uses **shi** as in 67-69

	Standard Hausa	Ghana Hausa	
(67)	**gida-n sa**	**gida-n shì**	'his house'
(68)	**mata-r sa**	**mata-n shi**	'his wife'
(69)	**kuɗi-n sa**	**kudi-n shì**	'his money'

Lexical

If a language is moved from its original cultural context to a different area where different languages dominate the linguistic setting, one will therefore expect a number of changes. These changes may include inadequate vocabulary in the language which may lead to the use of a word in a novel way or multiple ways. This is what Sebba (1997) refers to as 'maximum use of minimum vocabularies'. There are a number of vocabulary items used in Ghana Hausa which are not known in Standard Hausa and vice versa. This is the case where there is limited vocabulary so there is the need to fall on other languages for their vocabularies. This can be done in a number of ways. Amuzu (2010) mentions the following as some of the strategies: metaphorical extension, reduplication, multi-functionality, compounding, and circumlocution.

Metaphorical expansion

Amuzu (2010) explains metaphorical extension as the extension of the meaning of existing word root. The following are the examples, the word **ƙarƙashi** means 'under' in the Standard Hausa but in Ghana Hausa it means the following: under, at, understand. This is Akan influence of the word **'aseɛ'**. The illustration in 70-72.

(70)

a. Abu na karikashi-n wasa-n [Ghana Hausa]
Abu IMPERF under-DET play-ground-DET
'Abu is at the playing ground'

b. Abu yana wuri-n wasan [Standard Hausa]
Abu IMPERF under-DET play0ground-DET
'Abu is at the playing ground'

(71)

a. Mumuni ya-ji karikahsi-n magana-n ka [Ghana Hausa]
Mumuni 3SG COMPL-hear under-DET talk-DET 3SG
'Mumuni has understood your message'

b. Mumuni ya-fahimci magana-r ka [Standard Hausa]
Mumuni 3SG COMPL- understood talk-DET 3SG
'Mumuni has understood your message'

(72)

a. Rago-n na karikashi-n tebur [Ghana Hausa]
Sheep-DET IMPERF under-DET table
'The sheep is **under** the table'

b. Rago-n yana karikashi-n tebur [Standard Hausa]
Sheep-DET IMPERF under-DET table
'The sheep is **under** the table'

Below are examples of the English lexical items that are used differently in both the Standard Hausa and Ghana Hausa.

	Standard Hausa	Ghana Hausa	Source
bread	**burodi**	**paanu**	Akan
box	**akwati**	**adaka**	Akan
bag	**jaka**	**bagi**	English

window	**taga**	**takoro**	Akan
pepper	**barkono**	**tankwa**	unknown
banana	**ayaba**	**kwàdú**	Akan
ginger	**citta mai yatsu**	**kakaduro**	Akan
car	**mota**	**lore**	English
show	**nuna**	**gwadaa**	Hausa (meaning: 'measure')
window	**taga**	**takwaro**	Hausa (meaning: frame)
ferment/sour	**tsami**	**yami**	unknown
groundnut	**gyada**	**guʤiya**	unknown
spoon	**ʧokali**	**atiri**	Akan
watch	**agogo**	**woʧi**	English
match(es)	**aʃana**	**mankiʃi**	English
bicycle	**keke/basukur**	**basuko**	English
yam	**doya**	**dundu**	Hausa (meaning: 'beatings')
cow	**sa**	**shanu**	Hausa (meaning: 'plural of cow')

Findings and Discussions

The papers discussed aspects of Hausa spoken in Ghana by examining the linguistic difference that exists between Ghana Hausa and Standard Hausa. The discussion is largely based on phonology, morphology and lexicon. Phonologically, there is lack of phonological complexity in Ghana Hausa. It is seen in the analysis that speakers of Ghana Hausa avoid the use of diphthong which is more complex than the monthong as in **komi →komai** ('everything', nothing) etc. Again, speakers of Ghana Hausa avoid some consonants (**ɓ/ /s'/** and /**ɗ**) because of their complex nature. Dakubu (1997a) established that in the Ghana Hausa **/b/ /s/** and **/d/** are always used in place of / **ɓ/ /s'/** and /**ɗ**/. In view of this, there are no distinctions between words that involve such sounds in Ghana Hausa. For instance, these sounds are pronounced same in Ghana Hausa: **fada** 'palace' and **faɗa** 'fall into'. Also, the are some phonological processes that occur in Ghana Hausa. One of such process is epenthesis which is common to Ghana Hausa. The data showed that Ghana Hausa breaks the consonant cluster by inserting vowels between the consonants as in **gulbi** and **gulubi** 'river'. This is also seen in loan words form English for example: **belt** and **beleti.**

Again, speakers of Ghana Hausa labialize some consonants before /a/ which is missing in Standard Hausa as in **tari and twari** 'cough'. According to Bello (2015 & 2020), this phonological process also occurs in western dialects of Hausa e.g Sakkwatanci in Nigeria and Kuruhuyanci (dialect of Kurfey) in Niger. Palatalization is also very visible feature of Ghana Hausa and this is missing in Standard Hausa. The velar sounds before /i/ is

palatalized in Ghana Hausa, example **giwa** and **jiwa** ‘elephant’. Again, Bello (2015 & 2020) observed similar process in some dialects of Hausa spoken in Niger.

Another finding from the study is the use of **/n/** as genitive for both masculine and feminine gender. However, in Standard Hausa **/n//** and **/r/** are used for masculine and feminine gender respectively. Again, in Standard Hausa /**n**/ is used for singular masculine and all the plural nouns while the /r/ is used for feminine nouns. In the case of Ghana Hausa /**n**/ is used for all instances. Metaphorical expansion is also a unique trait of Ghana Hausa. Example: the word ƙarƙashi means ‘under’ in the Standard Hausa but in Ghana Hausa it means the following: ‘under’, ‘at’, and ‘understand’. This is an Akan influence of the word ‘aseɛ’.

Lexically, there are lexicons that Hausa speakers use which are not known in Standard Hausa

	Standard Hausa	Ghana Hausa	Source
bread	**burodi**	**paanu**	Akan
box	**akwati**	**adaka**	Akan
window	**taga**	**takoro**	Akan
banana	**ayaba**	**kwàdú**	Akan
ginger	**citta mai yatsu**	**kakaduro**	Akan

More importantly, there is a trace of language shift among the resident of the zongo communities. Some settlers gradually abandon their first language for Ghana Hausa immediately they settle in the zongos. According to Fasold (1984:213) ‘Language shift simply means that ‘a community gives up a language completely in favor of another one. Garret (2006:63) added ‘Language shift refers to a situation in which a community of speakers effectively abandons one language by shifting to another (not necessarily by conscious choice)’. This definition exactly fits into the happenings among the resident of the zongo communities where they have shifted to speaking Ghana Hausa at the expense of their first languages. In view of Trudgill (2000: 191), ‘Language shift involves the gradual replacement of the communicative functions of one language by another that the user considers to serve the maximum linguistic and social benefits of a particular place and time. Agyekum (2010) established that Hausa is widely spoken in the zongos as a lingua franca. He added that the Hausa as a language of trade is not only in Ghana but West Africa as a whole. According to Agyekum (2010: 383), ‘The Hausa used in Ghana is more of the spoken type than the Nigeria variety’.

Dakubu (1988:170) added that ‘personal observations and survey findings both indicate that there is some tendency for children born in the zongos, at least in the south, to learn Hausa before they learn their parents’ language or languages and to speak it better.’ Yankah

(2006) opines that there are other non-Ghanaian African languages like Hausa, which is spoken as a lingua franca among migrant populations and in northern Ghana, and Arabic, which is learnt in Islamic schools across Ghana but mainly used for religious purposes.

Again, the shift to Ghana Hausa in the zongos made the loanwords and borrowing more prominent in Ghana Hausa. The language is used in all facet of life in the zongos. Agyekum (2010) establishes language shift centers on diffusionist theory where societal and cultural factors affect the language shift. He added that the socio-cultural forces include ethnicity, gender, trade and commerce, education, occupation, mobility, prestige and status among others. According to Gumperz (2001:470) 'The diffusionists viewed the speech community as a dynamic field of action where phonetic change, borrowing, language mixture and language shift all occur because of social forces and where genetic origin is secondary to these forces.'

Conclusion

The paper investigated aspects of sociolinguistics of Hausa spoken in Ghana. Historically, the Hausa migrants were faced with communication challenges in conducting their businesses with the locals at the initial stages. There was therefore the need to have a common language to communicate with the local people. Also, the soldiers who were trained in the barracks by Hausa trainers from Nigeria also came back to their communities using a unique kind of Hausa. The combination of these two scenarios gave birth of Ghana Hausa. It is a form of simplified Hausa. It is described as grammatically simplified way of communication that develops between two or more groups that do not have a language in common. Sebba (1997) claims that the emergence of such languages is the result of a practical problem of communication between speakers in a multilingual context. Trade has always been mentioned as the common situation that gives birth to simplified languages. The primary data for this paper was gathered from Ghana Hausa speakers and Standard Hausa speakers. The paper considers Hausa spoken in Ghana as a different variety because of number of factors. These factors are those features that can be seen in most pidgins in the world and they are the linguistic facts and the social context in which pidgin evolved (Amuzu, 2010).

Secondly, Ghana Hausa is a mixture of the Standard Hausa, English and the local Ghanaian languages especially, Akan. Ghana Hausa has also acquired native speakers in Ghana. The dwellers of the zongos use Hausa as their first language and use it in all their transactions. Ghana Hausa has developed from the simplifying and mixing of different languages into a full-fledged language. The paper concedes that Ghana Hausa has not acquired a consistent system of grammar that is independent of the Standard Hausa and it lacks large stable lexicons, even though it has native speakers.

Although, geographically, it is seen as not indigenous Ghanaian language but the role it plays in the linguistic space of the country cannot be downplayed. It is one of the languages used in various important national announcement from the government. For instance, it is used by the Electoral Commission for electoral purposes, Ghana Statistical Services for census, Ghana National Commission for Civic Education (GNCCE) for civic matters among others. Some television and radio stations also use Ghana Hausa for some of their programmes. It is also used in the Arabic schools as a medium of instruction. The above discussions attest to the fact that Ghana Hausa is widely used in Ghana especially in the zongos for social and religious activities.

There is no doubt that Hausa has come to stay as one of the languages used in Ghana. In view of this, this study has come as very useful not only for the users but also policy makers and stakeholders who need the languages used in Ghana for their businesses. The study therefore suggests that future studies look into the number of speakers and the impact it has on business because of its wide usage in the various market centres.

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http://dx.doi.org/10.4314/gjl.v12i1.2

ASSESSING THE PHONOLOGICAL PROCESSES IN AKAN CHILD LANGUAGE

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This paper seeks to examine the phonological processes embedded in the speech errors of child phonology in Akan, a Niger-Congo (Kwa) language. The study has become necessary because cross-linguistically, several works have been undertaken on child language acquisition but very little or no attention has been given to that of Akan. Most of these works on African languages have centered on the acquisition processes with little on the phonological processes underpinning child language. Therefore, this study bridges the gap by providing a discussion of some phonological processes that underline the acquisition of Akan children. In the course of the phonological development of the Akan child as part of language acquisition, these processes occur as phonological simplification strategies to resolve relatively challenging natural adult forms of Akan expressions. This is either due to an articulatory accident or a defect in the speech organ. It is against this backdrop that Fromkin (1973) opines that a slip of tongue is evidence of a phonological process in action. Hence, this paper concludes that the inadequacies in child language acquisition trigger various phonological processes such as vocalization, stopping, de-affrication, anteriorization, fronting, cluster reduction, reduplication as a phonological simplification strategy in the acquisition of Akan.

Keywords: Phonological processes, Speech errors, Child language, Slip of tongue, Akan.

Introduction

In child language and non-native speakers' phonology, it is observed that there are so many inaccuracies and errors. These inaccuracies are rich in phonological processes. The focus of this paper is to examine such phonological processes through child language acquisition which is an important research subject in linguistics in recent times. Studies on child language development are often carried out in English and other Indo-European languages. A close assessment of the literature on child language acquisition indicates

that Bantu and other southern African languages have received much attention on how children develop speaking competencies in these languages. In this regard, mention is made of studies such as Demuth (1993, 2003) on the Sesotho language, Suzman (1991), and Pascoe and Jeggo (2019) on the Zulu language, Mowrer and Burger (1991); Gxilishe (2004) among several others on Xhosa. Within the Niger-Congo language family, Nwokah (1986), Oyebade (1990), and Adeniyi and Adeniyi (2017) have undertaken a similar study on Igbo and Yoruba respectively. With regard to Ghanaian languages belonging to the Niger-Congo (Kwa) family, studies on child language acquisition comprise Adjei (2002) on Ewe, Kpogo (2016) on Ga, Saah (1994), and Amoako (2020) on Akan.

However, irrespective of the typological dissimilarities in the various languages, the obvious findings from all these studies are that children encounter inadequacies in the acquisition of language. As part of the consensus, it is asserted that the child language acquisition phenomenon is not disorganized (cf. Stemberger & Bernhardt 2018). That is, the process of language development likely follows a natural order with few variations. In child language segmental phonology, it is noted that the child builds up sound inventory beginning from less challenging to more challenging segments. The same can be said of sound clustering, syllable development, and other prosodic features in various languages.

Consequently, in Akan, a recent study by Amoako (2020) observes that the acquisition order as in many other languages begins from stops and ends with laterals as follows: stops, nasals, fricatives, affricates, glides, laterals in that sequence. However, there is also an admission of the possibility of overlap and variation in the acquisition process. The implication is that stops and nasal sounds develop earlier whereas fricatives and affricates have a late development by the child. It is believed that from age 2, the child continues stocking up sound inventory to age 6 and 7 where the child attains a level of conformity with an adult inventory. For instance, all other things being equal, it is noted that before age 5, cross-linguistically, the child is yet to develop the ability to produce affricate segments. As a result, between the phases of age 2-6 precisely, child phonology has a segmental shortfall and inaccuracies. Following these inaccuracies and limitations, the child adopts various repair strategies to overcome their shortfall in the pronunciation of morphs and morphemes featuring the unattained or imprecise segment(s) at a particular period. The repair as a form of simplification strategy on the difficult morpheme for the child consequently sparks various phonological processes. These phonological processes are grouped into substitution process, assimilation process, and syllable structure processes. Therefore, this paper seeks to add the various phonological processes of child language to the existing ones in Akan.

The Akan Language

Akan as a descriptive characteristic refers to an ethnic as well as a specific linguistic group of people in Ghana and part of the Ivory Coast. In Ghana, geographically, this group of people predominantly occupy the southern (including the Oti enclave carved out of the Volta Region) and middle part of Ghana. The Akan with its various subdivisions has an identical culture and a language with intricate relationships leading to mutual intelligibility. According to Agyekum (2006), the language consists of about ten (10) related dialects that include Asante, Akuapem, Fante, Agona, Assin, Ahanta, Akyem, Wassa, Bono, etc. From the lists of dialects, it is only the three major dialects; Asante, Akuapim, and Fante that have achieved literary status. Nine out of the sixteen regions in Ghana are predominantly occupied by Akan speakers and they speak any of the dialects as their mother tongue. These regions are Central, Eastern, Ashanti, Western, Western North, Bono East, Bono, Oti, and the Ahafo regions. However, due to migration, Akan speakers can be found across the length and breadth of the country. It is for this reason that it is statistically estimated that over 50% of Ghana's population either speaks or understands the three major dialects as an L1 or a lingua franca. Therefore, due to its dominance and wider coverage, it is not out of place to claim that Akan is the most widely spoken language in Ghana.

Overview of Akan Sounds System

Akan Vocalic Inventory

Akan has ten (10) oral vowels [**i, ɪ, u, ʊ, e, ɛ, o, ɔ, a, æ**] at the systematic phonetic level **(**Schachter & Fromkin 1968; Clements 1976; Dolphyne 1988; Eshun 1993; Abakah 2002, 2006, 2013) and five (5) phonemic nasal vowels [**ã, ĩ, ĩ, ũ, õ] (**Eshun, 1993; Abakah 2002, 2006,2013; Manyah, 2008; Dolphyne, 2006). In terms of their distribution, eight vowels [**i, ɪ, e, ɛ, a, æ, ɔ, o**] occur word-initially in Fante and six [**e, ɛ, a, æ, ɔ, o**] in Akuapem and Asante. All the ten (10) phonetic vowels occur at the word medial position. In Fante, all the ten phonetic oral vowels occur word-finally. However, in Asante and Akuapem, only nine (9) vowels [**i, ɪ, u, ʊ, e, ɛ, o, ɔ, a**] occur word-finally (Abakah, 2006; Odoom, 2011). The vowel [æ] is allophonic, not phonemic. It is in complementary distribution with [a], where [æ] occurs before advanced high vowels and [a] occurs elsewhere (Clements, 1981, 1984; Stewart, 1983; Dolphyne, 1988 Abakah, 2004; and Adomako, 2015). Dolphyne (1988) explains that [æ] is a predictable [+ATR] allophonic variant of [a] before a following [+ATR] vowel. The chart below shows the ten phonetic oral vowels in Akan.

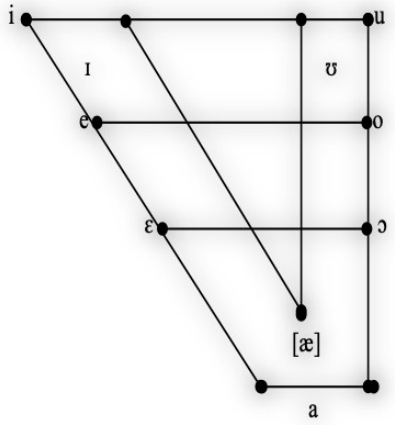

Figure 1: Akan Vowel Chart (Odoom, 2011)

Akan has four high vowels [**i, ɪ, u, ʊ**]. Akan vowels are also distinguished on the robust [±ATR] feature based on the root of the tongue as shown in the following [+ATR] vowels [i, e, u, o, æ] and [-ATR] vowels [ɪ, ɛ, a, ɔ, ʊ]. The [+ATR] vowels assimilate the [-ATR] vowels in a given word domain. The [+ATR] vowels cause the vowel assimilation and the [-ATR] vowels undergo harmonization (Kaye, 1982; Baković, 2002; Pavlik, 2009; Mahanta, 2007) as illustrated in (3).

(1)	+ATR		-ATR	
i.	æduro	'medicine/drug'	asɛm	'issue'
ii.	kukuo	'pot'	abɛ	'palmnut'
iii.	æsitɐire	'sugar'	aɐɥɪdɪɛ	'sugarcane'
iv.	etuo	'gun'	ayʊwa	'earthenware bowl'
v.	eburoo	'maize'	nsɛŋkwaa	'comedy/jokes'

The traditional lexical words in example (1a) demonstrates [+ATR] vowel harmony and that of (1b) shows [-ATR] vowel feature value.

Akan Consonantal Inventory

Like vowels, the exact number of phonemic consonants in Akan consonantal inventory has generated an ongoing debate. Various scholars have proposed diverse opinions. On the consonantal inventory of Akan, Schachter and Fromkin (1968) mentioned the segments /p, b, t, d, k, g, s, f/ as the only "true" consonants in Akan and / j, w, h / as glides though not true consonants. The non-vowel nasals /m, n/ were deemed to be predictable

by rule and thus need not be specified at the systematic phonemic level. Thus, aside from the eight consonants above, all other segments including the liquids, [r, l] are specified as [-Consonantal]. Schachter (1962) asserts that the liquids were borrowed into Proto Akan segmental inventory. Meanwhile, Eshun (1993) and Abakah (2006) on the other hand, have identified fourteen (14) systematic consonantal phonemes namely [p, b, t, d, k, g, m, n, r, f, s, h, j, w]. This number is six more than what Schachter and Fronkin (1968) had posited. Abakah (ibid) catalogues a chart of sixty-four (64) phonetic variants of the fourteen (14) consonant phonemes and asserts that excluding the fourteen (14) phonemes, the remaining fifty (50) are derived from the fourteen (14) as a result of the application of some phonological rules This claim amplifies the earlier position of Christaller (1933) and Dolphyne (2006). However, Adomako (2018a) expands this number by listing the following segments; [tɕɥ, dʑɥ, ɕɥ, dʑ, tɕ, ɲ, ɲɥ] and made the contention that these labialised and alveo-palatals occur before non-front vowels, therefore, are phonemic. He thus includes them on the Akan consonant chart in table (1) below.

Table 1: Akan Consonantal Inventory (adopted from Adomako, 2018a: 9)

	Bilabial	Labio-dental	Alveolar	Alveo-palatal	Palatal	Labialized alveopalatal	Velar	Labial-velar	Glottal
Stop	p, b		t, d				k, g		
Affricates				tɕ, dʑ		tɕɥ, dʑɥ			
Fricatives		f	s			ɕɥ			h
Nasals	m		n		ɲ	ɲɥ	ŋ		
Approximants	(w)		ɹ		j			w	

Overview of Phonological Processes

According to Wei (2008), phonological processes are the set of rules adopted to simplify the pronunciation of a language unit. Thus, phonological processes in child phonology are what the child brings to the language in order to simplify complex adult phonological expressions (cf. Younis 2008). This set of simplification rules consist of syllable structure processes, substitution processes, and/or assimilation processes. Each of these processes is a composite process that entails other individual processes. For instance, epenthesis, metathesis, final consonant deletion, reduplication, cluster reduction among others constitute syllable structure processes, while stopping, fronting, backing, gliding among others are components of substitution processes. Any of these phonological processes exist in human language as the set of rules of natural deviation that enhances speech production. However, any of these processes could also emerge as cosmetic measures within child phonology and among second language learners as a mitigation strategy

(Chan & Li 2000). This is expected because, at a certain level of language acquisition, the vocal apparatus of the child might not have developed to the extent necessary to produce appropriate articulations similar to adult forms.

In phonological processes, a phonological constituent being the target unit usually a segment or syllable may lose or acquire a feature in a continuum of partial to absolute terms. The process could completely overturn the primary articulation feature of the target unit. It is from this perspective that Abakah (2012) differentiates between palatalization and affrication in Akan as distinct phonological processes. Thus, a phonological process could probably emerge as a secondary articulation process in segmental phonology together with other syllable structures and assimilatory processes. As a secondary articulation phenomenon, then a phonological process also applies to the set of rules that support the addition of a lesser degree of closure accompanying the articulation of a primary sound. The above elaborations turn in the idea of superimposition of a feature in a cross-section of phonological processes such as labialization, palatalization, and the like.

Assessing phonological processes from the viewpoint of assimilation, Lord (1974: 147) defines it as a change in the properties of a vowel or consonant sound brought about by the influence of a neighboring, usually an adjacent consonant or vowel. This implies that a phonological process may involve an alteration in the features of a sound. The manipulation of the segment could perhaps be projected as a feature addition, narrowing, or an absolute delinking of a feature inherent in a sound. However, the process does not randomly take off but is triggered by another segment within the catchment of the altering sound. The objective of an assimilatory phonological process is to shape a segment or a phonological unit towards a rendition that is more compatible to suit a particular environment. It is a composite process that involves a collection of several other phonological activities of modification on a phonological constituent.

Phonological Process in Akan

Various phonological processes have been discussed in a number of literature on Akan. The processes are explored in various works either as an ordinary natural phenomenon in the language or subsumed as having manifestation in a particular phonological aspect in the language. For instance, Adomako (2015) examines some of the phonological processes as reflected in an Akan linguistic game. Again, Adomako (2017) addresses the phonological processes as reflected in the Akan female naming system. Moreover, Boadi (2014) expatiates on the phonological processes that apply to the underlying representation (UR) in Akan to exemplify the phonological differences in the three main dialects. Nevertheless, Abakah (2012) enumerates a number of these processes as inherent in the three main dialects of Akan. The discussion on phonological processes in

the literature of Akan has identified some processes such as palatalization, labialization, labial palatalization, vowel harmony, stridentization, coronalization, dorsalization, velarization, posteriorization among others.

Most of these processes are treated as natural occurrences inherent in Akan to facilitate speech production. Conversely, Chan & Li (2000) argue that a phonological process could be sparked as a synthetic deviation to ease an articulatory challenge. It is in line with this that Fromkin (1973) contends that a speech error is evidence of a phonological process in action. Hence, in this paper, we turn to examine the phonological processes as evidence in the phonology of native Akan-speaking children within the age range of two (2)-seven (7). This target group is plausible because it is the language acquisition phase of child development that is characterized by numerous inadequacies. Due to these phonological inadequacies, children inadvertently adopt various phonological processes in speaking and the production of adult forms. Hence in our subsequent discussion, we gravitate to the discussion of how child language in Akan finds solace in other phonological processes as a resolution to challenging adult expressions.

Methodology

Research approach and design

This is a descriptive qualitative study to unravel the phonological processes embedded in the errors and inadequacies of child language in Akan.

Data source

The data for this study were collected from the primary source. Eighty (80) words in varying phonological shapes and sound sequences were compiled. The data were primarily nominals familiar to the children and few verbal items denoting action. Lust (2006) suggests that one prominent method of studying child's knowledge of the language is by studying their language production through play, recordings, and transcription of natural speech. Accordingly, in order to assess the target phonology, the children and corresponding parents were engaged with these pictorial images to act as a stimulus to elicit their pronunciations. Occasionally, for emphasis and confirmation of the phonological process in the error or inaccuracy, respondents were stimulated to repeat the pronunciations through a play around the nominal items. Eventually, with the permission of the parents, the pronunciation of all respondents was recorded.

Data size

In all, eighty (80) traditional lexical words were extracted from the recordings as the primary data for this study. The 80 extracted primary source data were subsequently compared to pronunciations from the parents as the native speakers of the language.

Participants

A total of 36 participants comprising 9 males and 9 females children and 18 mothers were purposefully sampled for the study. These children are from 2-7 years. All participants indicated their interest to participate in the project by responding to flyers distributed to them. Participants were required to have not lived outside of Ghana for the purpose of controlling for first language attrition. All participants provided written consent to participate in the project.

Data collection procedure

Participants were also recorded in their various settings in the homes. For their consent and supervision, a parent of the 18 children was added as part of the respondents to report on their ages. Additionally, the parents were aged 22-40 and comprise of fourteen females and four males. They gave a natural pronunciation of the gathered data for comparison. This brought the total sample size of the study to thirty-six (36). The eighteen children were grouped into 3-6 based on age and phonological advancement. That is, ages 2-3 form one group of six since they had a similar phonological advancement as beginners. Equally, age 4-5 constituted the next intermediary group of six, and age 6-7 formed the last group of six to represent the final phase of phonological development. They were recorded using a recorder and later transcribed.

Data analysis

The errors were intuitively classified according to the phonological processes involved and were transcribed in the IPA convention for ease and clarity. The descriptive approach was used for the analysis of data.

Ethical considerations

We stated explicitly to the respondents that the purpose of the research study is to gather data of children who are from 2-7 years in order to provide a comprehensive account of the various phonological processes embedded in child phonology. We explained to the respondents that the data collection exercise was expected to last for about 5 working days. And each recording session lasted for about 3 hours. Their responses were audio-recorded. Although the data collected do not border on confidentiality of the records of

the respondents, we assured the respondents that based on their wishes; we will protect their identity in the data they give out.

Data Presentation and Analyses

This section discusses the various phonological processes in our data gathered. These phonological processes are categorized into substitution and syllable structure processes.

Substitution Processes

In this phonological process, a sound is used to replace another sound in a given word domain. The following are some of the substitution phonological processes in child phonology in Akan.

Stopping/Plosivisation of Stridents in Akan Child Phonology

In the data collection, it was observed that a common phonological process in child phonology is stopping. Though it was a cross-cutting phonological process that characterizes all the children in the various language acquisition phase, yet, it was predominant among age 2-3 children. This is the phase known for the development of stops and is marked as the starting point of language acquisition. At this stage, it is evident that the only acquired consonant or in the acquisition is the stops. Thus, any other segment such as fricatives or affricates proves relatively challenging to the child. As part of the rehearsal for the articulation and application of the stops, child phonology at this stage treats any other consonant is a plosive. Consequently, the seemingly complex fricatives and affricates as the stridents in a morpheme are substituted. The attempt to de-stridentized a segment in a morpheme is occasioned with the process of stopping. That is, in child phonology, stridentized segments are simplified through another phonological process known as stopping or plosivisation to be precise. The following data (2) illustrates a similar replacement of sibilants in the context of child phonology in Akan especially among age 2-3 children.

(2)	Stridents	Adult Form	Child Form	Gloss	Child Age
i.	/tɕɥ/	ntɕɥɔm	ntɔm	‘chickenpox’	2-3yrs
ii.	/dʑɥ/	ndʑɥɔm	ndɔm/nbɔm	‘music’	2-3yrs
iii.	/tɕ/	tɕɪtɕɪrɪ	kɪkɪ/tɪtɪ/gɪgɪ	‘to tie’	2-11months
iv.	/tɕ/	ntɕɪn	nkɪn/ntɪn	‘salt’	2-10 months
v.	/dʑ/	dʑina	dina/gina	‘to stop’	3-5 months
vi.	/dʑ/	adʑa	ada/aga	‘father’	3-2 months
vii.	/f/	mframa	mp(b)rama	‘air’	3-1 month
viii.	/t/	mɪ sisi	mɪ titi	‘my waist’	3-3 months

Stridentized morphemes in the adult forms of the above data feature strident segments such as [tɕɥ, dʑɥ, tɕ, dʑ, f]. Akpanglo-Nartey (2002) asserts that strident feature is a general acoustic term that refers to all segments such as [tɕɥ, dʑɥ, tɕ, dʑ] that have increased turbulence in airflow due to the absolute occlusion and gradual release of airflow. This integrated activity makes it complicated for the developing vocal tract of the child to adjust.

Moreover, as asserted by Stemberger and Bernhardt (2018), Amoako (2020) stridents and affricates are part of the late sounds acquired by the child. Thus, the absence of the affricates in the sound inventory of the child at the pre-affricate development stage compels the child's phonology to resort to a phonological process as a resolution to the absent or challenging sound. Consequently, the phonology of the child relies on the already developed readily available stops such as [p, t, k, b, d, g]. This plosive substitution phonological process that allows the child to simplify the complex segment for onward pronunciation and production of the morpheme is popularly known as stopping or plosivization (Rose 2009).

Again, the other two segments [s, f], though plain fricatives are also simplified by being substituted for [t, p/b] respectively in example (2vii, viii). This substitution is perhaps attributed to the late acquisition of fricatives in language development. The overlap between the two segments; [t] and [s] is possible in child phonology on the basis that the two are closely identical in point of articulation but differ in manner. Positioning two articulators in close approximation for the airstream to escape through a narrow space for turbulence is challenging for the limited articulatory ability of the child.

Partial De-Stridentization in Akan Child Phonology

In Akan child phonology, particularly among age 4-5, this process of de-stridentizing challenging stridents segments assumes a different realization other than stopping (plosivisation). In this, a different rendition of simplifying stridentized segments such as [tɕɥ, dʑɥ, ɕɥ, dʑ, ɕ, tɕ] is applied. Schachter and Fromkin (1968), Abakah (1978), Dolphyne (2006), and Adomako (2015, 2018b) argue that strident sounds [tɕɥ, dʑɥ, ɕɥ, dʑ, ɕ, tɕ] in Akan have undergone the process of palatalization. The palatality in these stridents sounds is testified in the formation of a constriction at the palatal location as an accompaniment to a stricture of greater degree in the articulation of these sounds.

The composite articulatory activities tend to be complicated for the 4-5 child developing Akan as a mother tongue. The referred complexity is resolved in the phonology of the child by substituting a simple plain fricative; [f, s] for the complex [tɕɥ, dʑɥ, ɕɥ, dʑ, ɕ, tɕ]. This is possible because, at this age 4-5 of the language developmental phase, the child has or is in the process of acquiring ability for sibilants production (Ingram 2008). This

substitution forms part of the phonological rehearsal and resolution of the challenging unit for the child. Until full mastery over strident or sibilant production, the child's phonology resorts to this pattern of replacement. This continuous simplification process eventually enhances the production of stridentized segments by the Akan child. The following data illustrates this partial de-stridentization process.

(3)	Stridents	Adult Form	Child Form	Gloss	Child Age
i.	/ɕɥ/	mɛɕɥɪ w(ʊ)	mɛfiw	'I will beat you'	4yrs 1month
ii.	/ɕɥ/	aɕɥɪdɪɛ	afɪdɪɛ	'sugarcane'	4yrs 3months
iii.	/ɕɥ/	aɕɥɪɕɥɛ	afɪfɛ	'mirror'	4yrs 6months
iv.	/ɕɥ/	nɕɥɪrʊma	nfiroma/nsɪrʊma	'a whistle'	4yrs 6months
v.	/ɕ/	ɕire	fire/sire	'clay food'	4yrs 4months
vi.	/ɕ/	ɕɛpɛɛ	sɛpɛɛ/fɛpɛɛ	'glamorous'	4yrs 2months
vii.	/ɕ/	nɕɪɕɛɪ	nsɪsɛɪ/nfɪfɛɪ	'an arrangement'	5yrs 1month
viii.	/ɕ/	aɕɛdɪ	afɛdɪ/asɛdɪ	'a command'	5yrs 3months

From data (3), we can see that all morphemes comprise a strident either at the word-initial or medial position in the adult form. These stridents are usually get replaced with a plain strident or fricative [s, f] within the child phonology. This stage probably marks the period where the child is developing the articulatory ability for sibilants. i.e. (intra-sibilant developmental phase). The substitution of [ɕɥ, ɕ] for [f, s] as demonstrated above is not ordinary or accidental but has a phonological underpinning. Notably, [ɕɥ, ɕ] are replaceable with [s, f] because the former and the latter are all [+SIBILANT] or stridents, with the only difference being that the latter is fronted in articulation. It is obvious that for simplicity and articulatory convenience, the phonology of the Akan child opts for a plain strident by the inability to draw the tongue back to the palatal location contemporaneously. This fronting process of partially de-stridentizing [ɕɥ, ɕ] is probably due to the simultaneous approximation and stricture involve in the production of these palatal strident sounds. The vocal tract of the child at this point of language acquisition is yet to gain mastery over these seemingly co-articulation processes. On this account, the child's phonology substitutes a simpler version of strident for the more complex segment. A similar relationship can be drawn from the replacement of [s] for [ɕ] in example (v-viii) whereby both are stridents. However, the substitute [s], is non-back and non-palatal but the target [ɕ] is palatal fricative and a back segment as well.

This substitution process helps to simplify the complex component of stridentality to afford the child some articulatory ease. Nevertheless, stridentality in the target is partially retained with the plain fricative /f, s/ as the replacement. In other words, it is also tenable that the replacement of [ɕɥ, ɕ] for [f, s] de-palatalizes the palatality in [ɕɥ, ɕ] but retains the [+Strident] feature specification. That is, a relatively easier strident depalatalize and replace a complex strident [ɕɥ, ɕ].

Velar Fronting in Child Phonology

A velar segment produces at the post-palatal region of the roof of the mouth. This description captures the location from the velum (soft palate) to the onset of the glottal section. On the other hand, fronting as a phonological process refers to the circumstance whereby a post-alveolar sound such as a velar or glottal segment is replaced with a sound that is made toward the front of the vocal tract (Williamson 2010). In this perspective, the pre-palatal region that comprises the alveolar, labio-dental, and bilabial domains of the vocal tract constitutes the frontage of the tract. It aligns with this description that Kresheck et al (1996) contend that fronting fundamentally represents the replacement of a posterior consonant with an anterior consonant. This substitution is common among children within age 2-3 as part of the inadequacies associated with language development.

Fronting usually occurs at the onset of a morpheme than morpheme final. To present a better appreciation of the occurrence of this process, Kresheck et al (1996) cite the phenomenon among English learners where [tæn] is pronounced for [kæn] instead, [ti:] for [ki:], [bæt] for [kæt]. Conditions like these are not limited to English children acquiring the language; it is a cross-linguistic phenomenon and Akan is not an exception. Unlike in the alveolar region, the velar region of the child has a late readiness and maturity for sound articulation. The following data demonstrates velar fronting.

(4)	Posterior Adult Form	Child Form	Gloss	Child Age
i.	a<u>k</u>ɔ<u>k</u>ɔ	a<u>t</u>ɔ<u>t</u>ɔ	'chicken'	2yrs 3months
ii.	<u>k</u>a<u>k</u>aɪ	<u>d</u>a<u>d</u>aɪ	'monster'	2yrs 4month
iii.	<u>k</u>o<u>k</u>o	<u>t</u>o<u>t</u>o	'porridge'	2yrs 1month
iv.	<u>g</u>u<u>g</u>u	<u>d</u>u<u>d</u>u	'to pour'	2yrs 5month
v.	<u>ŋg</u>ɔ	<u>nd</u>ɔ	'oil'	2yrs 6month
vi.	<u>ŋk</u>atɪ	<u>nt</u>atɪ	'groundnut'	3yrs
vii.	<u>ŋk</u>uruma	<u>nt</u>uuma	'okra'	3yrs

Example (4i-vii) places the velar segment [k, ɡ,ŋ] at either the word-initial or medial position. However, the production of these velar segments at their various positions proves challenging for the child, and they eventually get substituted. In the chronological order of consonant acquisition in language development, velars and posterior segments constitute part of the late acquired segments (Fee 2014, Amoako 2020). While posteriors are yet to be developed by the under-age three children, some anterior segments including alveolars, are already developed and active in the child's phonology. Therefore, at the pre-velar development, velars are mostly substituted for alveolars as exemplified above. The substitution is not decisive but rather the inability of the child's speech organs to produce velar segments in morphemes constrains the tongue to surge forward instead for the production of the velar that results in the articulation of alveolars as substitutes. This

deviational phonological rule that permits the substitution of a velar segment like [k, g, ŋ] for an alveolar such as [t, d, n] respectively is described here as the velar fronting.

However, fronting in general as a phonological process entails the replacement of any posterior consonant for an anterior consonant (Kresheck et al 1996). In Akan, aside from the cases of velar fronting as shown in example (4), fronting also triggers the partial reversal of posteriorization as reported in Abakah (2012). Instead of posteriorization at the word-final position in Asante and Gomoa Mfantse as demonstrated in Abakah (ibid), this de-posteriorization in child phonology occurs at the word-initial position with the constrained or forced replacement of the anterior coronal nasal [n] in place of the posterior coronal nasal [ɲ].

(5)	Posterior Adult Form	Child Form	Gloss	Child Age
i.	ɲamɪ	namɪ	'God'	3yrs
ii.	ɲinaa	ninaa	'all'	3yrs 1month
iii.	ɲansa	nansa	'wisdom'	3yrs 2months
iv.	ɛɲɥa	ɛna	'snails'	3yrs 1month
v.	ɲɥansɪma	nansɪma	'a fly'	3yrs 3months
vi.	æɲɥummɪrɛ	ænummɪrɛ	'evening time'	3yrs 7months
vii.	kwamɪ	kamɪ	'personal name'	3yrs 6month
viii.	kwata	kata	'leprosy'	3yrs 5months
ix.	ɛɥɛ	hɛ	'to look'	3yrs 9months
x.	ɛɥɪ	hɪ	'to beat'	3yrs 8months

Examples (5i-vi) demonstrate that the palatal nasal /ɲ/ and the labialized nasal /ɲɥ/ respectively are the target posterior segments that have been replaced in the child form. This replacement is not accidental but phonologically conditioned. That is, these posterior nasals have an inherent additional property of palatality [ɲ] and labiality [ɲɥ] that complicate the articulatory process for the amateur vocal tract of the child. The complexity originates from the point that in the production of the palatal nasal, the velum is lowered to block the oral cavity and another constriction is formed between the palatal region and the back of the tongue. These dual articulatory activities occur concomitantly, and it is complex for the child. For the labialized nasal [ɲɥ], the oral cavity is blocked concurrently with the rounding of the lips. Due to the complication in articulation and the resultant absence of the posterior nasal [ɲ, ɲɥ] in the segmental inventory of the child at that period of language acquisition, their phonology resolves the deficit by anteriorizing the posterior [ɲ, ɲɥ] through the substitution of [n] for [ɲ, ɲɥ]. This de-posteriorization retains the nasality component property but drops the palatality and the labiality in the target segment [ɲ, ɲɥ] as evident in the child form.

Similarly, in example (5viii-x), child phonology drops the labial component inherent in the labial velar [kw] and the labialized alveopalatal [ɕɥ] in favour of a plain velar [k] and the placeless fricative [h]. This is on account that Mensah (1987), Gussenhoven and Jacobs (1998), Ewen and van der Hulst (2001), Abakah (2006) contend that the segment [h] is more placeless with no pre-specification than glottal. However, the substitution is conditioned by the relative complexity and unavailability of the target labialized segments in the child's phonology. Hence, from the viewpoint of the glottality of [h] in the child form with respect to (5vii- x), the replaced and the replacing segment are both posteriors yet [k] and [h] is relatively easier for the child than its labialised counterpart [kw] and [ɕɥ]. In a nutshell, this substitution in child phonology is not ordinary but phonologically conditioned by articulatory convenience and resolution to a challenging segment.

Lateralization Processes in Akan Child Phonology

Hitherto, the voiced alveolar lateral /l/ was considered to be completely alien to the Akan consonant inventory. However, with its occurrence in native Akan stems, Abakah (2006) demonstrates convincingly that the lateral /l/ is an indigenous Akan segment but not of borrowed origin as had been earlier assumed. The general position is that the lateral /l/ is in free variation with /r/ and /d/ in almost all the three dialects of Akan. In distribution, /r/ and /l/ commonly occur intervocalically. Though the two coronal consonants /r/ and /d/ are autonomous phonemes, yet the trill /r/ and the lateral /l/ seem to be in complementary distribution i.e., the two occur in a mutually exclusive environment. It is only that in the Mfantse and the Asante dialects, [r/l] are used interchangeably. Due to the free variation between the three coronal consonants, even in obvious situations where a non-lateral, be it either a trill /r/ or a stop /d/ occurs at the input level of phonological representation, these nonlateral coronals are lateralized and they surface as /l/ at the output level. A non-lateral is substituted for a lateral at the output level.

In Akan, it is the phonological relationship of free variation between /d, r, l/ that triggers this lateralization process. This lateralization is not limited to child language phonology but in adult speech, and the phonology of an Akan speaking English too. Perhaps, it has its genesis from child language acquisition as the child imitates adult expressions. However, in an L2, it occurs as a slip of tongue due to L1 interference. The following examples from the phonology of age 6-7 children illustrate this phenomenon of lateralization both in native Akan stems and in loanwords. The trill /r/ and the stop /d/ and other non-laterals are presented at the input level of adult expressions for they are phonemic while the lateral is phonetic as they are realized only at the phonetic level.

(6)	Adult Form	Child Form	Gloss	Child Age
i.	a̱raba	a̱laba	'a personal name'	6yrs 2months
ii.	a̱nanta	a̱lanta	'bowlegged'	7yrs 4month
iii.	fṟɪda	fḻɪda	'a personal name'	6yrs 6months
iv.	ɔṟɪba	ɔḻɪba	'is coming'	6yrs 3months
v.	ɔdɔtɔ	ɔḻɔtɔ	'a forest type'	7yrs
vi.	buṟodo	buḻodo	'bread'	6yrs 5months
vii.	bʊṟɔdɪ	bʊḻɔdɪ	'plantain'	6yrs 7months
viii.	bɪ̱ʌʃ	bḻaɛ	'brush'	6yrs 7months

Example (6) shows that the non-literal occurring at the level of the input in phonological representation is substituted for a lateral and is mainly due to the relationship of free variation. Regardless of the fact that the lateral /l/ is a free variant of /r/ and /d/, the lateralization at the output level renders it erroneous. The lateralization could be unduly carried out as in example (6iii) especially in an environment where the lateral does not occur intervocalically. Such phenomenon stems from the overapplication of the free variation relationship to non-native lexical items. These items have no direct equivalents in Akan and are often code switched but accidentally lateralized as a result of the over-application of intervocalic free variation between alveolar /r/ and /l/. In a related circumstance, the lateral in adult input form gets unduly delateralized by the replacement of a non-lateral. It is noteworthy that this process of lateralization and delateralization is also common in adult phonology just as in the phonology of age 6-7 children.

Syllable Structure Processes in Akan Child Language

The acquisition of syllables is an integral part of language development in children. Accordingly, it is said that the acquisition of syllables as a unit in language leads to the formation of formulaic utterances in the course of a child's language development (Peters, 1983). However, in the view of Clark (1982), syllables are acquired in the order of magnitude and along the lines of the segments attained at each phase of the acquisition process. In light of this, it is plausible that the progression and mastery are dependent on the level of complexity and scope of the syllable of the language in question. Various phonological processes are adopted by the child on the syllable to aid speech and mitigate syllable sophistication. Some of these processes include reduplication, cluster reduction, dimunization, initial consonant deletion, final consonant deletion, epenthesis, syllable deletion, medial consonant deletion, vowelization, among others.

Akan is known to have simple syllable structures, and as a result, few of these phonological processes are applicable in child language phonology. According to Dolphyne (2006), the basic syllable structure in Akan consists of a V, C, and a CV. This implies that a closed syllable and consonant clusters are non-existing in Akan. This

position is reinforced by Kaye (1985), Adomako (2008) with the assertion that any final consonant constitutes an autonomous syllable. Nevertheless, a CCV string in the onset realized as a CrV seems to contest the non-existence of consonant clusters in Akan. It is out of this contention that Marfo and Yankson (2008) clarifies that a CrV is only a product of two basic CV syllables. Differently put, the CrV structure in Akan that appears to be contentious is only a phonetic representation of a basic two-syllable string of CV_1rV_2 which has been subjected to re-syllabification following a reduction in one of the two syllables. Precisely, in the processing of the input to derive a CrV_2, there occurs an elision of the vowel in the preceding CV structure. This reduced syllable then constitutes CrV_2 with the succeeding rV structure integrated into the initial CV syllable in phonological representation. From Marfo & Yankson (2008) perspective, the derived CrV structure after the elision of the V_1 is then re-syllabified into CrV_2. This syllable reduction and re-syllabification is triggered by an economy of speech as stated in Bencivenga (1987), Bresnan (2001), and it is on this grounds that the CrV_2 is a product in phonetic representation than an autonomous basic syllable structure. The input from which it was derived is a $C_1V_1C_2V_2$ structure that has the V_1 elided.

However, in child phonology, the CrV phonetic representation is further subjected to additional phonological processes to simplify the structure for easy pronunciation. The processes as occurred in child phonology are liquid vocalization (vowelization), epenthesis, reduplication, and deletion to break the surface consonant cluster in the sequence. These processes are highlighted in the following.

Vocalization of [r] in CrV Structure in Child Phonology

The phonological process of vocalization is a simplification phenomenon that substitutes a syllabic liquid for a vowel (Pollock 1991). The process is common in child phonology. Language acquisition researchers such as Hyman (1975), O'Grady, and Sook (2001: 331), among others have concluded that in the acquisition process, vowel sounds are developed earlier than consonants. Amoako (2020) affirms this conclusion in the context of Akan. Thus, vocalization and its popularity in child phonology probably originate from the early acquisition of vowels ahead of consonants especially liquids. The Akan situation of language acquisition and child phonology is not exempted from the frequent vocalization that occurs in other languages.

In this regard, vocalization is prevalent in the phonetic realization of a CrV structure where the liquid [r] occurring word medially is vocalized. The output of this vocalization is the conversion of the CrV to a CVV sequence in the surface form in child phonology. This breaks the surface consonant cluster and simplifies the string for child articulation. The following examples (7) indicate the occurrence of vocalization in Akan child phonology.

(7)	Input	Adult Form	Structure	Child Form	Structure	Gloss	Child Age
i.	bɪra	br̲a	Cr.V	bɪ̲a	CV.V	'to come'	3yrs 2months
ii.	pɪra	pr̲a	Cr.V	pɪ̲a	CV.V	'to sweep'	3yrs 3months
iii.	tɪra	tr̲a	Cr.V	tɪ̲a	CV.V	'to skip'	3yrs
iv.	ɔkɪra	ɔkr̲a	V.Cr.V	ɔkɪ̲a	V.CV.V	'a cat'	2yrs 8months
v.	ɔbɪrɛ	ɔbr̲ɛ	V.Cr.V	ɔbɪ̲ɛ	V.CV.V	'fatigue'	2yrs 9months
vi.	ŋfɪrama	ŋfr̲ama	C.Cr.V.CV	mfɪ̲ama	C.CV.V.CV	'air'	3yrs 5months

It is obvious in data (7) that the string of consonant clusters in input CrV in adult phonetic representation is simplified in child phonology for easy pronunciation. That is, adult phonology begins from the CV.CV as the input while child phonology in imitation of adult form applies to adopt CrV as the input. Therefore, to reduce the complex /Cr/ consonant cluster in child phonology, the liquid /r/ loses its [+Consonantal] feature and becomes [-Consonantal] through vocalization. The ensuing string is therefore rendered as a CV, which is a very familiar syllable structure in child phonology especially when the consonant in the CV is a stop as in (7i- v).

However, examining the CrV structure from the underlying CV.CV representation as in [bɪra, pɪra, ɔkɪra] argued in Marfo & Yankson (2008), it appears the liquid deletes without a replacement. This perspective is also possible from the level of phonological representation (PR). That is, the other implication is that, unlike in adult phonology, it is rather the underlying intervocalic liquid that is targeted for deletion from the PR to the phonetic form in child phonology. The effect of both analogies therefore is that syllable deletion is another effective syllable simplification strategy particularly on polysyllabic words in child phonology. Consequently, the phonological process of deletion in Akan child phonology is discussed below.

Syllable Deletion in Child Phonology

Aside from vocalization, another pervasive phonological process in child phonology is the deletion of an entire syllable unit. The most commonly affected unit is the weak syllable in polysyllabic words. The deletion is either to get rid of the challenging part or to truncate an extensive lexical item for easy pronunciation. The deletion of a weak syllable fewer impacts the structure of the lexical item. In Akan, the weak syllable is likely an initial syllabic consonant or a final syllabic consonant. Again, it could also be an initial or final vowel as well. Ingram (2008) accounting for the reasons for a syllable truncation, states that a syllable could be deleted because a constituent of that syllable is underdeveloped or non-exiting in the phonology of the child. It is either of the aforementioned reasons that enforce syllable deletion in child phonology as illustrated in the example (8) below.

(8)	Adult Form	Structure	Child Form	Structure	Gloss	Child Age
i.	mmirika	C.CV.CV.CV	mita	CV.V.CV	'to run'	2yrs 7months
ii.	ahurusi	V.CV.CV.CV	ahuti	V.CV.CV	'jubilation'	3yrs 1month
iii.	aduro	V.CV. CV	edu	V.CV	'medicine'	2yrs 4months
iv.	paanʊʊ	CV.V.CV. V	anʊʊ	V.CV.V	'bread'	2yrs 6months
v.	mpabʊa	C. CV.CV.V	pabʊa	CV.CV.V	'footwear'	3yrs 3months
vii.	ɔkɔm	V.CV. C	ɔm	V.C	'hunger'	2yrs 3months

The data above illustrates the point that polysyllabic words are often simplified through the deletion of difficult syllables. The syllable to be deleted has no fixed position. For instance, in example (8i), the initial nasal syllable [m] together with the medial syllable [ri] are deleted to shorten the word for easy articulation. The initial syllable is probably deleted to break down the fictitious consonant cluster as in example (8v). But the deletion of the medial syllable and the final syllable in example (8i-iii, vi) is likely due to the gestural complexity in articulating the alveolar [r] and the velar [k]. In this regard, [k] and [s] are replaced with [t] as in (8i, ii) and [p] for [f] in (8v). In a nutshell, simplification through syllable deletion and substitution enhances production in child phonology.

Reduplication in Akan Child Phonology

In addition to the above simplification processes, reduplication is also another mitigation strategy through which children replace sophisticated syllables or units in a word with a relatively easier and convenient part of the base. The repeated unit or the reduplicant (RED) is usually a complete or partial copy of an existing base. In other words, reduplication in child phonology repeats part or a whole of a base as a replacement for a complex syllable or unit. Reduplication in child language encompasses deletion because it deletes and replaces by copying a part or a whole of the base to replace the vacuum created. The aim is to avoid the challenging unit in the base. The repeated part of the base is in a sense a substitute for the deleted sophisticated portion. Thus, reduplication in child language is not a morphological process to derive new words but a simplification strategy. With respect to the direction of reduplication in child language, there is a tendency that the copying and subsequent repetition could be progressive or regressive depending on where the child finds a convenient unit. That is, the reduplicant can be copied either from the right to the left or from the left to the right of the base. Though reduplication as a simplification strategy in Akan child phonology is sporadic and not pervasive as a substitution. Example (9) below shows the said process.

(9)	Adult Form	Structure	Child Form Form	Structure	Gloss	Child Age
i.	ɔkramaɪ	V.CrV.CV.V	maɪmaɪ	CV.V.CV.V	'a dog'	3yrs 2months
ii.	krataa	CrV.CV.V	taataa	CV.V.CV.V	'a sheet'	2-5months
iii.	abɛnkwaɪ	V.CV.C.CV.V	abɛnbɛn	V.CV.C.CV.C	'palmnut soup'	2-10months
iv.	tɛirefua	CV.CV.CV.V	fuefua	CV.V.CV.CV	'an egg'	3-11months
v.	bofurotɪ	CV.CV.CV.CV	bobotɪ	CV.CV.CV	'doughnut'	2-9months
vi.	abʊrɔbɛ	V.CV.CV.CV	abɛbɛ	V.CV.CV	'pineapple'	3yrs
vii.	bisikiti	CV.CV.CV.CV	kiki/bibiti	CV.CV.CV	'biscuit'	2-7months
viii.	ahʊma	V.CV.CV	amama	V.CV.CV	'a rope/ thread'	3yrs 1month

All the above expressions in the child form contain a reduplication of the base. For instance, from the phonetic representation in example (9i, ii, viii), the final CV.V and CV of the base are copied regressively (right to left) to replace the challenging CrV structure in the initial position for (9i, ii). This results in the deletion of the complex CrV structure in (9i, ii) and it is replaced with the remaining CV.V reduplicant which is familiar and convenient in Akan child phonology. In the course of the simplification, the nominal vowel prefix in example (9i) is also dropped as a weak syllable. The final output is a partial regressive reduplication in the child form. However, in example (9iii, vii) the same process is carried out progressively. In this context, the complex syllable or unit appears at the suffix or final position of the base for (9iii) and at the medial position for (9vii). Hence, the medial CV.C and initial CV syllable of (iii, vii) respectively is progressively copied to replace the complex structure at the right of the base. In example (9iv, vi) the child copies and randomly select familiar segments from the base. The copied or randomly selected segments of the base are repositioned as a modified reduplicant. The process of reduplication in child phonology either shortens the number of syllables in the adult form or retains them. Nevertheless, unfamiliar unit(s) are deleted and replaced with the familiar unit(s) as repeated reduplicants copied from any part of the base.

Conclusion

This paper discussed various phonological processes employed in Akan child phonology. It was observed that the Akan language has its inherent natural phonological processes such as palatalization, stridentization among others that are superimposed on its phonotactics and the building of larger constituents. However, the study noted that in the acquisition of child language, the segmental inventory and the inherent processes are acquired not as a spontaneous composite whole but chronologically. Moreover, vowels

are part of the early attained articulatory ability whereas stops are acquired before fricatives and affricates cross-linguistically with respect to manner. Therefore, in the course of the mastery, the speech and phonology of the child are characterized with other phonological processes as adopted by the 2-7-year-old child to simplify complex unattained articulatory competencies. As elaborated in the discussion, some of these synthetic phonological processes include the substitution of one segment for the other while others are syllable simplification strategies to afford the child some ease in production. The study gathered that in the Akan child phonology, substitution processes are dominant. In this respect, fricatives are replaced with stops in this pattern [s] > [t], [f] > [p] or [b], and other non stops such as [d͡z] > [d], [t͡ɕɥ] > [t] under the process of stopping (plosivisation). With the phonological process of velar fronting, velar segments such as [k, g] are fronted in the pattern of [k] > [t], [ɡ] > [d] as a product of velar fronting in Akan child phonology. Also, in child language, stridents or affricates such as [t͡ɕɥ, d͡zɥ, ɕɥ, d͡z, t͡ɕ, ts, dz] are probably de-affricated to surface as [t, d, h, ɡ, h, k, t, d] respectively under the process of de-stridentization or de-palatalization. All these processes are adopted in child phonology as a simplification strategy for complex segments. Finally, with regard to syllable structure processes in child phonology, complex consonant clusters such as the CrV structure is subjected to vocalization in order to attain simple CV or V syllable familiar to the child. Aside from vocalization, other complex structures are either deleted as of a weak syllable or reduplicated to get rid of the complex structure and replace them with a relatively easier unit copied from the base.

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http://dx.doi.org/10.4314/gjl.v12i1.3

CARDINAL NUMERALS IN AKAN: A CONSTRUCTION MORPHOLOGY ACCOUNT

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This paper presents a Construction Morphology account of complex cardinal numeral formation in Akan (Kwa, Niger-Congo). Through a detailed description of the Akan numeral system, which is decimal, we identify various ranges of cardinal numerals and show that they share structures with other constructions in the language because they are either compounds or coordinate constructions. We show that, consistent with crosslinguistic patterns, the two arithmetic operations that underpin the construction of cardinal numerals in Akan are addition and multiplication and they are formally realised differently. While multiplication is manifested mainly as compounding (and reduplication), addition is expressed mainly through compounding and coordination. The Construction Morphology framework allows us to account for the full range of Akan cardinal numerals in a consistent manner, showing how numerals relate to other constructions in the language. We posit two constructional schemas for the two arithmetic operations, with various subschemas for different instantiating constructions, including some constructional idioms in which certain recurrent forms are pre-specified.

Keywords: Akan, cardinal numeral, Construction Morphology, constructional idiom, template unification

Introduction

The nature and function of numbers and numerals[1] have received considerable scholarly attention from diverse fields, including Philosophy, Psychology, Neuroscience, Mathematics and Linguistics. The issues that have engaged the attention of most linguists include the syntactic category and distribution of numerals, the formal make-up and meaning of numeral constructions as well as the discovery of rules for generating all and only the well-formed numerals in a language (van Katwijk 1965, 1968; Brainerd 1966, 1968b; Brainerd & Peng 1968; Brandt Corstius 1968; Siromoney 1968; Hurford 1975; Stampe 1976; Corbett 1978a, 1978b; Stump 2010; Comrie 2011;

[1] In this paper, we use the term *numeral* (Num) to refers to linguistic expressions and *number* (NUM) to refer to the value of a linguistic expression.

Epps et al. 2012). Other linguists, psycholinguists and neuroscientists, believing in the psychological reality of the activity of counting, seek to find the biological foundations of the number sense (Dehaene 1997, 2001; Seron & Pesenti 2001) and its socio-cultural and cognitive motivation (Hurford 1987, 2007; Wiese 2003a, 2003b, 2007; Gordon 2004; Gelman & Butterworth 2005; Epps 2006). These studies show that numeral systems distinguish between two basic types of numerals – primary numerals and complex numerals, the latter built out of the primary numerals. Two important factors underpin their formation. One is the arithmetic operations employed, which may be one of the four identified cross-linguistically – addition, subtraction, multiplication, or division. The other is the morphological and/or syntactic processes involved, which may be affixation, compounding, juxtaposition, reduplication or coordination (Greenberg 1978).

Although the properties of Akan numerals have not featured in the theoretical literature on numerals, this is not the first study on Akan numerals. Christaller (1875: 50-55) describes Akan numerals, distinguishing between *definite numerals* (e.g., *du* 'ten') which denote exact numbers and *indefinite numerals* (e.g., *pii* 'many', *nyina* 'all' & *bi* 'some') which do not denote exact numbers. He treats the former as (abstract) nouns and the latter as adjectives. He also categorizes numerals formally into *primary* and *compound* numerals and functionally into *cardinal*, *iterative*/*multiplicative*, *distributive*, *ordinal* and *fractional* numerals. Balmer & Grant (1929) and Dolphyne (1996) cite numerals from the Fante and Asante dialects respectively, but do not analyse them. Ofori (2008) discusses a subset of cardinal numerals (20-90 and 200-900) in the Asante and Akyem dialects. He recognises them as compounds and attempts to account for the morphophonological processes (vowel harmony, deletion, compensatory lengthening, etc.) which occur at the boundary between constituents to ensure the well-formedness of the numerals. Ofori's study, though limited in coverage, shows that, in their formal makeup, those Akan numerals are compounds. Finally, in some recent studies focused on the properties of non-cardinal numerals (Appah 2019a, 2019b; Appah et al. 2019) it is shown that these non-cardinal numerals share formal structures with other morphological and syntactic constructions in Akan.

What remains largely undone is a detailed theoretical study of Akan cardinal numerals, and the present paper is a modest attempt towards filling the gap. The purpose is to study the internal grammar of Akan complex cardinal numerals like those in (1) and to present a Construction Morphology account of their properties, showing the units and the arithmetic operation that underly the formation of the numerals as well as how the structure of cardinal numerals relates to other constructions in Akan. We also attempt to explain the semblance between the structure of complex cardinal numerals and other morphological and syntactic constructions in the language.

(1)	**du-biako**	'11'	[lit. ten-one]
	e-du-onu anan	'24'	[lit. PL-ten-two four]
	ɔ-ha e-du-asa ebien	'132'	[lit. SG-hundred PL-ten-three two]
	a-ha-esia	'600'	[lit. PL-hundred-six]
	m-pem ebien	'2000'	[lit. PL-thousand two]

Through a detailed analysis of the data, we seek to answer the following questions: What are the classes of cardinal numerals in Akan? What arithmetic operations underpin the formation and interpretation of Akan complex cardinal numerals? Are there any formal means of marking the arithmetic operation in the numerals? How do we explain the structural similarity between cardinal numerals and other constructions in Akan?

The data and analysis presented in this study will show the following: (i) Akan complex cardinal numerals fall into well-defined groups, showing patterns of regularities; (ii) the formation and interpretation of the numerals is underpinned by specific arithmetic operands which may have specific formal representation in the form of functional elements like the conjunction **ne/na** 'and' which marks addition in numerals with values greater than *one hundred*; (iii) the regularities in the structure of Akan complex cardinal numerals and the similarity between them and other complex words and phrases are not unexpected, given that the processes used in numeral formation are the same ones employed in forming other morphological and syntactic constructions in the language; (iv) each group of numerals may be formalized as a constructional schema, but the complexity of some numeral constructions suggests that they result from the conflation of the schemas of more basic constructions. We note that the potential multiple inheritance that gives rise to such multiply complex numerals may be seen as the result of *template unification* (Booij 2007; Appah 2017c). The constructionist view of the lexicon as a *construction* (Jurafsky 1992: 8), the repository of a hierarchically structured network of constructions sharing multiple inheritance relations, makes it possible for a construction to inherit properties from more than one construction.

We start with a brief review of some pertinent distinctions in the study of numeral systems, where we point out the primary distinction between primary and complex cardinal numerals. This is followed by an equally brief introduction to Construction Morphology, the theoretical framework for the study. Next, we discuss the construction of Akan cardinal numerals followed by the conclusion of the study.

Numeral systems, numeral formation, and underpinning arithmetic operations

Greenberg's first Generalization about numeral systems states that "[e]very language has a numeral system of finite scope" (Greenberg 1978: 253). These numeral systems tend to behave like subsystems within languages with their own internal grammar and exhibit remarkable cross-linguistic uniformity which may be attributable to the logical and cognitive requirement that, to serve their purpose, numbers must be ordered sequences of well-distinguished entities. The systemic numerals correspond to the counting words in the conventionalized counting sequence, the cardinal numerals, which occur recursively as constituents of more complex higher-valued numerals and may underlie the formation of corresponding forms of other numeral types – ordinal, multiplicative, frequentative, etc. (cf. Hurford 2001; von Mengden 2010; Stump 2010).

Systemic numerals are categorized into two basic types – primary and complex (sometimes called compound) numerals. Primary numerals are the unmotivated,

usually mono-morphemic, units. They typically include all numerals up to and including the base numeral. For decimal numeral systems like Akan and English, for example, they include *one* to *nine*, *ten*, (even *eleven* & *twelve* in contemporary English), and some multiples of *ten* like *hundred* and *thousand*.

The primary numerals divide functionally into atoms (1-9) and bases (10, 100 and 1000), whose complementary properties are crucial for the formation of complex numerals and for the overall structure of the numeral system. Atoms, also called digital numerals (Hurford 2007), are elements of numeral systems with the highest potential of forming a continuously recurring (sub)-sequence of numerals in combination with bases or their multiples (von Mengden 2010: 39). Comrie (2011) defines the "base" of a numeral system as "the value *n* such that numeral expressions are constructed according to the pattern ... *xn* + *y*, i.e., some numeral *x* multiplied by the base plus some other numeral [*y*]". Here, the order of elements may be language-specific. Thus, bases are characterized as elements that combine with atoms, or paradigmatic choice out of a sequence of atoms (cf. von Mengden 2010: 33). The lowest base number is the *fundamental base* (Greenberg 1978) and it may occur in various forms in its multiple.

Complex numerals are made up of two or more primary numerals. They are generated "recursively" from primary numerals and their interpretation is mediated by arithmetic operands – addition, subtraction, multiplication, or division. Of these four fundamental arithmetic operations attested in the languages of the world the commonest, cross-linguistically, are addition and multiplication (cf. generalization 9, Greenberg 1978). The arithmetic operations may not be overtly marked in the numeral. However, where they are marked, there are various options available, including lexical ones like 'with' and 'and', for addition, 'upon' for multiplication, 'from' for subtraction, etc. As will be shown below, in Akan, addition is formally marked with a lexical item, e.g., **ne/na**, only in cardinal numerals greater than one hundred (>100). Thus, numeral systems have two core components – a set of primary forms and a set of morphosyntactic rules that combine the primary forms into complex numerals whose formation may be a matter of morphology, syntax, or both. Therefore, complex numerals may surface as derived words, compounds, or phrases. For example, English *seventy* and *eighty* are clearly derived complex words consisting of the bases *seven* and *eight*, respectively, and the suffix *-ty*, meaning *ten*, while higher numerals like 'twenty-one' and 'forty-five', are mostly compounds, "a special type of compounds" (Dressler 2006: 25). In the same way, Akan numerals above *one hundred*, like 104 in (2), have the structure of coordinate constructions marked by the conjunction **na**.

(2) **ɔ-ha** **na** **anan**
SG-hundred CONJ four
'(one/a) hundred and four'

Here, internal commutability is prohibited, as the linear order of the conjuncts is fixed. If the order is reversed, the structure becomes ill-formed, as shown in (3). Again, without the conjunction, either a completely different numeral is formed (if **ɔha** 'hundred' is pluralized) or the expression becomes ungrammatical, as shown in (4).

(3) ***anan na ɔha**
four CONJ hundred

(4) **a-ha anan (*ɔha anan)**
PL-hundred four
'four hundred'

For numerals like (5), discerning whether it results from compounding (thus, morphology) or syntax is not straightforward. They may be considered syntactic because the constituents are written as separate words, but there is no overt maker of syntactic status. Sometimes, there may be an overt marker of the syntactic status, as the alternate expression in (6) shows.

(5) **ɔha eduasa ebien**
hundred thirty two
'(one) hundred and thirty-two'

(6) **ɔha na eduasa ebien**
hundred and thirty two
'(one) hundred and thirty-two'

Compared to (6), the traditional view of (5) might be that the conjunction is deleted or phonologically unrealized/empty (cf. Hurford 1975). However, we find no reason why (5) & (6) may not be regarded as two separate renditions of the intended meaning – a morphological rendition (5) and a syntactic rendition (6). Here, the usual test for lexical integrity, like the impossibility of inserting some matter between the parts of a word and internal inflection, may not help in determining the wordhood of the numeral because no Akan numeral permits the insertion of extraneous materials. However, plural marking may occur on any constituent whether the numeral is assumed to be formed morphologically or syntactically. This shows that numeral formation may involve both morphology and syntax and may be subject to specific restrictions on linear order, violating which the numerals become ill-formed.

It is for this reason that it is suggested that numerals constitute subsystems within languages with their own internal grammar, sometimes exhibiting typologically unusual characteristics and being subject to restrictions that other comparable constructions are not (cf. Dressler 2006: 25; Spencer 2011: 484). Notwithstanding this, it is observed that numeral formation seems to be so systematic/schematic that it must be seen as a rule-governed operation. That is, the numeral system of a language generates complex numerals from the stock of primary forms according to recursive rules and underlying arithmetic operations, so that any value can be expressed, in principle. The actual representation of this putative recursive process, however, depends on whether one sees numeral formation as syntactic or morphological. In keeping with the spirit of the times, most studies from the 1960s regarded numeral formation as a syntactic process (Brainerd 1966, 1968a, 1968b; Brainerd & Peng 1968; Merrifield 1968; Siromoney 1968; Van Katwijk 1968). This theoretical approach to studying numerals has persisted until now. Hurford (1975, 1987, 2007), for example,

observes that the uniformity observed in the structure of complex numerals can be generated from the set of universal phrase structure (PS) rules in (7).

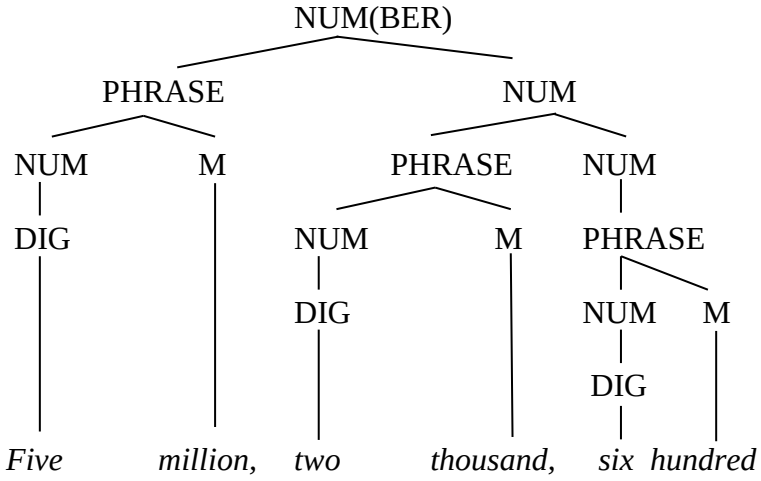
(7) Universal PS Rules (Hurford 2007: 774)

NUMBER	→	{ **DIGIT** / **PHRASE (NUMBER)** }	(interpreted by addition)
PHRASE	→	**(NUMBER) M**	(interpreted by multiplication)

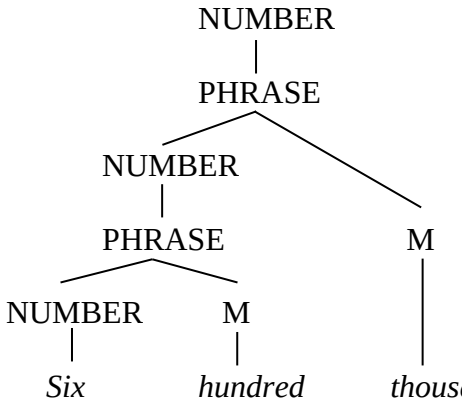
'DIGIT' represents single numeral words up to the base number. 'M' represents noun-like numerals, including *-ty*, *thousand* and *billion*, in a decimal system, used as multiplication bases (Hurford 2001: 10758).

The PS rules yield trees like (8) and (9), which are meant to show that numeral formation is ultimately a syntactic process, although there is no reason why the numerals in (8) and (9) cannot be regarded as compounds (consider, [[*Six hundred*]$_N$ *thousand*]$_N$), given that numerals may be subject to the same morphophonological processes as other compounds (cf. Ofori 2008).

(8)



(9)



(Hurford 2007: 775)

von Mengden (2010: 49) favours a morphological interpretation of numeral formation. He suggests that the difference between a primary numeral and a complex numeral is morphological because the primary numeral is mono-morphemic while the complex numeral consists of several constituents. However, this is problematic because the fact that a complex numeral consists of several constituents does not imply morphological formation.[2] As shown in (2), some complex numerals take the form of coordinate constructions with overt markers of coordination. Surely, English *one hundred and seven* '107' is syntactic and not morphological, unless one overlooks the coordinating conjunction. Thus, this morphology-only view will fail to account for the full range of numeral constructions. von Mengden is not unaware of this fact. He suggests, however, that whether the rules that form numerals are regarded as morphological or syntactic "will [...] ultimately remain a matter of the underlying theoretical approach" (von Mengden 2010: 41).

Although deciding on whether a form is syntactic or morphological may not be straightforward, as the discussion of (5) & (6) reveals, the decision cannot be as simply theory-dependent as von Mengden suggests. There should be theory-independent (probably language-specific) criteria for determining whether a process is morphological or syntactic. The popular lexical integrity tests come to mind, although they may not be wholly reliable, as noted above. von Mengden (2010: 41) makes an observation which we believe to be an apt description of what the structure of complex numerals reveals about the relationship between morphology and syntax. He observes that "whether a complex numeral is, in the particular case, best analysed as an affixation, a compound or a juxtaposition of co-ordinate syntactic phrases should be a question of locating areas in a continuum of possible structures rather than a categorial

[2] It should be noted that primary numerals may be morphologically segmentable in some languages. For instance, in Akan, lexical word classes except for verbs, usually have a prefix and/or suffix which marks grammatical number or some semantic category (see Osam 1994). Thus, in this paper the term primary is used to refer specifically to (digital) atoms and (non-digital) bases, independent of their internal morphological structure.

decision". This obviously constructionist view allows for a uniform treatment of all numeral constructions – morphological or syntactic (cf. Booij 2010; Jackendoff 1997).

We adopt a constructionist approach to the analysis of Akan complex cardinal numerals. This approach allows us to show how all kinds of constructions may unify to derive complex numerals. We present the Construction Morphology framework in the next section.

Construction Morphology

Construction Morphology (CxM) is an abstractionist word-based theory of linguistic morphology, which aims to provide a framework for adequately accounting for the differences and commonalities of word-level and phrase-level constructs (Booij 2010). CxM builds on insights from Construction Grammar, especially the central notion of *construction*, which is defined as a pairing of form and meaning (Goldberg 1995; Bybee 2013; Jackendoff 2008). Constructions may be built by means of schemas, which abstract over sets of existing complex forms and serve as a recipe for forming other constructions of comparable complexity (Booij 2007, 2010; Appah 2013). See, for example, the schema in (10) which generalizes over right-headed compounds.

(10) $\langle\ [[a]_{Xi}\ [b]_{Yj}]_{Yk} \leftrightarrow [SEM_j \text{ with relation R to } SEM_i]_k\ \rangle$

The upper-case variables X and Y represent the major lexical categories (V, N & A). The lower-case variable *a* and *b* stand for arbitrary strings of sounds, whilst *i, j* and *k* are indexes for the matching properties of the compound and its constituents (Booij 2010).

In CxM, schemas and their instantiating constructions co-exist in a hierarchically structured lexicon, where two types of relations hold – "instantiation", which obtains between a schema and a construction that is formed by the schema and "part of", which exists between a construction and its constituents. The relations are illustrated in (11), where each dominated schema instantiates the one that dominates it and the individual constituents, *school* and *uniform* are 'part of' the compound *school uniform*.

(11) $\langle\ [[a]_{Xi}\ [b]_{Yj}]_{Nk} \leftrightarrow [SEM_j \text{ with relation R to } SEM_i]_k\ \rangle$

$\langle\ [[N]_i\ [N]_j]_{Nk} \leftrightarrow [SEM_j \text{ meant for } SEM_i]_k\ \rangle$

$\langle\ [[school]_i\ [uniform]_j]_{Nk} \leftrightarrow [uniform_j \text{ meant for } school_i]_k\ \rangle$

$[school]_N \qquad [uniform]_N$

Constructions are not expected to be compositional; they just have to be predictable. Thus, constructions may have properties that do not emanate from their constituents (Booij 2010; Appah 2015, 2017b). However, both compositional and extra-compositional properties of constructions can be accounted for without positing

abstract categories to serve as the source of non-compositional properties (cf. Jackendoff 1997, 2002; Appah 2013, 2016b, 2017b).

A schema in which one of the slots is lexically specified is called a *constructional idiom* (Jackendoff 2002). Here, the pre-specified element is treated as part of the constructional schema, so that only the variable slot is available to be filled, on occasion, to instantiate the construction in concrete terms. We employ this feature prominently to show how general properties of the various classes of numerals discussed in this paper may be captured straightforwardly in (sub-)schemas that abstract over the properties of the classes of numeral constructions, with some recurrent forms pre-specified in the schema, making them constructional idioms.

One advantage of the view that actual constructions and the schema they instantiate occur in this hierarchically organized constructional space, called the *constructicon* (Jurafsky 1992), is that nuances in the semantic and formal properties of complex forms are not difficult to account for, since they can be related to regular patterns by positing subschemas. Another is that schemas can be unified through multiple inheritances, yielding multiply complex schemas. This is called template unification (TU), and it accounts for the simultaneous application of multiple processes, skipping any intermediate step(s), so that two independent processes, none of which seems to be sufficient to account for a complex constructions on their own, can apply simultaneously to form a multiply complex construction that can be said to have started a life of its own (Booij 2010).

Following Appah (2017c) we assume that TU occurs freely, to the extent that the properties of the unifying schemas do not conflict, and is enhanced when one schema has an open slot, with constraints that can be fully satisfied by the properties of the other schema. This possibility of unifying constructions freely to form actual expressions, so long as they do not conflict, coupled with the existence of constructions with open slots makes it possible to capture Chomsky's (1957, 1965) intuitions about the creative potential of language (cf. Appah 2017c).

The structure and formation of complex cardinal numerals

As discussed above, a numeral system consists of a set of primary numerals and a set of morphosyntactic rules that combine them into complex numerals whose interpretation is mediated by arithmetic operands. We present Akan primary digital numerals in Table 1 and the non-digital base numerals in Table 2.

Akan numerals are derived from nouns although they may be used as modifiers in a nominal construction (Christaller 1875). Like nouns, they are coordinated by noun phrase connectives **ne** (Asante, Akuapem) and **na** (Fante). As shown in Table 1 and 2, each numeral typically consists of a prefix and a stem but the form of the prefix and/or the stem may vary depending on the dialect (e.g., Fante (Fa), Akuapem (Ak), Asante (As), etc.). The dialectal differences between the forms of the numerals are largely due to dialect-specific phonological processes such as cross-height and rounding vowel

harmony, consonant mutation and other assimilatory processes. However, because there is a strong mutual intelligibility between the various dialects there is no variation in the semantic content of the numerals in the language, primary or complex. In this paper, we use Fante (Fa) as the default dialect in citing examples for analysis. We will, however, attempt to point out any dialectal difference that has implication for analysis. As Akan is a tonal language, all numerals have a tonal melody which may vary across different dialects. We have not marked tones on numerals in this study because it has no direct bearing on our current analysis, although a study of tonal phonology of numerals may be justified in its own right.

There is one morphosyntactic difference between primary digital numerals and primary non-digital numerals: while digital numerals do not have alternations between singular and plural prefixes, the three non-digital bases have singular and plural prefixes (see Table 2). The atomic digits (1 – 9) take the prefix **ba-** when they refer to human nouns, e.g., **mmeranteɛ baanan** 'four young men', but **ba-** cannot be used with non-digital bases, e.g., **mmeranteɛ** ***baaha/pem** 'int: hundred/thousand young men'.

Table 1. Akan primary digital cardinal numerals

Digital/Atoms		
	PREFIX	*STEM*
1	*ba-/bi-/ɛ-*	*ko/kor* [*e.g., ɛkor, biako* (Fa/Ak), *baako* (As)]
2	*m-/a-/e-/ba-/bi-*	*nu* [*e.g., abien* (Fa/Ak), *mmienu* (As), *baanu* (Fa/Ak/As)]
3	*m-/a-/e-/ba-*	*sa* [*e.g., ebiasa,* (Fa), *abiɛsa* (Ak), *mmiɛnsa* (As), *baasa* (As/Ak), *ebaasa* (Fa)]
4	*a-/ɛ-/ba-/n-*	*nan* [*e.g., anan* (Fa/Ak), *nnan/ɛnan* (As), *baanan* (Fa/Ak/As)]
5	*e-/ba-/n-*	*num* [*e.g., enum* (Fa/As), *nnum* (Ak/As), *baanum* (Fa/Ak/As)]
6	*n-/a-/e-/ba-*	*sia* [*e.g., asia* (Fa/Ak), *nsia* (As), *baasia* (Fa/Ak/As)]
7	*n-/a-/ba-*	*son/suon* [*e.g., asuon* (Fa), *ason* (Ak), *nson* (As), *baason* (Fa/Ak/As)]
8	*n-/a-/ba-*	*wɔtwe* [*e.g., awɔtwe* (Fa/Ak), *nwɔtwe* (As), *baawɔtwe* (Fa/Ak/As)]
9	*n-/a-/ba-*	*kron* [*e.g., akron* (Fa/Ak), *nkron* (As), *baakron* (Fa/Ak/As)]

Table 2. Akan primary non-digital/base cardinal numerals

	Non-digital/bases	
	PREFIX	*STEM*
10	*e-/a-*	*du [e.g., e-du* 'SG/PL-ten' (Fa), *(e-)du* 'SG-ten' (As/Ak), *a-du* 'PL-ten' (As/Ak)
100	*ɔ-/a-*	*ha* [*e.g., ɔ-ha* 'SG-hundred' (Fa/Ak/As), *a-ha* 'PL-hundred' (Fa/Ak/As)
1000	*m-/a-/ɔ-*	*pe/pem* [*e.g., a-pem* 'SG-thousand' (Fa/Ak/As), *m-pem* 'PL-thousand' (Fa/Ak/As)]

The primary numerals (except **ɔha** and **apem**) in Akan may also function as proper names given to children based on their relative order of birth or a name inherited from a family member, e.g., **Nsia** 'name for sixth born', **Akron**/**Nkroma** (also spelled Nkrumah) 'name for a ninth born' (see Table 3 below).

In the rest of this section, we discuss the structure and formation of Akan complex cardinal numerals. In section 4.1, we clearly set out our approach to the constructional analysis. We then discuss the various groups of complex cardinal numerals and show how they may be represented in the constructional approach.

Table 3: Akan names based on primary cardinal numerals

	NUMERAL	**NAME**
1	*baako/biako*	Bako
2	*mmienu/ebien*	Manu
3	*mmiɛnsa/abiasa/ebaasa*	Mɛnsa/Mansa
4	*ɛnan/anan*	Anan
5	*enum*	Anum
6	*nsia/asia*	Nsia
7	*nson/ason*	Nsonwaa
8	*nwɔtwe/awɔtwe*	Awɔtwe/Botwe
9	*nkron/akron*	Akron/Nkroma
10	*edu*	Badu

Akan complex cardinal numerals: the constructional approach

As noted above, complex cardinal numerals are formed by combining two or more primary cardinal numerals. In the following discussion we show that Akan complex cardinal numerals come in sets with shared properties and are underpinned by specific morphosyntactic and arithmetic operations. Formally, the numerals behave like regular compound and phrasal constructions in the language. Therefore, we posit constructional schemas for the common predictable properties of the groups. Given that the numerals that instantiate the schemas are fixed in form and meaning, the schemas may be construed as redundancy statements about the form and meaning of the numerals (cf. Booij 2009, 2010). The meaning – NUM(be) – of a numeral in a particular set is the numerical value of the result of the underpinning arithmetic operation. For example, multiples of *ten*, *hundred*, and *thousand* are formed by multiplication (20 = 10x2, 200 = 100x2, etc.). An example is **a-ha ebien** 'two hundred' [PL-hundred two]. However, there are no overt markers for the arithmetic operations involved in the formation of numerals below 100. For numbers greater than 100, the default marking for addition is coordination, usually with just one explicit conjunction, **na** 'and' which occurs before the last constituent, as exemplified in the numerals **ɔ-ha na anan** '(one/a) hundred and four' [lit. SG-hundred CONJ four], as shown in (2) above. Multiplication may also be marked lexically in some multiplicative numerals, where the formation of multiples of thousand are involved, e.g., **mpem ahorow mpem** 'thousands of thousands' [lit. PL-thousand various/multiples of PL-thousand] as discussed in (33) below (cf. Appah et al. 2019; Christaller 1875).

Thus, we may define constructional schemas for the two principal arithmetic operations involved in the constructions of Akan cardinal numerals – multiplication and addition. The schema for multiplication is in (12).

(12) *Multiplication schema*
⟨ [[*a*]$_{[+M]i}$ [*b*]$_j$]$_k$ ↔ [NUM$_i$ x NUM$_j$]$_k$ ⟩
(The variables *a* & *b* stand for arbitrary phonological strings, whilst *i*, *j* & *k* are indexes for the matching properties of the constituents and the numeral as a whole. NUM = arithmetical value (product) of the corresponding constituents indexed *i* and, *j*).

There is usually a member of the complex that functions as the base for the arithmetic operation. For multiplication, the bases are the non-digital primary numerals (Table 2) which, following Hurford (1975), are identified by the feature (+M). All numerals formed by multiplication instantiate this schema, as shown in (13) for the numeral **aha ebien** '200'.

(13) ⟨ [[*a*]$_{[+M]i}$ [*b*]$_j$]$_k$ ↔ [NUM$_i$ x NUM$_j$]$_k$ ⟩
⟨ [[*aha*]$_{[+M]i}$ [*ebien*]$_j$]$_k$ ↔ [hundreds$_i$ x two$_j$]$_k$ ⟩ '200'

In the case of addition, we posit two separate schemas. The first (14) is for numerals that occur between the multiples of 10, up to 99 (11-19, 21-29, 31-39, etc.) in which there is no formal marking of addition.

(14) *Addition schema for numerals between 10 and its multiples but <100*
⟨ [[*a*]$_i$ [*b*]$_j$]$_k$ ↔ [NUM$_i$ + NUM$_j$]$_k$ ⟩

(NUM = arithmetical value (sum) of the corresponding constituents indexed *i* and *j*)

The second schema in (15) is for numerals that are greater than 100 which optionally employ the conjunction *na* to mark addition.

(15) *Addition schema for numerals >100*
⟨ [Num$_{Ci}$ (na) Num$_j$]$_{Numj}$ ↔ [NUM$_i$ + NUM$_j$]$_k$ ⟩

(NUM = the value of the corresponding Num; Num$_C$ = numerals ≥100)

We see that the formal pole of schemas (12) and (14), to the left of the double arrow in the schemas, are similar to those for regular compounds in Akan, except the subscripted feature (cf. Appah 2013, 2015, 2016a, 2016b, 2017a, 2017b; Appah et al. 2017). Consider, for example, the general schema for noun-noun compounds in Akan and its instantiation by the compound **àsɔ́rédáń** 'church building' in (16).

(16) ⟨ [[*a*]$_i$ [*b*]$_j$]$_{Nk}$ ↔ [SEM$_j$ with relation R to SEM$_i$]$_j$ ⟩
[[*àsɔ́ré*]$_{Ni}$ [*dáń*]$_{Nj}$]$_{Nk}$ 'church building'
[*àsɔ́ré*] 'church' [*dáń*] 'building' (cf. Appah 2017a: 143)

We see that the formal pole at the highest level is very much like the formal pole of the schema in (14). In the same way, schema (15) is like the schema for coordinate constructions (cf. Appah et al. 2019). Thus, these schemas are instantiations of the respective compounds and coordinate constructions in Akan, supporting our view that in terms of form, numeral constructions are not particularly different from other morphological and syntactic constructions in the language. This point will be illustrated further below.

Groups of Akan complex cardinal numerals

We now discuss the various groups of Akan complex cardinal numerals. We will begin with numerals in which two or three primary numerals are juxtaposed to form the complex numeral. The numerals are, therefore, compounds (Christaller 1875; Ofori 2008) and are subject to all the phonological processes that operate within compounds (cf. Dolphyne 1988; Marfo 2004; Abakah 2004; Ofori 2008). Being compounds means that they are words which should exhibit evidence of lexical integrity and the most convincing sign of lexical integrity in Akan numerals is that their immediate constituents cannot be interrupted by any extraneous material – lexical or syntactic. Thus, whatever occurs inside a numeral in this group must itself be a numeral and an immediate constituent of the complex numeral or be embedded in an immediate constituent of the numeral. This is consistent with the condition that the sister of a numeral must be a numeral (Hurford 1975, 1987, 2007). See (8) and (9) above. For practical reasons, we have to begin with a discussion of the formation of the multiples of the base numeral, up to 90.

Multiples of ten (20-90)

To be able to put the discussion of the formation of numerals whose value is less than one hundred in proper perspective, we need to clarify the formation of the multiples of the base *ten* from *twenty* to *ninety*, which are presented in Table 4. They are formed by compounding a digital numeral and the plural of the base **du** ‘ten’, where plurality is marked by the prefix *e-* (as in **e-du** [PL-ten]).

Table 4: Akan numeral – 20-90

	Numeral
20	*edu-o-nu*
30	*edu-a-sa*
40	*edu-a-nan*
50	*edu-o-num*
60	*edu-o-sia*
70	*edu-o-suon*
80	*edu-ɔ-wɔtwe*
90	*edu-ɔ-kron*

The relatively simple structure of these numerals is consistent with Greenberg's (1978) observation that multiples of the base of a numeral system, like '70', in a decimal system, are less marked than other comparably high numbers, like '71'.

An interesting formal feature of these numerals is the appearance of what looks like an interfix, a stem extender (SE), that occurs between the decimal base and the digital numeral on the right. The SE is realized as a mid-back vowel that agrees in tongue root position and/or rounding harmony with the vowel of the digital numeral (see Ofori 2008 for a discussion of the phonological rules that derive SE). The only unrounded vowel that occurs as a SE in these numerals is the vowel [a] which occurs in the numerals **eduasa** '30' and **eduanan** '40'. Its presence can be explained by the fact that this vowel occurs freely with both advanced and lax vowels, as well as rounded and unrounded vowels in Akan (cf. Dolphyne 1988).

The general properties of the set of multiples of ten in Table 4 are captured in the constructional schema in (17), which states that the meaning of a multiple of '10' is the product of the numerical value of a digital numeral and the value of the pre-specified base **e-du** 'PL-10'. Thus, the arithmetic operation involved in the interpretation of these numerals is multiplication, as shown on the right of the double arrow, so that schema (17) instantiates the multiplication schemas in (12), where there is no overt marking of multiplication in the formal realization. The instantiating schema in (18) is for '20'.

(17) *Schema for numerals 20-90*
⟨ [[*e-du*]$_i$ -SE- [*b*]$_{j\ [dig]}$]$_k$ ↔ [10$_i$ x NUM$_j$]$_k$ ⟩

(18) *Schema for numerals 20-90*
⟨ [[*e-du*]$_i$ -SE- [*b*]$_{j\ [dig]}$]$_k$ ↔ [10$_i$ x NUM$_j$]$_k$ ⟩
⟨ [[*e-du*]$_i$ -o- [*nu*]$_{j\ [dig]}$]$_k$ ↔ [10$_i$ x 2$_j$]$_k$ ⟩ '20'

Having settled the structure of the multiples of '10', up to 90 in Akan, we can now discuss the structure of numerals that occur between *ten* and multiples of *ten*, such as 11-19 and 21-29 – 90-99.

Between decades (11-19)

The first set of numerals that occur between the decades are numerals from 'eleven' to 'nineteen' (11-19). They are formed by compounding the base **du** 'ten' with the digital numerals (see Table 5).

Table 5: Akan complex numerals – 11-19

	Numeral
11	*du-biako* 'ten-one'
12	*du-ebien* 'ten-two'
13	*du-ebiasa* 'ten-three'
14	*du-anan* 'ten-four'
15	*du-enum* 'ten-five'
16	*du-esia* 'ten-six'
17	*du-esuon* 'ten-seven'
18	*du-awɔtwe* 'ten-eight'
19	*du-akron* 'ten-nine'

We assume that the numerals in this group instantiate the constructional schema in (19) which also instantiate the schema in (14). The indices (*i, j,* & *k*) identify forms and corresponding meanings of numerals. The feature [$_{dig}$] denotes the set of digital numerals 1-9. That is, the numerals are formed by adding a digital numeral to a base, which also happens to be the fundamental base (Greenberg 1978), given that the Akan numeral system is decimal.

(19) *Schema for numerals 11-19*
⟨ [[*du*]$_i$ [*b*]$_{[dig]j}$]$_k$ ↔ [10$_i$ + NUM$_j$]$_k$ ⟩

Schema (19) is a constructional idiom, a constructional schema with the first element pre-specified as **du** '10' (cf. Jackendoff 2002), which states that the meaning of a numeral within the range 11-19 is the sum of the numerical value of a digital numeral and the value of the pre-specified base **du** 'ten'. Thus, the arithmetic operation involved in the interpretation of this class of numerals is addition, as shown in the semantic poles to the right of the double arrow. But there is no overt marker of addition in the formal pole, to the left of the double arrow. Thus, one might be tempted to suggest that the formal process of compounding marks the addition of the numerical value of the constituents. However, numerals which are formed by multiplication may also surface as compounds, so there is no intrinsic link between the arithmetic operation of addition and the formal operation of compounding. In terms of the linear order of constituents, the higher number (**du**, in this case) occurs first and then the digit. This is consistent with observations about the occurrence of modifiers in Akan (Saah 2004) as well as the packing strategy (Hurford 2007). That is, the lower value numeral serves as a modifier to the meaning of the higher value numeral.

Between decades (21-29 – 91-99)

Like numerals within the range 11 to 19, all numerals ranging between the multiples of 10, like 21-29, 31-39, etc., up to 91-99 are formed by compounding a base which is a multiple of ten, from 20 to 90 (Table 4), and a digital numeral (Table 1) and they

instantiate a schema like the one in (19). We shall illustrate the group with the numeral that occur between 20 and 30, as shown un (20).

(20) *Numerals ranging from 21-29*

eduonu biako '21'	**eduonu anan** '24'	**eduonu esuon** '27'
eduonu ebien '22'	**eduonu enum** '25'	**eduonu awɔtwe** '28'
eduonu ebiasa '23'	**eduonu esia** '26'	**eduonu akron** '29'

We may call these the *twenty-n constructions* and represent them by the schema in (21) which instantiates a higher constructional schema, ⟨ [[PL-ten]-*n*] ↔ [PL-ten + n, 0<n<10] ⟩ with a constraint that *n* be digital. The structure of this class of numerals is consistent with the observation by Comrie (2011) that numeral expressions are constructed according to the pattern ... *xn + y*. That is, some numeral *x* multiplied by the base plus some other numeral [*y*].

(21) *twenty-n construction*
⟨ [eduonu-n] ↔ [20 + n, 0<n<10] ⟩

Schema (21) is a complex one that results from a conflation of two schemas. The fully specified schema is in (22). It inherits its structure from two separate schemas, an addition schema which builds on an existing multiplication schema like (17) for the base numeral, which is a multiple-of-ten, through the process of template unification (Booij 2007), as shown in (23).

1

(22) *Schema for numerals 21-29*
⟨ [[*du* [*a*]$_{i\ [dig]}$]$_j$ [*b*]$_{k\ [dig]}$]$_q$ ↔ [[10 x NUM$_i$]$_j$ + NUM$_k$]$_q$ ⟩

(23) ⟨ [*du* [*a*]$_{i\ [dig]}$]$_j$ ↔ [10 x NUM$_i$]$_j$ ⟩ ⟨ [*du* [*b*]$_{k\ [dig]}$]$_q$ ↔ [10 + NUM$_k$]$_q$ ⟩

⟨ [[*du* [*a*]$_{i\ [dig]}$]$_j$ [*b*]$_{k\ [dig]}$]$_q$ ↔ [[10 x NUM$_i$]$_j$ + NUM$_k$]$_q$ ⟩

The idea of template unification is consistent with the observation that "by allowing inheritance to hold of constituents internal to particular constructions we can capture generalizations about the internal structure of constructions. By allowing multiple inheritance we account for instances which appear to be simultaneously motivated by two distinct constructions" (Goldberg 1995: 100).

Multiples of hundred (200-900)

Multiples of hundred (200–900), as presented in (24), are formed by compounding the base **aha** (the plural of **ɔha** 'hundred') and a digital numeral (cf. Ofori 2008; Christaller 1875), and their general properties are captured in the schema in (26), which is a constructional idiom with the form **a-ha** 'PL-hundred' pre-specified. A primary/complex numeral *n* (0<*n*<100) may be coordinated to the compound as an addend, as shown in (25).

(24)

ahaenu/ahaebien	'two hundred'	**ahaesia**	'six hundred'
ahaasa/ahaebiasa	'three hundred'	**ahaesuon**	'seven hundred'
ahaanan	'four hundred'	**ahaawɔtwe**	'eight hundred'
ahaenum	'five hundred'	**ahaakron**	'nine hundred'

(25)

ahaenu/ahaebien na ebien	'two hundred and two'
ahaesia na asuon	'six hundred and seven'
ahaasa/ahaebiasa na du-biako	'three hundred and eleven'
ahaesuon na eduonu anan	'seven hundred and twenty-four'

(26) *Schema for multiples of hundred 200-900*
⟨ [*aha* [*a*]$_{[dig]i}$]$_j$ ↔ [100 x NUM$_i$]$_j$ ⟩

Again, as noted above, the largely uncomplicated structure of the multiples of 100 numerals is consistent with the observation that the multiples of a base of a numeral system are less marked than comparably high numerals.

Multiples of thousand

Multiples of thousand (*thousands*) are formed in three principal ways with interesting properties and uses. There are three different subtypes, which are discussed below.
Multiples of thousand (2000-9000)

The first means of forming multiples of thousand is by compounding **mpem** (plural of **apem** 'thousand'), with the digital numerals 1-9, as shown in (27), and their general properties captured in the constructional schema in (28), which is a constructional idiom in which **m-pem** [PL-thousand] is pre-specified. A fully specified schema exemplifying *mpem enum* '5000' is found in (29).

(27)

mpem ebien	'two thousand'	**mpem esia**	'six thousand'
mpem ebiasa	'three thousand'	**mpem esuon**	'seven thousand'
mpem anan	'four thousand'	**mpem awɔtwe**	'eight thousand'
mpem enum	'five thousand'	**mpem akron**	'nine thousand'

(28) *Schema for multiples of thousand 2000-9000*
⟨ [*mpem* [*a*]$_{[dig]i}$]$_j$ ↔ [1000 x NUM$_i$]$_j$ ⟩

(29) ⟨ [*mpem* [*enum*]$_{[dig]i}$]$_j$ ↔ [1000 x 5$_i$]$_j$ ⟩ '5000'

Mpemdu 'ten thousand', also realized as **ɔpedu**, has a similar structure but the multiplier is not digital. Indeed, numerals up to one million minus one (1,000,000-1), which are formed by multiplication and are multiples of the base **apem** 'thousand', instantiate the schema in (28). Given this, we can revise schema (28), generalizing it by taking away the constraining feature [$_{dig}$] of the multiplier and introducing a constraint in the semantic pole on the right of the double arrow that requires that the multiplier be greater than 1 and less than 1000, as shown in (30).

(30) *Schema for multiples of thousand numerals up to 999000*
⟨ [*mpem* [*a*]$_i$]$_j$ ↔ [1000 x NUM$_{[1 < x < 1000]i}$]$_j$ ⟩

The appended constraining feature ($_{[1 < x < 1000]}$) is needed because, as will be shown in (33) below, the expression **mpem mpem** does not necessarily refer to the product of 1000 multiplied by 1000 (i.e., 1 million). Rather it is a multiplicative numeral which refers to an indefinite number of "thousands" (Appah et al. 2019; Christaller 1875). One million is formed by compounding **ɔpe** and **apem**, as in **ɔpepem** or by reduplicating **ɔpe**, as in **ɔpepe**. See discussion of **ɔpe** below.

Multiples of thousand in multiples of ten (20,000-900,000)

The second group of multiples of thousand, as the examples in (31) show, are formed by compounding **ɔpe** with multiples of 10 (Table 4) and 100, as in (24).

(31)

ɔpeduonu	'twenty thousand'	**ɔpeduosia**	'sixty thousand'
ɔpeduasa	'thirty thousand'	**ɔpeduoson**	'seventy thousand'
ɔpeduanan	'forty thousand'	**ɔpeduowɔtwe**	'eighty thousand'
ɔpeduonum	'fifty thousand'	**ɔpeduokron**	'ninety thousand'
ɔpehanu	'200,000'	**ɔpehasa**	'300,000'
ɔpehannan	'400,000	**ɔpehanum**	'500,000

All the examples in this group are from the Akuapem dialect, as reported in Christaller (1875) and their properties are captured by schema (32), which states that **ɔpe** is multiplied by a multiple of the base. This renders the constraining feature $_{[\text{Non-dig}]}$ superfluous because, as noted above, the Akan numeral system is decimal which makes the base non-digital. However, we maintain it to distinguish the numerals in (31) from those in (27), which have both digital and non-digital multiplicands.

(32) ⟨ [*ɔpe* [*a*]$_{[+\text{M, Non-dig}]i}$]$_j$ ↔ [1000 x NUM$_i$]$_j$ ⟩

Multiples of thousand (million and above)

The third group of multiples of thousand looks very much like the second, discussed in 0, but the numerals may be formed by just reduplicating **mpem/ɔpe** or the reduplication plus words that express multiplicity (or infinite number) of some referent such as **ahorow** 'various' (Appah et al. 2019; Christaller 1875). See the data in (33).

(33)

ɔpepeto	'millions'
ɔpepepem	'thousand millions/a milliard'
mpem-mpem	'thousands'
mpem ahorow mpem	'thousands of thousands'
ɔpehuhaa/mpem mpem huha	'many thousands/myriads'

It is clear from the numerals in (31) and (33) that, unlike the other multiples of thousand, these groups do not admit singular **apem** 'thousand'. Even plural **mpem** occurs only minimally. Rather, the root of thousand **pem** is truncated, realized simply as **pe**, and is prefixed with **ɔ-** to form **ɔpe** which serves as the multiplicand and is compounded with another numeral (the multiplier) or a word that refers to an indefinite number, including **tó** 'empty (as of a container)'. We believe that the prefix **ɔ-**, which marks abstract nouns elsewhere in the grammar (as in **ɔ-ko** 'a war'), helps in conveying the potentially unbounded nature of the numerals formed based on **ɔpe**.

It can be argued that this pattern of *thousands* formation lexicalizes the general meaning of thousand in **ɔpe**. However, the sense of multiplicity, which is ordinarily expressed by the plural form **mpem** in other multiples-of-thousand (0), is passed on to the numeral which follows **ɔpe** or any measure word, for that matter, which follows it (cf. Appah et al. 2019). The distributional difference between **mpem** and **ɔpe** leads us to consider them as allomorphic variants where, in addition to the formal differences, the **ɔpe** variant is underspecified for the feature [MULTI]plicity. Thus, we find, for instance, that even when the right constituent is not a numeral, it still has the responsibility of expressing multiplicity as far as an **ɔpe**-based multiple of thousand is concerned.

Naturally, it would be expected that whatever occurs as the second element (numeral or not) would have the capacity to bear the sense of multiplicity. Hence, it is not possible for digital numerals (1-9) to occur with **ɔpe**, but the non-numeral **ahorow** 'different kinds/various' does occur with **ɔpe**, as in (33), because it inherently expresses multiplicity. The use of **tó** [tʰó] 'empty (as of a container)' is a bit of a puzzle, but it can be explained if we consider the fact that an empty container is available to be filled by any quantity that would occupy the available space. But, because the size or volume of the "empty container" is not indicated, its capacity can be construed with an elastic tinge (Appah et al. 2019).

We observe from the foregoing that Akan has two principal strategies for forming multiples of thousand both of which inherit some properties from **apem** 'thousand'. In one, **apem** is pluralized and compounded with a multiplier, which can be any number up to '999'. In the other, an allomorphic variant of **apem** (**ɔpe**) lexicalizes the general meaning 'thousand' but the sense of multiplicity is left for the multiplier to express, and the multiplier cannot be digital, if it is a numeral. But it can also be any form that expresses potentially indefinite quantity. Hence, Christaller (1875: 51) observes that this formula is used for expressing an indefinite number of thousands and millions.

We can account for these observations in the constructionist framework by positing schemas and sub-schemas to account for the regularities and sub-regularities in *thousands* formation. We assume a constructional schema with two sub-schemas, one each for the two patterns, with their associated meaning specifications forming a hierarchy of types. Each sub-schema is a constructional idiom in which a specific realization of the word for thousand is pre-specified, as shown in (34).

(34) ⟨ [APEM [*a*]$_i$]$_j$ ↔ [1000 x NUM$_i$]$_j$ ⟩

[*mpem* [*a*]$_i$]$_j$ [*ɔpe* [*a*]$_{[Non\text{-}dig]i}$]$_j$

The difference between these two sub-patterns is underscored by the fact that one may participate in some further derivation where the other is either totally excluded or rarely used. As the discussion of examples (31) and (33) shows, it is the constructional idiom [*ɔpe* [x]$_{[Non\text{-}dig]i}$]$_j$ that is employed for the expression of numerals, equal to or greater than one million. On the other hand, **ɔpe** never seems to occur as a base for numerals below *ten thousand*. We may argue, therefore, that reduplicated **ɔpe** (**ɔpepe**) has grammaticalized (or is grammaticalizing) into a form for 'million', being currently employed for expressing any numerical value construed as multiples of million. It is this 'million' sense of **ɔpepe** that can be multiplied by the digital numerals from '2' to '9' in forming multiples of millions up to nine million, as shown in (35).

(35) **ɔpepe** '1 million' **ɔpepensa** '3 million'
ɔpepennu '2 million' **ɔpepemnan** '4 million'
(Christaller 1875: 51)

Also, all instances of millions and their multiples, including billions, cited by Christaller (1875), have reduplicated **ɔpepe** as base, as shown in (36).

(36) **ɔpepe-du** 'ten millions'
ɔpepeha 'hundred millions'
ɔpepepem 'thousand millions, a milliard'
ɔpepepepem 'a billion'
(Christaller 1875: 51)

Finally, when **ɔpepe** is (re-)reduplicated (e.g., **ɔpepepeepee**) it is used for huge numbers of millions, including billions and trillions (sometimes with socio-political slant).[3]

Summary and conclusion

In this paper, we have discussed the construction of Akan complex cardinal numerals, showing that they fall into well-defined groups whose interpretation is mediated by specific arithmetic operations. The basic facts about Akan primary and complex cardinal numerals and the arithmetic operations underpinning their interpretation are summarized in Table 6. It shows that:

[3] In contemporary Ghanaian political discourse, the (re-*)reduplicated form of *ɔpe* 'million' is employed in the ever-present blame-game between politician, where a new government attempts to show how much a predecessor government has borrowed and/or misappropriated, with the magnitude of the amount involved, correlating with the number of times the stem *pe* is reduplicated, as in *ɔpepepeepeepeepee*.

i. Akan has twelve primary numerals – 1-10, 100 and 1000 (Table 1 and 2). All others are complex numerals formed from the twelve primary numerals.
ii. Complex numerals come in the form of compounds or coordinate constructions.
iii. Two arithmetic operations (addition & multiplication) underpin the formation/interpretation of Akan complex cardinal numerals.
iv. The arithmetic operations apply to the formation of well-defined groups of numerals; 11-19 are constructed exclusively through addition (Table 5), multiples of ten (20-90) through multiplication (Table 4), etc.

Table 6. Summary of arithmetic operation and examples of cardinal numerals

Numeral range	**Means of expression**	**Arithmetic operation**	**Example**	
			Number	**Expression**
Primary forms				
1–10, 100, 1000			5	*enum*
Complex forms				
11–19	(PL-)ten + $NUM_{[dig]}$	Addition	15	*duenum*
tens: 20–90	PL-ten x $NUM_{[dig]}$	Multiplication	50	*eduonum*
Between *tens* 21–29, ... 91–99	PL-tens + $NUM_{[dig]}$	Addition	55	*eduenum enum*
Hundreds: 200–900	PL-hundred x $NUM_{[dig]}$	Multiplication	500	*ahaenum*
Thousands: 2000–9000	PL-thousand+$NUM_{[dig]}$	Multiplication	5000	*mpemenum*
tens of thousands 10,000–	• PL-thousand x tens • *ɔpe* + $NUM_{[Nod-dig]}$	Multiplication	50,000	*mpemeduonum*
Million	COMP: *ɔpe* + *apem*	Multiplication	1,000,000	*ɔpepem*
Millions/billions	COMP: *ɔpepe* - (...)	multiplication	Thousands/millions /billions	*ɔpepepeepee*

In this paper, we have attempted to situate our observations in the context of the current state of research on numerals. We find that our observations are generally consistent with what has been found in the literature, although the interpretation of the observed facts differ, depending on the theoretical assumptions underpinning the study. We have shown that Akan complex cardinal numerals share structures with other constructions in the language. Therefore, structurally, they do not differ radically from other constructions in the language. However, they exhibit unique formal and semantic properties that portray them as pairings of particular forms and particular meanings. Thus, we analysed them as constructions and posited constructional schemas to account for individual groups, capturing the common properties of the groups. This study, therefore, has shown how the formation of cardinal numerals, which straddles morphology and syntax may be accounted for straightforwardly in a constructionist framework. An interesting observation we make, which may be studied further, is the lexicalization of the form **ɔpe** for the expression for multiples of thousands in Akan.

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PRODUCTION AND INTERPRETATION OF ACCENTUAL INTONATION TUNES IN L2 ACQUISITION: IMPLICATIONS FOR NIGERIAN SPOKEN ENGLISH ACCENT

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Intonation is one of the most problematic aspects of English prosody for L2 learners. Although studies on Nigerian English (NigE) intonation have claimed that Standard English intonation differs significantly from native Englishes, but the interpretation and production of accentual intonation tunes in L2 acquisition have been inadequately explored. Fifty final-year Nigerian university undergraduates in the Department of English were randomly sampled, and each of the respondents was made to read aloud into a digital voice recorder, and to interpret ten English sentences. Respondents' performance was converted to simple percentages, while the voice production of each of the respondents was elicited from Huckvale's Speech Filing System (SFS). Respondents' frequency of occurrence at the production level showed 134 instances of appropriate use, while inappropriate use amounted to 366 out of 500 expected results of accentual tunes. Performance on sex basis revealed males' and females' appropriate accentuation at 67 instances each and 183 instances of inappropriate accentuation respectively, with both sexes showing no difference in accentual tune use. Findings further revealed that out of 500 expected results for the interpretation of accentual tunes, respondents appropriately interpreted the English sentences in 360 instances, while 140 respondents misinterpreted the English sentences. Though, the results of the respondents revealed some level of competence in the interpretation of accentual tunes, at the production level, respondents unsatisfactorily applied accentual tunes to English expressions. The study recommends that the exposure of L2 learners to digitised non-enculturation materials should be imbibed across private and government-owned institutions across the educational strata.

Keywords: Accentual intonation tune, L2 acquisition, native Englishes, Nigerian spoken English accent, university undergraduates

Introduction

Intonation is a communicative import that helps to determine the product of communication regardless of the lexical or grammatical meaning of the words used. It is a phonological phenomenon used to give different meanings to utterances. Generally, intonation is the rise and fall in pitch of voice during speech production. The fluctuations of pitch patterns in some languages convey synthetic information, although their uses linguistically vary from one language to another. Most important is that the lexical items in any language are usually spoken with a varying pitch. A static pitch in one's voice is not normal in conversation. Therefore, the pitch of the voice is constantly changing. Where there is no such constant change of pitch, the spoken utterance will not only sound monotonous or unintelligible, but one is also sure to be deprived of an important means of expression (Crystal, 1980).

Reviewing works of literature on intonation, it is not difficult to find that most linguists have extensively worked on the functions of intonation, which reveals the important role intonation plays in the communication of meaning. As vital as the knowledge of intonation is to the perception of meaning, this knowledge may not be common among L2 speakers. Observations show that not much attention is given to it, especially at the primary and secondary school levels in Nigerian classrooms. The reasons could be as a result of the fact that it is a suprasegmental feature, its complexity arising from stress, syllable placement, inadequate experts to handle the technicality of the topic, and inadequate facilities such as language laboratories, among others. Commenting on this assertion, Cruttenden (1986, p.181) says "… the literate in any given language tend to know at least something about grammar but little or nothing about intonation". Furthermore, commenting on the correlation between punctuation (as used in grammar) and intonation, Cruttenden (1986) points out that there is a correlation between punctuation and intonation. For instance, a pair of commas will often indicate a parenthesis or a parenthetical type of structure like a non-restrictive relative, and in such a case, the pair of commas will often correlate with the boundaries of a separate intonation group, e.g., Carl Basset, who was expected to win, actually only came second. Intonation is very essential in communication. It determines the meaning the speaker passes along to his or her hearers. Moreover, it betrays the speaker’s attitude and reveals the true intentions of a speaker. Often, this is achieved with the aid of other non-linguistic features, such as facial appearances.

Relatedly, Cruttenden (1986) describes the scope of intonation as prominent syllables, how they are made prominent, and to what extent they are made prominent. It involves how the movement from one syllable to the next is made. Therefore, the importance of intonation, its functions in communicative events, and its uniqueness in the study of language inform the current study. Apart from that, linguists (Aina 2018; Akindele and Oladipupo, 2022) have observed that many L2 users have challenges perceiving and producing the

appropriate intonation tunes in English utterances, and this could have a great comprehension effect. There are two basic intonation tunes (rise and fall) that are used to perform different functions: grammatical, accentual, attitudinal and discourse functions.

A significant number of studies on the English intonation of L2 Nigerian users (see Atoye, 2005; Akinjobi & Oladipupo, 2010; Odeyemi, 2017; Adejuwon, 2019) exist in the literature. For instance, Akinjobi and Oladipupo (2010) examined intonation and attitude in Nigerian English to ascertain the extent to which Nigerian speakers of English use English intonation tunes to express an attitude in line with the Standard English model. The study corroborated existing claims that Nigerian users of English encounter difficulty in appropriately using English intonation, especially attitudinal intonation. While this study focused on the attitudinal function of intonation, the interpretation and production of accentual intonation tunes in L2 acquisition have been sparsely researched. This, therefore, accounts for the essence of this study and its contribution to the body of knowledge on the interpretation and accentuation of intonation tunes among Nigerian L2 learners. For the purpose of clarity, standard English is a variety of English spoken in English-speaking countries and countries that speak English as a Native Language (ENL), such as British English, American English, and Australian English. While this is also referred to as "native English", "non-native English" is a variety of English spoken in countries where English is taught as a second language (L2). For instance, countries like Nigeria, Ghana, and Gambia, to mention just a few, are observed to be L2-speaking countries.

Nigerian English and Nigerian English Phonology

Crystal (2003) remarks that over 300 million people across the globe use English as an official language. In Nigeria, English is not just an official language but a language of wider communication and a second language for the majority of Nigerians. It is also the language of education and a teaching subject in the Nigerian school curriculum. The widespread use of English in Nigeria, along with some linguistic peculiarities, has resulted in Nigerian English (NigE), a variety of English written and spoken in Nigeria. Nigerian English, as defined by Alo (2005, p.16), refers to "a domesticated variety of English, functioning within the Nigerian linguistic and socio-cultural setting as a second language (ESL)". It manifests the linguistic (phonological, syntactic, semantic, pragmatic and socio-cultural) characteristics of the Nigerian environment (social and physical). This NigE variety has been investigated at different linguistic levels—syntax, lexis, discourse-pragmatics, phonetics and phonology—and has been found to be markedly different from the native variety, especially at the phonological level. Investigation into the sound systems of NigE has further shown that the prosodic domain of stress, rhythm, and intonation constitutes a major hurdle for most NigE speakers (Banjo, 1979). In the same vein, Nigerian English phonology has been characterised as being remarkably different from Standard English (SE) form at both segmental and prosodic levels (see Atoye, 1991;

Awonusi, 2004; Akinjobi, 2004; Akindele, 2011, 2018, 2020). The heterogeneous linguistic culture and linguistic diversity of Nigeria have not made the task so easy, especially at the level of phonology. Scholars (Banjo, 1979; Jibril, 1982; Udofot, 2003; Utulu, 2014) have observed that the English spoken by the speakers of these Nigerian languages is often influenced by the phonetic features of their mother tongues. Several linguists (Sunday, 2008; Akinjobi & Akindele, 2016; Aina, 2018) have also commented on the noticeable differences in the accents of the NigE and SBE forms. These variations, apart from the segmental features, have been noticed to be more prominent in intonation. Intonation tune assignment has been claimed to be the most problematic for Nigerian users of English (see Okon, 2001; Akinjobi & Oladipupo, 2005; Oladipupo, 2008).

Review of extant works on intonation in L2 contexts

A significant number of works have explored intonation in diverse L2 contexts. Some notable empirical studies on intonation are conducted among Spanish English speakers (Henriksen, Geeslin & Willis, 2010; Rao, 2016), German L2 speakers of English (Grosser, 1993), Japanese EFL learners (Saito & Saito, 2017), French learners of English (Horgues, 2013), Dutch L2 learners (van Maastricht, Swerts & Krahmer, 2013), Finnish learners of English (Toivanen, 2005), Russian learners of English (Mitrofanova, 2012), Indian English speakers (Puri, 2013), Malaysian learners of English (Yap & Pillai, 2018), Cantonese English speakers (Yiu, 2018), Vietnamese learners of English (Nguyễn & Đào, 2018), South African learners of English (Swerts & Zerbian, 2010), Cameroon English speakers (Ouafeu, 2014), Nigerian learners of English (Atoye, 2005; Akinjobi, 2012; Femi-Olaleye, 2020) among others.

Within the Nigerian context, Atoye (2005) investigated the perception and interpretation of intonation by some Nigerian university undergraduates and discovered that 85.7% of the correct perception of changes in intonation and 25.7% of the correct interpretation of the meanings normally associated with the intonation contours were obtained from the respondents' performance. The study emphasised intensified efforts in the teaching of the social meaning of English intonation to non-native learners rather than the analysis of its phonological structure. Akinjobi (2012) examined how academic competence translates to linguistic performance in Nigerian users of English intonation patterns, particularly postgraduate students of English. The study observed that the academic competence of respondents has little effect on the appropriate assignment of intonation tunes in expressions. Odeyemi (2017) underscored context and discourse intonation in English-medium product advertisements in Nigeria's broadcast media. Taking insights from Brazil's discourse intonation, the study discovered that the allocation of prominence to a word is an advertising model's decision based on context-of-use. In addition, Adejuwon (2019) examined discourse intonation patterns in the non-interrogative utterances of selected educated Nigerian speakers of English. Analysis showed that intonation choices in the

natural speech of the respondents are contrary to discourse intonation as they deviate from the rules of discourse intonation.

Furthermore, Asadu, Okoro and Kadiri (2019) analysed the intonation patterns of selected Nigerian bilingual educated speakers of English with orientations from Pierrehumbert's auto-segmental metrical approach. The analysis showed a low level of proficiency in the use and assignment of accurate patterns of intonation in the speeches of the participants. Olusola (2019) investigated the English intonation patterns in Nigeria's national assembly sessions. Guided by insights from Brazil's Discourse Intonation and Praat as analytical instruments, the study concludes that there is inconsistency in the discourse intonation of Nigerian federal legislators and that legislators are not conscious of the communicative value of English intonation in discourse but are mainly concerned with structural patterns of tone in units. More significantly, Femi-Olaleye (2020) focused on the application of computer-assisted pronunciation instruction (CPI) in the intonation activities of the selected primary school pupils, comparing the performance of the pupils before and after the computer-aided exercise. The post-test result showed that respondents in the experimental group improved in their understanding and use of intonation patterns more than those in the control group. The study suggested frequent alignment with computerised instruction, much more than the traditional way of teaching English intonation. Additionally, Akindele and Oladipupo (2022) used acoustic evidence to examine how 20 bilingual Nigerian English speakers from two universities in south-western Nigeria use intonation as well as the intra- and inter-language challenges they encounter in assigning intonation tunes to varied meanings. Having subjected respondents' production to Praat analysis using the TextGrid annotation, the study discovered that even in situations where different tones are expected, these speakers' utterances tended to use a simple fall tone more frequently. The study submitted that the participants' performances can be explained in terms of the inter- and intra-linguistic influences on their speech, as inter-language variables have to do with how their native tongues affect how they use the English intonation tones.

Although, the foregoing are studies on the intonation of Nigerian users of English, studies on the interpretation and production of accentual intonation tunes among Nigerian speakers of English have been sparsely researched. Therefore, this study investigates the production and interpretation of accentual intonation among university undergraduates who study English as a course. Within the realities of interlanguage development, which concern assessing the proficiency level of L2 learners, this study examines the production and interpretation of accentual intonation tunes by selected L2 learners. It attempts to find out whether or not L2 learners can identify and produce syllables of accented words in the English utterances given. To achieve this goal, the following objectives guide the study:

1. to examine the extent to which L2 learners can appropriately interpret and produce accentual tunes in English sentences;
2. to explore whether or not L2 learners' accentual intonation pattern conforms to Standard English form;
3. to determine the performance of respondents in the accentuation of tunes on the basis of sex;
4. to explain the implication of respondents' performance in the interpretation and production of accentual tunes for the Nigerian spoken English accent.

Methodology

Final-year university students of the Department of English, Osun State University, Nigeria, constituted the participants. Through the survey method of data collection, data were gathered with the consent of the students. Using the random sampling technique, the study sampled fifty students (25 males and 25 females) to serve as respondents. Questionnaires were administered to assess the respondents' knowledge of intonation tune interpretation. Complementarily, to test respondents' knowledge of the usage of accentual intonation, respondents were made to read aloud ten sentences into a speech analysis software (Huckvale's Speech Filing System/WASP) for acoustic analysis. The recorded voices of the participants were later played back by the researchers. The researchers were actively engaged in listening to and rating the recorded production of the respondents. The first rater and principal author is a trained L2 phonologist and phonetician with over a decade of experience in spoken English teaching and training L2 university students. The second author and rater is also a Nigerian L2 speaker and postgraduate student who has been undergoing speech training in L2 learning for over six years. Both raters independently listened to the recordings, and their perceptual results were compared. Aspects of divergence required joint listenership, and further disparity necessitated the intervention of another trained phonologist before a consensus was reached. Tokens of occurrences of appropriate and inappropriate accentuation were generated and converted to simple percentages. The highest number of occurrences of inappropriate accentuation was taken as the emerging trend in participants' use of accentual intonation. The voice productions of the participants were also subjected to acoustic analysis with the use of SFS/WASP to show the pitch track of participants and to ascertain if prominence was articulated on the syllable of the accented word as expected in Standard English form. This helped to know how participants were able to accentuate intonation variations. The productions were analysed using tables to show the statistics of the production of respondents' English intonation patterns. The acoustic analyses were done to corroborate the perceptual/statistical analysis.

Findings and discussion

This section of the study presents findings and discusses the analysed data in statistical and acoustic forms in accordance with the research objectives. It examines the statistical score of the administered and filled-out questionnaires that were returned. The questionnaire contained multiple-choice questions that aimed to test how respondents interpreted intonation tunes.

Table 1: Overall performance of interpreted tunes by the respondents

No of Respondents	No of Items	Potential Scores	Appropriate Interpretation	%	Inappropriate Interpretation	%
50	10	500	360	72%	140	28%

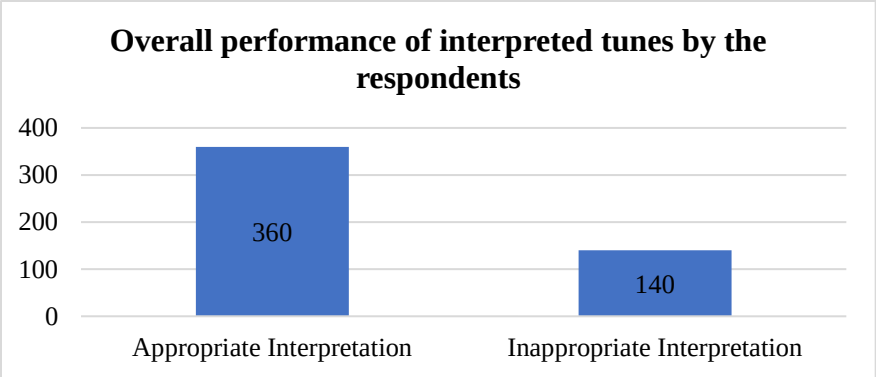

Fig.1: Overall performance of interpreted tunes by the respondents

Table 1 above reveals the overall performance of students in the interpretation of accentual intonation tunes. Out of 500 potential scores, the appropriate interpretation of intonation tunes amounts to 360 instances (72%), while the inappropriate interpretation stands at 140 instances (28%). This implies that respondents proved to have more competency in interpreting accentual tune than in articulating accentual tune in their utterance.

Table 2: Overall performance of accentuated tunes by respondents

Respondents	Items	Expected Use	Appropriate Accentuation	%	Inappropriate Accentuation	%
50	10	500	134	26.8%	366	73.2%

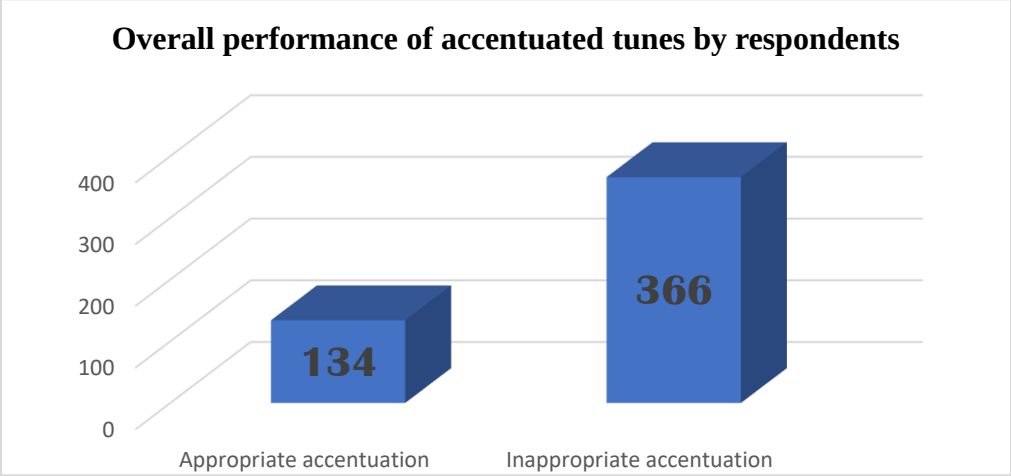

Fig.2: Overall performance of accentuated tunes by respondents

Having transcribed and perceptually evaluated the voice productions of the respondents, the overall statistical assessment of the respondents' voice productions is presented in this section. In Table 2 and Fig.2 above, the statistical report of respondents' performance in tune accentuation is presented. Of the total expected potential use of 500, the number of instances of inappropriate accentuation (366 instances, amounting to 73.2%) outweighs 134 instances of appropriate accentuation (26.8%). Unlike the level of competency demonstrated in interpreting accentual tune appropriately, as revealed in Table 1, respondents appear to struggle with appropriate accentuation of intonation tune.

Table 3: Overall performance on tunes tested for respondents' accentuation and interpretation

Respondents	Items	Expected Use	Appropriate Accentuation	Inappropriate Accentuation	Appropriate Interpretation	Appropriate Interpretation
50	10	500	134 (26.8%)	366 (73.2%)	360 (72%)	140 (28%)

Table 3 above shows the overall performance of the participants. More significantly, Research Objective 1 is addressed in the section. Out of the overall expected production test of 500 overall use, appropriate production use was 134 (26.8%), while inappropriate use was 366 (73.2%). Interpretation of the accented syllables was higher for the participants. Out of 500 expected interpretation use, participants had 360 (72%) instances of appropriate interpretations, while 140 (28%) instances of inappropriate interpretations were recorded. There seems to be an opposite performance rate between production performance and interpretation performance in participants' results. The implication of this

is that participants seem to understand the use of prominence on the accented syllables of the focus expression, but articulating it is problematic. This finding aligns with Atoye (2005), who averred that non-native speakers of English in Nigeria have relatively better perceptual ability than interpretation of intonation tunes. Inference can be drawn that if the interpretation of intonation tune is not well understood by L2 learners, performance in accentuation will be more difficult. Similarly, knowing that accentuation is evaluated in natural spontaneous speech, this study coheres with the submission of Adejuwon (2019) that there is an absence of consistency in educated Nigerian English speakers' intonation choices in spontaneous speech both in interactional and non-interactional contexts.

Table 4: Performance of respondents' accentuated tune on the basis of sex

Respondents	Items	Expected Use	Appropriate Accentuation	%	Inappropriate Accentuation	%
25 Males	10	250	67	13.4%	183	36.6%
25 Females	10	250	67	13.4%	183	36.6%

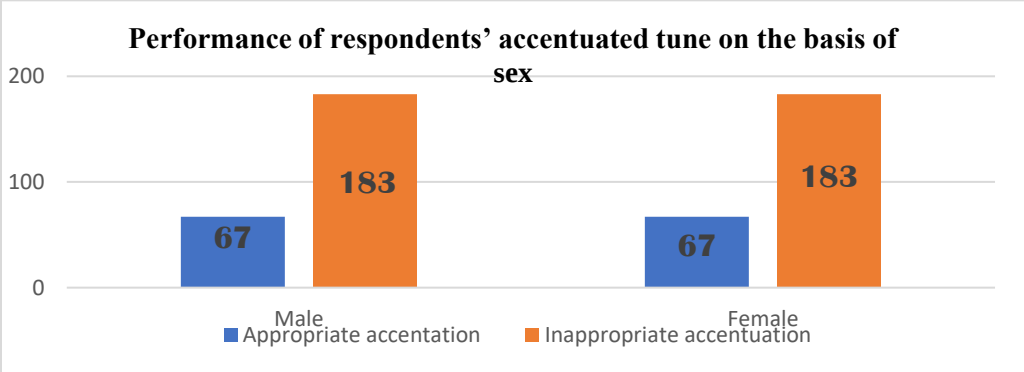

Fig.3: Performance of respondents' accentuated tune on the basis of sex

Table 4 and Fig.3 consider contrasting respondents' performance based on sex, knowing the linguistics-oriented arguments on sex roles and phonological variation. Table 4 shows the performance of respondents on the accentuation of tunes on the basis of sex. In response to Research Objective 3, both sexes perform at the same level: 67 instances (13.4%) of appropriate use and 183 instances (36.6%) of inappropriate accentuation. Both sexes' performance on the accentuation of intonation tunes show the challenge they are embattled with, concerning the accentuation of tunes. Although the result generated in Table 3 is not sufficient enough to take positions on the ongoing debate on sex performance in Nigerian spoken English, some extant studies (Akinjobi & Oladipupo, 2010; Akindele, 2011; Oladipupo & Akinjobi, 2015; Obasi, 2022) have claimed that females tend to be more

accurate in speech articulation than their male counterparts. This could mean that Nigerian female L2 learners are more diligent and focused on learning and practising accentuation during classroom engagements. This, according to Trudgill (1972) and Kunsmann (2000), could mean that females use standard linguistic forms (RP in this case) more frequently than men to mark social prestige.

Following efforts on perceptual assessment of the participants' recorded voices, table 5 is presented to show how respondents accentuate syllables of the focus words. The performance of the participants showed that out of the expected 500 instances, only 174 instances of tunes were appropriately used. The inappropriate use of tunes was higher, with a production use of 326 (65.2%). This seems to be one of the reasons why participants cannot emphasise the focus items in the sentences. Addressing Research Objective 2, there is a fundamental challenge with the use of tunes by L2 participants. Many of them cannot produce the tunes appropriately. This has a great effect on the comprehension of English sentences at both perceptual and production levels. This result corroborates Akinjobi and Oladipupo's (2010) position that non-native speakers are deficient in appropriate accentuation, and this therefore grossly affects their ability to mark attitude with intonation tunes. In the same vein, the result in Table 5 echoes and maintains the view of Asadu, Okoro and Kadiri (2019), who decry the low level of proficiency in the articulatory use and assignment of accurate patterns of intonation by Nigerian speakers of English. In succinct terms, Nigerian L2 users need to be intentional in dedicating time to the development of intonation and communicative skills.

Table 5: Participants' Production/Accentuation Performance

Sentences	**Participants**	**Expected Tune**	**Realised Tunes**	**Accented words**	**Appropriate Accentuation**	**Inappropriate Accentuation**
↓James likes singing juju music.	50	\Fall	18	JAMES	14 (28%)	36 (72%)
I will ↓celebrate Amina if she makes a first-class degree.	50	↓fall/rise↑	12	CElebrate	12 (24%)	38 (76%)
…. while she ↓volunteered to clean the house, she could not complete the task before dinner.	50	↑rise/↓fall	18	VOlunteered	12 (24%)	38 (76%)
Is there going to be an in↑crease in the fuel pump in October?	50	rise↑	20	INcrease	12 (24%)	38 (76%)

Nigeria is a ↓multi-ethnic nation, isn't it↑?	50	↓fall/↑rise	11	MULti-ethnic	11 (22%)	39 (78%)
I wish to become a re↓nowned professor in future.	50	↓fall	22	ReNOWNed	12 (24%)	38 (76%)
Is she ↓wearing a black shirt↑? I mean↓ John	50	rise↑/fall↓	13	WEARing	17 (34%)	33 (66%)
↓Intonation can be problematic for non-native speakers of English	50	↓Fall	20	intoNAtion	20 (40%)	30 (66%)
Regular ↓exercise keeps the body fit.	50	Fall	26	Exercise	12 (24%)	38 (76%)
Do you think regular walk can make a person lose some ↑weight?	50	↑rise	14	REgular	12 (24%)	38 (76%)
Total	**500**		**174 (34.8%)**	**326 (65.2%)**	**134 (26.8%)**	**366 (73.2%)**

Acoustic analysis

The perceptual/statistical analysis of the data shows that the inappropriate realisation of accentual intonation tune (73.2%) in the production of respondents outweighs instances of appropriate realisations (26.8%). Corroborating this discovery, the spectrograms below provide a graphic representation of respondents' production in two categories: the near-accurate and the total deviant. This establishes the findings in the analysis that there were both appropriate and inappropriate instances of accentual tune in respondents' utterances. In the charts below, "InA" stands for "Inappropriate Accentuation" while "NaA" signifies "Near-accurate Accentuation".

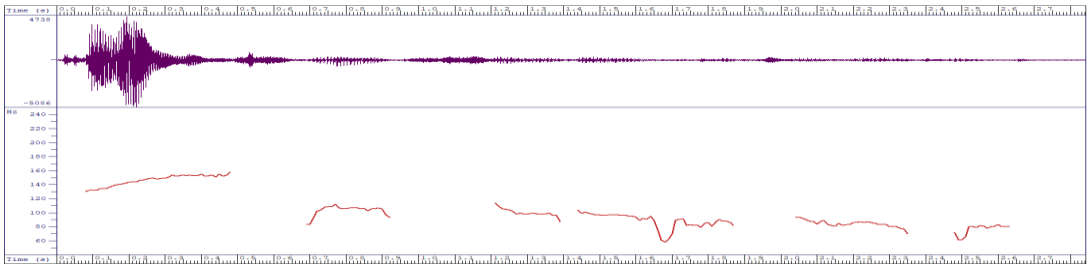

Fig. 4: InA - //James likes singing Juju music//

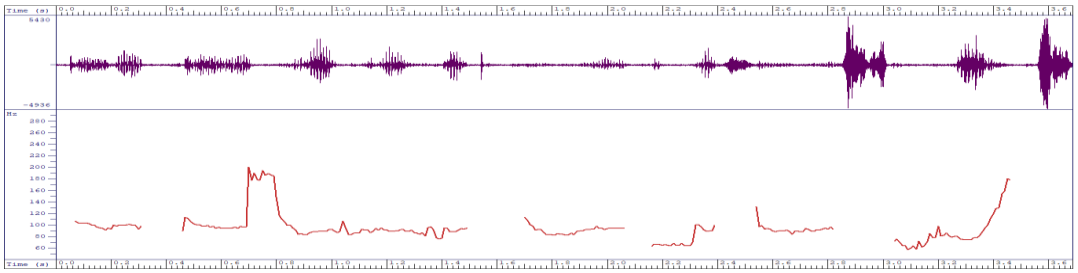

Fig. 5: NaA - //James likes singing Juju music//

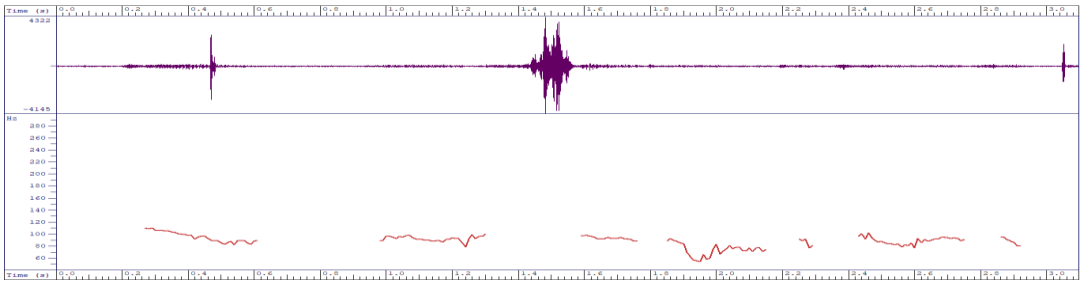

Fig.6: 'InA' - //Do you think regular work can make a person lose some weight?//

The test item "James likes singing Juju music" is a declarative sentence providing information. According to the rules of intonation tunes, it is an instance of a "fall tune". Fig.4 is presented as an instance of inaccurate accentuation. It does not convincingly show the first tone unit, "James" being accented to rise above other tone units, and to orchestrate the fall or downward glide of pitch on other tone units. Each of the tone units maintains equal modulation, which does not represent a fall tune. While the pitch contour in Fig.4 marks a departure from the rules of English intonation, Fig.5 shows near conformity to the SBE intonation. As required, the pitch rises on the accented first tone unit "James" and falls gradually onto the last tone unit "music".

The test item "Do you think regular exercise can make a person lose some weight?" is a question that exemplifies the rising tune. In the above charts. Fig.6 marks an instance of an inappropriate accentual tune. As shown in the pitch contour, the rising of the pitch should have climaxed at the last tone unit "weight", but on the contrary, the pitch falls on it. However, Fig.7 marks contrariwise and shows near-accurate accentuation of the test item. To mark an instance of rising tune, pitch contour shows modulation as the pitch rises on "re", the accented syllable in the first tone unit and climaxes at the final tone unit "weight".

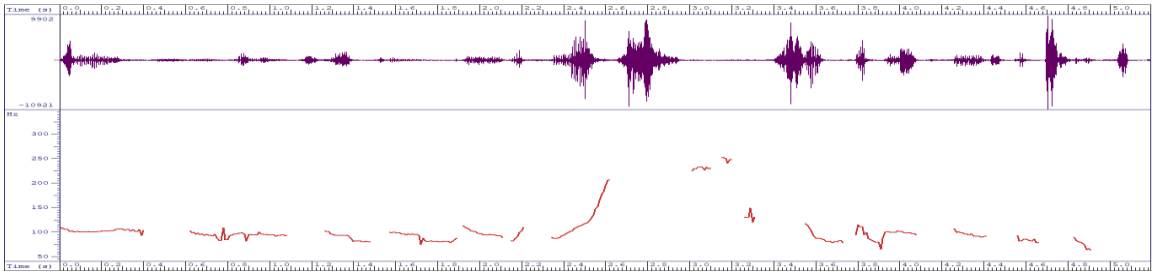

Fig.7: ‘NaA’ -//Do you think regular work can make a person lose some weight?//

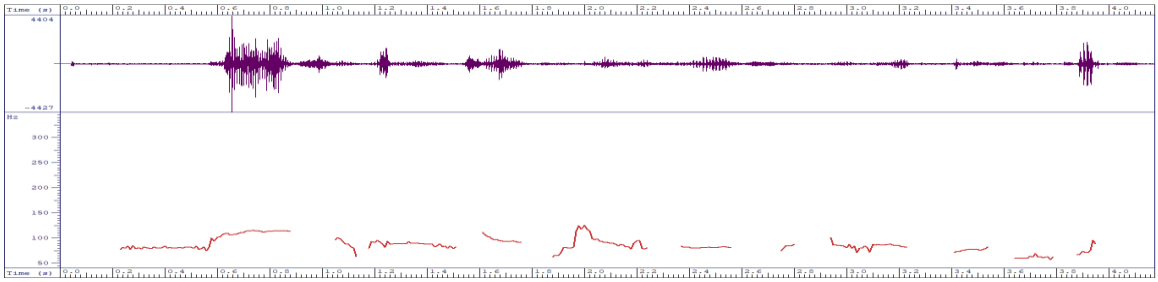

Fig.8:‘InA’://While she volunteered to clean the house she could not finish the task//

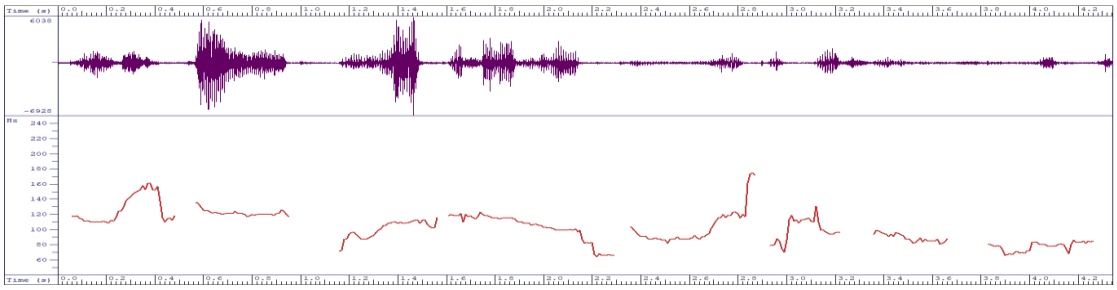

Fig.9: ‘NaA’ -//While she volunteered to clean the house, she could not finish the task//

Furthermore, the test item "while she volunteered to clean the house, she could not finish the task" is a complex sentence expected to be accentuated in the rise-fall intonation tune. While Fig.8 shows near accurate production, Fig.9 shows deviation. As captured in the pitch contour of Fig.9, the pitch modulation does not indicate the accented word that should have triggered a rise in tune. Conversely, the pitch rises on the last word in the first dependent clause "house", and falls on the first word of the main clause "she". Although

Fig.8 does not perfectly conform to the SBE rules of intonation, it instantiates near-accurate accentuation where the pitch should have risen on "VO" in volunteer, the first syllable of the first tone unit. Based on the explanation offered on these spectrograms, accentual intonation is considered problematic for Nigerian non-native users of English, specifically university undergraduates considered in this study, although very few of them seem to have a fairly good understanding of the application of English intonation rules. This has been earlier observed by Amayo (1981) and later attested by Akindele and Oladipupo (2022), who take the position that, within the phonological realities of Nigerian English bilinguals, intonation continues to be difficult for them to articulate both in conscious and spontaneous speech activities unless attention is paid to non-enculturation sources and technology-driven models to stimulate speech production and learning in L2 context (Adesanya, 2021; Akindele & Oladipupo, 2022).

Conclusion and Recommendations

Respondents' frequency of occurrence at the production level showed appropriate use amounting to 134 instances (26.8%), while inappropriate use was 366 (73.2%) out of 500 expected results of accentual tunes. Out of 500 expected interpretation use, participants had 360 instances of appropriate interpretation (72%), while 140 (28%) inappropriate interpretations were recorded. There seems to be an opposite relationship between production performance and interpretation performance results. Though the results of respondents revealed competence in the interpretation of accentual intonation tunes (72%), at the production level, respondents did not apply accentual tunes (26.8%) to English expressions. To corroborate the perceptual analysis, spectrograms showed the pitch contours of some respondents' production. The pitch modulation expected on the focus syllable of the accented word was not applied by participants, as observed from the acoustic /instrumental analysis. The implication of this is that participants seem to understand the use of prominence on the accented syllable of the focus items in the given sentences, but articulating the accented syllables was problematic. It also reinforces existing positions that the Nigerian spoken English accent differs significantly from native English and should be described as the outer circle English. Also, the performance of production on sex basis revealed males' and females' appropriate use at 67 (13.4%) each and inappropriate use at 183 (36.6%). Although very rare, findings showed that both males and females showed no difference in accentual tune use at the production level.

There is a significant difference in the production and interpretation of accentual intonation tunes among L2 learners, as affirmed by the results. Results also confirm that L2 acquisition in accentual intonation tunes tilts towards excellent performance in the written interpretation of accentual tunes. However, at the production level, where respondents are expected to produce the accented syllables in the English sentences given, the respondents had a very low performance (26.8%). This has some pedagogical implications for L2

acquisition, as demanded in Research Objective 4. It implies that at the pedagogical level, a gap exists between L2 competence on the subject matter and reality. This implies that there is a gap between the application of classroom knowledge and the actual production of this knowledge, especially because L2 is learned within the classroom setting. This is in response to Research Objective 2, which states that L2 learners' accentual intonation pattern differs from the SBE form. Also, many of the L2 learners are from tone language backgrounds. The phenomenon of interference or negative transfer in L2 learning at the phonetic and phonological levels plays out, especially when L2 learners are made to produce some English sounds that cannot be found in the sound system of their native language. This aptly captures the position of Tench (1996) that intonation is put to limited use by tonal languages, unlike its elaborate use in stressed-timed languages like English. This also corresponds with the submission of Mohamad, Hanafi and Dako (2021) that mother tongue influence is responsible for the disparity in most L2 learners' production of some English sounds. On this basis, the linguistic background of L2 learners influences NigE accentuation.

The core areas of the English prosody of stress and intonation should be introduced to L2 learners as early as possible. Some elite institutions in Nigeria currently expose some L2 learners to native English accents through non-enculturation sources (Akinjobi, 2013; Adesanya, 2021), such as video tapes, cable networks where native English accents are domiciled (cartoon networks), and materials from native accents in spoken English classes. This exposure should also be emulated and inculcated by government-owned institutions across the educational strata. Adequate provisions should be made by institutions for efficient and effective digital language laboratory drills. Comprehension is very important in speech utterances. When communication is distorted, intelligibility problems set in. Therefore, in L2 acquisition, the pedagogical target should be geared towards proper spoken English drills at the perceptual and production levels. This will eventually help to improve spoken English that is locally, nationally, and internationally intelligible.

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PRODUCTION AND INTERPRETATION OF ACCENTUAL INTONATION TUNES IN L2 ACQUISITION: IMPLICATIONS FOR NIGERIAN SPOKEN ENGLISH ACCENT

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