

- Ngum, C. (2004). Verbal extensions in Meta'. Maîtrise Dissertation. University of Yaounde 1.
- Tamanji, P. (2009). *A descriptive grammar of Bafut*. Cologne: Rüdiger Köppe Verlag.
- Tamanji, P. & G. Mba (2003). A morphological study of verbal extensions in Bafut. in Idiata, Daniel Franck & Gabriel Mba (eds). *Studies on voice through verbal extensions in nine Bantu languages spoken in Cameroon, Gabon, DRC, and Rwanda*. Munich: Lincom Europa.

Phonological Explication of Anaañ Tongue Twisters¹

Itoro Michael

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

1. Introduction

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

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

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

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

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

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

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

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

The objectives of this paper therefore are to:

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

1.2 Relevant Scholarship on Tongue twisters

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

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

1. Iyan mu ire, iyan ro ire ru

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

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

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

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

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

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

2. Theoretical Approach

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

2

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

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

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

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

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

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

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

3. Method

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

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

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

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

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

3.1. Data Presentation

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

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

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

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

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

A crafty person cannot cheat another crafty man.

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

You earn as you work.

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

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

4. Analysis of the Data on Anaañ Tongue twisters

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

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

4.1 Phonological Explication of Anaañ Tongue twisters

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

4.1.1 Vowel Alteration

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

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

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

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

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

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

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

9. /úkeèd àdʒlɔ lɔià èdià úduá/ (èdià úduá èdià úduá èdià úduá). 'We all eat yams from the market'.

/úkeèd àdʒlɔ lɔià èdià úduá/ [èdià úduá, úduá úduá, úduá úduá úduá]
[èdià èdià, údià údià údià, údià údià]
[èdià èdià, èdià èdià, èdià èdià]
[údià údià, údià údià, údià údià]

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

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

4.1.2 Sound change/Segment replacement

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

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

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

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

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

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

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

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

This phrase manifests phonetically in three different ways:

i. /lmúk ékpé kpòkkò úbòk lsòŋ/ /a/ → [Ø]
ii. /émúk ékpéékpékkéebòk lsòŋ/ /i, u/ → [e], /ɔ/ → [e]
iii. /lmúk íkpé íkpikke íbòklsòŋ/ /e, a, u/ → [i], /ɔ/ → [i]

The data in (11) is a good example of changes involving vowel sounds. The data shows that /i/ is replaced with [e], while /ɔ/ is replaced

with [e] in (ii). In (iii), /e/ is replaced with [i], and /o/ is replaced with [i]. The rationale for the changes are for the purpose of ease of articulation, to maximize speed and preserve energy. The data in (10 & 11) are good illustrations of segment replacement involving vowels. In what follows, we shall draw examples from another data to reflect changes in sounds as they affect Anaañ consonants using the examples in (12).

12. Ákók á!tón ájùppó ákòk àtón, ákók á!tón ájùppó ñsúkàràrà.
'A man who hates his own brothers'.

The example in (12) shows a repetition of the initial segment in all the words except the last one. There are cases of segment replacement in the course of producing each of these phrases in fast and repeated speech. This is illustrated in (13).

13.
i. /ákòk á!tón ájùppó ákòk àtón, ákók á!tón ájùppó ñsúkàràrà/
ii. /ákòk á!tón ájùkkó ákòk àtón, ákók á!tón ájùkkó ñsúkàràrà/ /pp/ → [kk]
iii. /átòk á!tón ájùttó átòk àtón, átòk á!tón ájùttó ñsútàtàrà/
/k/ → [t], /pp/ → [tt], /r/ → [t]
iv. /akón á!tón ájùttó ákon àtón, ákón á!tón ájùttó ñtútàtàrà/
v. /o/ → [o], /k/ → [n], /s/ → [t]

In (ii), /pp/ in the third word is replaced with [kk]. In trying to move from one word to the other, there is a jump of the original segment into a following or preceding adjacent word, which triggers a change in the phonetic form of the words.

The tongue tries to move from /pp/ to the next consonant /k/, but one sound is displaced and replaced with a phonetically similar consonant to the right for ease of pronunciation and economy of energy/time. This replacement cuts across /pp, k, r, s/, which manifest as [kk, t, t, tt] respectively.

4.1.3 Assimilation

Assimilation is a process where segments are modified to accommodate the feature specifications of adjacent or distant segments (Fromkin 1971). It is a phenomenon where sounds look more alike in the course of pronunciation or analysis. Segments in words when produced in isolation are different from those produced in a stretch of speech. Sounds kept changing to accommodate features of adjacent segments. Let us consider the four examples in (14).

14. i. Mkpá!nuún Mkpá!nuún kàppá dük ùfién kàppá dük ùdóm.
'Confusion, confusion, confusion'.
ii. Mkpùtātāppá tēppá jòhò èkpāñ. 'Touch anybody that comes your way'.
iii. Mmótò mbàkalá átò jén mbàkalá k'úsùñmbàkalá ágwòd.
'White man's car hits white man's child on a white man's road and killed'.
iv. /ákpòñ ísídàkkáké íkpòñ ákpòñ, ákpòñ ákpédàkká ákpòñ àkpòñ, ákpòñ ákpá/

'A namesake cannot be separated from his namesake, if a namesake is separated from his namesake, the namesake will die'.

The production of each of these examples in fast speed shows the manifestation of different forms of consonant assimilation at different positions of the words in a sequence as illustrated in (15-17)

15. /m̀kpá!nuún m̀kpá!nuún kàppádük ùfién kàppá dük ùdóm/
The phoneme /kp/ which occurs at the medial position of the words, interacts with the velar and bilabial stops in a sequence, so that the segments, when produced in repeated/fast speech manifest differently as presented in (ii-iv).
i. m̀kpá!nuún m̀kpá!nuún kàkpá dük ùfién kàkpá dük ùdóm/
/pp/ → [kp]
ii. /m̀kpá!nuún M̀kpá!nuún kpàkká dük ùfién kpàkká dük ùdóm/
/pp/ → [kk]
iii. /m̀kpá!nuún M̀kpá!nuún kpàkpá dük ùfién kpàkpá dük ùdóm/
/k/ → [kp]

The initial segment /m/, in the first two words is not affected by this alteration. The changes affect the velar and the bilabial stop segments only. This is also the case with /m/ in the following data.

16.
i. /m̀kpùtāatāppá tēppá d̥ʒòwò èkpāñ/
ii. /m̀kpùukpàakpàkpá kpàkpá d̥ʒòwò èkpāñ/ /t/, /pp/ → [kp]
iii. /m̀kpùtāatākká tēkká d̥ʒòwò èkpāñ/ /pp/ → [kk]

The sounds /t, pp, / assimilate the distant consonant /kk, kp, / as shown:
/pp/ → [kk] ~ [kp]; /t/ → [kp]
Let us consider the example in (17).

17. i. /ákpòñ ísídàkkáké íkpòñ ákpòñ, ákpòñ ákpédàkká ákpòñ ákpòñ, ákpòñ ákpá/

The repetition of these sentences contributes to the assimilation of alternate phonemes in the same position. The segments that are highly affected are the alveolar and velar segments. /kp/, which occurs at the medial position of the first word, spreads to assimilate the second word at the same phonetic environment. This occurs in all the words, for ease of pronunciation as seen in 17(ii & iii)

- ii. /ákpòŋ íkpídàkkáké íkpòŋ ákpòŋ, ákpòŋ ákpédàkkà ákpòŋ ákpòŋ, ákpòŋ ákpá/
 iii. /ákpòŋ íkpíkàkkáképé íkpòŋ ákpòŋ, ákpòŋ ákpékpàkkà ákpòŋ ákpòŋ, ákpòŋ ákpá/ /s, d, k/ → [kp]
 /s/ → [kp]
 /d/ → [kp]
 /k/ → [kp]

Observe that since the word in the sequence all have similar initial segments, it blocks all forms of assimilation at this position. At the same time, where the medial segments in the word sequence all have the same phonetic sound, such sounds remain unaltered. This therefore confirms the assumption that alternate segments trigger assimilation faster than phonetically similar segments in all positions Sardat et al (1994). In what follows, we shall consider changes that occur in words with assonance.

4.1.4 Reduplication/Repetition

Repetition here involves the reduplication of segments across word boundary, thereby making the tongue to get jumbled up and leading to the doubling of the words in a sequence. This is illustrated with the data in (18-20).

18. i. /ámá ágwò ánáám ágwò/ 'It is a friend that betrays his best friend'.
 ii. /ámán ágwò ámán ágwò/
 iii. /ánám ágwò ánáám ágwò/
 iv. /ámá ágwò áamá ágwò/
 v. /ánán ágwò ánán ágwò/

Repetition in (18) does not trigger any change in the vowels at the word initial position, rather it affects only the nasal consonants, which manifests in a form of word play, where /n/ is replaced with [m] and vice versa so that /ánám/ → [ámán],

$C_1C_2 \rightarrow C_2C_1$
 /n/ → [m], /m/ → /n/

There is an interchange between /n/ & /m/, which in turn results in the change of the meaning of the sentence in (ii-v) as illustrated below:

/amá/ 'lover', becomes [ánám, anán, ánáam] 'meaningless'
 /ánám/ 'cause' becomes [ámán, ánan, áamá] 'meaningless'

The interchange gives room to word reduplication in (18 ii-v).

Anaañ is an agglutinating language that combines many word forms into a single word. In this case, speakers are constrained to how to produce what. All nouns begin with a vowel or syllabic nasal, while verbs take on syllabic prefix. This, in essence makes Anaañ have lexical items with word initial syllabic segments. Therefore, jumping from word final consonant to the vowel of a following word looks time consuming and causes confusion in illustrated with words in (examples 20-21), using the data in (19).

19. i. Afia áfòn áfòn áfòn áfiòñ. 'White material is good for moonlight outfit'.
 ii. Ámáámáná, át' ámámáná, mímáámáná mímáánámámáná 'Before Abraham I was'.
 iii. Ámáánèn ábòhò, ànéénèn ákéénéùlén. 'When you are too rigid, you die in your rigid way'.
 iv. Íchíp útùd úbiòm úfòk ànné. 'The palm kernel in my grandmother's kitchen'.
 v. Íkòròsl àdè íkòròsl íkòròsl íkànná íkòròsl. 'All motor cycles have the same quality'.
 vi. Úkéèd àjìd ldiàèdià úduá (èdià úduáèdià úduá èdià úduá). 'We all eat yams from the market'.

20.

- i. /afia áfòn áfòn áfòn áfiòñ/
 ii. /afiòñ áfiòñ áfiòñ áfiòñ áfiòñ/
 iii. /afòn áfòn áfòn áfòn áfòn/
 iv. /afòn áfòn áfònáfòn áfiòñ/
 v. /afion áfiòn áfiòn áfiòn áfiòn/

In these twisters, one could not make a distinction in meaning between one word and the next because of the continuous repetition of words in the sequence. The subtle changes in pronunciation trigger reduplication in (ii-v). Alteration here therefore involves a high rate of error. Observe also that there is an aspect of vowel reduction, where the diphthong in /afia & áfiòñ/ is reduced to pure vowel without any trigger. This is not the case in examples in (21 a - c).

21. a. i. /íkòròsl àdè íkòròsl; íkòròsl íkànná íkòròsl/
 ii. /íkòròs íkòròsl íkòròsl íkòsi íkòròsl/

- b. i. /Ámá ànèn ábòwò, ànéenèn ákèenè Unén/
 ii. /Ámánèn ànéenèn ànéenèn Unén/
 c. i. /Ámàámàná, àt' àmámàná, mímàámàná mímàaná mímàná/
 ii. /Ámàámàná, amámámàná, mímàámàná mímàaná mímàná/

The data presented make use of a combination of repetition and rhyme. There is a rapid alternation between similar but distinct phonemes so that the distinct phonemes are dropped and replaced with similar phonemes in (ii). The twisters here rely on two or more sequences of sounds that require the repositioning of the tongue between sounds, then the same sounds are repeated in a different sequence.

One can therefore say that words with similar initial phonemes pose problem of pronunciation when there is a shift to adjacent words with alternating segments. The reader therefore tends to pronounce the similar words repeatedly and eliminate the non-similar sequences. As observed earlier, the repetitions produce results that are humorous, when they are mispronounced, while others simply rely on the confusion and the mistakes of the speaker for their amusement value.

4.1.5 Shortening/deletion

Word repetition triggers word shortening and segment deletion. For instance, /íkòròsì/ is shortened to /íkòsi/ in (23a). The forms /ade/ & /ikanna/ are deleted rather than being shortened. In the process of shortening the word, the penultimate syllable /ro/ gets deleted. The diphthongs /ia, iò/ in example (21 above) are shortened to pure vowels in (22 ii & iii).

- i. /afia áfiòŋ áfòn áfòŋ áfiòŋ/
 ii. /afòŋ áfòŋ áfòŋ áfòŋ áfòŋ/
 iii. /afòn áfòŋ áfòn áfòn áfiòŋ/
 /afia áfiòŋ/ → [áfòŋ áfòŋ].

23. i. /ímúk ékpè ákpòkkó úbòk Ìsòŋ/ 'a stunted person'.
 ii. /ímúk ékpè kpòkk úbòk Ìsòŋ

Apart from syllables and words, initial and final segments always stand the risk of being deleted in the context of tongue twisters. In the examples in (23), the initial and final segments /a, & w/ in /ákpòkkó/ is deleted as represented here /ímúk ékpè kpòkk úbòk Ìsòŋ/. This same process cuts across the data in (14 above), repeated here as (24).

24. Ágwó ágwòk éwòk ísíwòkkò ñgwòk. 'You cannot be talking (boasting) while swimming'.

/ágwó ágwòk égwòk ísígwòkkò ñgwòk/ →
 [ágwó ágwòk agwòk ísígwòkkò gwòk]
 [ágwòwò ágwòwòágwò ísígwòkkò ñgwòk]

The syllabic nasal is deleted and the slot is replaced with a vocalic segment so that we have

[ágwó ágwò agwòk ísígwòkkò agwòk].

In another instance, /k/ is deleted in [ágwòwò ágwòwòágwò ísígwòkkò ñgwòk].

This process cuts across almost all the data. What is worth knowing is that deletion here does not respect the conditioning factors as specified in the phonology of Anaañ (Udoh 1998).

4.1.6 Weight reduction

Segment deletion most of the time, results in weight reduction of the affected syllable in the word. In Anaañ, as well as other Lower Cross languages, a CVC or CVV syllable structure counts as a heavy unit, while V or CV structure counts as light syllable (Udoh 1998). Let us consider the example repeated as (25).

25. mīkpūtātāppá tāppá dzówò èkpán. 'Touch anybody that comes your way'.

- i. /mīkpūtātāppá tāppá dzówò èkpán/
 ii. /mīkpūukpāakpākpá kpākpá dzówò èkpán/ /t/, /pp/ → [kp]
 iii. /mīkpūtātākká tākka dzówò èkpán/ /pp/ → [kk]

There is the reduction of the weight unit of the fourth and sixth syllables, when the coda of the syllable is released to open the initial syllable in /tap/. /p/ is deleted without any replacement. This deletion follows the displacement of the following /p/, which forms a part of the following syllable. The second /p/ has to go since the two segments were true geminates, rather than being altered by any phonological or morphological process. True geminates must obey the principle of inalterability, which constrained the alteration of one part of the geminate by any phonological process. Therefore /pp/ is deleted and replaced with /kp/.

iv. /mīkpū-tāa- tāap- pá tāap- pá/ →

[mīkpūu-kpāa- kpā- kpākpā-kpā]

N-CVV-CVV-CVC-CV CVC-CV

→ N-CVV-CVV-CV -

CV CV-CV

The weight unit of the penultimate syllable of the first word and the initial syllable of the following word have been reduced from a heavy [CVC] to a light [CV] syllable structure.

4.1.7 Tonal Rhythm

The rhythm of words in a sentence is determined by the tonal melody Carrot et al(2006). Tongue twisters actually evolve around segment interaction error (Hahn & Bailey 2005), where segments interchange by perseverating or anticipating another segment within a word or elsewhere. The error does not affect the tonal melody of the token.

26. Abòm ùhàn ùbòk ùfòk ùkòd. (Breaking the wash hand basin of the in-law).

/abòm uʃàn ubók ufók ukód/

/əbòm əʃàn əbók əfók ukód/

/ʊbòm ʊʃàn ʊʃàn ʊʃàn ukód/

/əbòm abòm uʃàn uʃàn ukód/

Although there is an alteration of the segments in the sequence, the tonal structure remains unaltered because tone is a property of a syllable. This is to say that tone is used for the production of a syllable rather than a segment. Therefore, in as much as the syllable structure of the data is not altered, the tones will remain unaltered. In other words, when segments are altered, the tone remains unaltered. This confirms the assertion that tone has an autonomous feature of stability, where the deletion of a segment within a syllable may not affect the existence of the tone as represented in (22 repeated here as 27).

27.

i. /áfíà áfòh áfón áfòh áfíòh/ [LH, HL, HH, LL, HL]

ii. /áfíòh áfíòh áfíòh áfíòh áfíòh/ [LH, HL, HH, LL, HL]

iii. /áfòh áfòh áfón áfòh áfòh/ [LH, HL, HH, LL, HL]

iv. /áfón áfòh áfón áfòh áfíòh/ [LH, HL, HH, LL, HL]

v. /áfíòh áfíòh áfíòh áfíòh áfíòh/ [LH, HL, HH, LL, HL]

Despite the confusion or exchange of word/segment positions, the tonal melody remains unaltered. This therefore shows that tongue twisters are perfect instrument for the teaching/learning of tones. It should be noted that, the rhythm of the tone is created by the structure of the syllable. The rhythm is a combination of V-CV(C) (vowel, consonant-vowel) syllable

pattern. This is illustrated in (example 28), where [H] represents a high tone, [L] low tone, while [-] is a syllable boundary.

28. Akádá nkádá íhinné úbòk ké èkpád akádá nkádá.
'A crafty person cannot cheat another crafty man'.

i. /à-ká-dáj-ká-dá í-ʃín-né ú-bók kéèkpád akádá nkádá/
V-CV-CV N-CV-CV V-CVC-CV V-CVC CV V-CVC V-CV-CV N-CV-CV

L H H H H H H H H L L L H H H H H
/à-ká-dáa - ń ká-dá- in -néú -úbók kéèkpád akádá nkádá/

ii. /akádá akádá íʃinné úbók kéèkpád akádá akádá/
L H H H H H H H H L L L L H H H H H

There is no monosyllabic word in (28), except for 'ke', which marks location. The locative marker does not exist independently in fast speech. The /e/ is always deleted, while the consonant moves to the following syllable to form a CV structure. The rhythm in each of the words is disyllabic, with a combination of two-three level tones. The number of the syllable determines the number of tones, since tone is said to be a property of the syllable.

4.1.8 Metathesis

Metathesis is a phonological process that involves the exchange of positions of segments within a word. There is a case of metathesis, which involves the restructuring of the segments within a word. Example,

29. /ètim itàm átámmá itim akétém ntem/ (rhyme)

/etim atamma itim aketem ntem/ → [etim atamma itim aketem mten]
/ntem/ → [mten]
/1 2 3 4/ → [4 2 3 1]

The structure shows that there is a kind of exchange of positions in such a way that the initial segment shifts to the final position and vice versa. This process is very rare in Anaañ tongue twisters owing to the fact that Anaañ has restricted numbers of permissible segments at the coda position of the syllable or word final position. This makes most words end with a vowel. Such slips could also occur in the speech form of Anaañ learners of English in a word such as 'slippers'.

30. /slip-/ → [silp-]
/1 2 3 4/ → [1 3 2 4]

There is an interchange between /sli/ and /sil/. The segment /l/, which occurs after /s/, moves to the third position, while /i/ moves to the second position of the segment to produce 'silppers'.

From the analysis presented, it has been seen that, segment alteration occurs with increased speed in speech repetition. Although the alterations occur in form of slips, there is a high level of comprehension and communication by the interlocutors when dealing with tongue twisters.

The repetition effects in fast speech, always result in moving from meaningful to meaningless words/phrases or sentences. For instance, in the examples on the repeated forms in the data, meaning is lost in all the words owing to certain alterations. An observation of the data shows that it was difficult for participants to produce tokens with alternating segments in repeated and fast speech. This therefore resulted in various forms of sound change, slips, errors and confused segments.

Tongue twisters could induce different kinds of alternate segments, where vowels are replaced with consonants and vice versa. Switching from one segment to the other across word boundaries take more effort and time, and therefore triggers segment deletion, segment shortening, metathesis, assimilation, segment replacement, and a restructuring of the syllable structure. This, in essence shows that there is an interaction between segments that occur at word boundary in tongue twisting activities.

As observed earlier, tongue twisters effects manifest at phonetic and phonological levels in speech, leading to a form of slip in speech production. The quality of slips is influenced by the speed in the speech. The positions of the segments also affect pronunciation. Interaction between segments and word positions show that reversing the pairs is more confusable than repeating the whole phrase with the same order across pairs. This phenomenon is central to sounds rather than words. However, tongue twisters lines could be represented on print and electronic materials, for the purpose of documentation, to make it readable by a wider research community and preserve the genre from extinction.

5. Conclusion

In conclusion, tongue twisters evolve around segment arrangement, sounds repetition, adjacency, and the state of the mind of the speaker. The strange and unusual selection and arrangement of sounds in tongue twisters make it more entertaining because listeners make fun from the errors emitted in tongue twisters, whereas errors are not tolerated in normal speech.

When certain combinations of sounds are produced quickly, speakers tend to lose control of their articulators and jump from one sound to another. The production process requires planning on how to cascade from the mental/phonological planning stage to the actual articulation, which entails how to combine the articulators with the manner in which the speech producing mechanism operates. Therefore when certain confused sounds are arranged in a sequence, the speaker will have to adjust the articulators to accommodate the articulation of the sound in the sequence, which is time consuming, energy sapping and cumbersome. Speakers rather tend to adjust towards sounds that are produced with ease.

When the articulation process is repeated, speakers also try to avoid difficult sounds in the sequence and replace such difficult sounds with a simpler one. Therefore, when tokens are repeated, adjacent sounds become merged, changed, deleted or replaced in the course of speech production.

On the whole, this phenomenon does not occur on word list twisters but on sentence/phrase twisters. Tongue twisters processes involve cascading from planning process to actual articulation. One can therefore conclude that the phenomenon centres on wrapping of the articulators in speech production performance. An experimental analysis on the Anaañ tongue twisters should be carried out in subsequent research to unravel more information on the trigger and effects of tongue twisters. This paper serves as the basis for the understanding of the interface between language rhyme, game and linguistics.

End notes

¹This paper is a part of an on-going larger research on Anaañ folklore. The paper has three phases. The second and third phases are still at the preparatory stage. We are grateful to all contributors especially, the respondents who provided the data that were extracted and used for this work.

The word 'tongue twisters' is used in its singular form in this work. Therefore it takes a singular verb marker.

Our thanks also go to Prof. Uwemeidmo Iwoketok, who laid the foundation of oral literature in the Department of Linguistics and Nigerian languages, University of Uyo.

References

- Albert, P. (2000). Detection of errors during speech production: A review of monitoring models [REVIEW]. *Cognition*, 77, 2, 31-39.

- Anderson, N. S. (1960). Poststimulus cuing in immediate memory. *Journal of Psychology*, 60, 216-226.
- Bard, E.G., Anderson, A. H., Sitallo, C., Aylett, M. Doherty-Sneddon, G. & A. Newlands (2000). Controlling the intelligibility of referring expressions in dialogue. *Journal of memory and language*, 42, 1-22.
- Best, W. (1996). When requests are basket but baskets are biscuits, where do the words come from? A single case study of error paraphasic errors in aphasia. *Cognitive neuropsychology*, 13, 443-480.
- Blunken, G. (1998). Lexicalization in speech production: Evidence from form-related word aphasia. *Cognitive neuropsychology*, 15, 321-360.
- Carrot, K., C. Au, & Harper, A. (2010). Prosodic structure and tongue twisters. In Cécile, F., Babara, K., Mariapaolo, I. & Nathalie, V. (Eds.), *Laboratory phonology 10*, Pp 433-461. Berlin & New York: Mouton de Gruyter.
- Dell, G. S. & Rapka R. J. (1992). Errors in inner speech. In Boars, B. J. (Ed.), *Experimental slips in human error: Exploring the architecture of volition*, Pp 236-262. New York: Plenum Press.
- Dell, G. (1994). The sequential cuing effect in speech production. *Cognition* 53, 91-127.
- Dell, G. & P. A. Reich (1981). Stages in sentence production. An analysis of speech error data. *Journal of verbal learning and verbal behaviour*, 20, 611-629.
- Dell, G. & P. G. O'Seaghdha (1991). Mediated and convergent lexical priming in language production. A comment on Levelt et al 1991. *Psychology review*, 604-614.
- Dell, G. S. (1986). Spreading activation theory of retrieval in sentence production. *Psychology review*, 93, 283-312.
- Fricsh, S. A. & R. Wright (2002). The phonetics of phonological speech errors. An acoustic analysis of slips of the tongue. *Journal of phonetics*, 30, 139-162.
- Fromkin, V. (1971). The non-anomalous nature of anomalous utterances. *Language*, 47, 27-52.
- Gary, M. & Dell, G. S. (2012). Inner speech slips exhibit lexical bias, but not phonemic similarity effect. *Cognition* 106, 528-537.
- Goldrick, M. (2005). Limited interaction in speech production: chronometric speech error and neuropsychological evidence. *Cognitive Neuropsychology*, 22, 563- 594.
- Goldrick, M., Blumstein, S. E. (2006). Cascading activation from phonological planning to articulatory processes. Evidence from tongue twisters. *Language and cognition processes* 21, 6, 649-683.
- Goldrick, M., Keshet, J., Gustafson, E., Heller, J. & Needle, J. (2016). Automatic analysis of slips of tongue: insights into the cognitive architecture of speech production. *Cognition* 149, 31-39.
- Goldstein, L., Poripher, M., Chen, L., Saltzman, E., Byrd, D. (2007). Dynamic action units slip in speech production errors. *Cognition*, 103, 3, 386-412.
- Hanson, V. L., E. W. Goodwell & C. Perffetti (1991). The tongue twisters effects in the silent reading of deaf college students. *Harkins laboratories status report on speech research - SR- 107/108*. 171-180.
- Hahn, U. & Bailey T. M. (2005). What makes words sound similar? *Cognition* 97, 227-267.
- Harley, T. A. (1984). A critique of top-down independent levels models of speech production: evidence from non-plan-internal speech errors. *Cognitive Science*, 8, 191-219.
- Jacobs, C. L., Yiu, L. K., Pinet, S. & Watson, D. G. (2015). Differences between sequential ordering in speech and typing.
- Jeschaniak, J. & H. Schniefers (1998). Discrete serial versus cascaded processing in lexical access in speech production: further evidence from the coarticulation of near synonyms. *Journal of experimental psychology: learning, memory and cognition*, 24, 256-274.
- Jou, J. & Harris R. J. (1992). The effects of divided attention in speech production. *Bulletin of psychonomic society* 30, 301-304.
- Levelt, W. J. M. (1989). *Speaking: From intension to articulation*. Cambridge, Massachusetts : MIT Press.
- Levit, A. J. & Healy, A. F. (1985). The role of phoneme frequency, similarity & availability in experimental elicitation of speech errors. *Journal of memory and language*, 4, 717-733.
- Maidment, D. W. Mecken, B. & Jones, D. M. (2013). Modalities of memory: is reading lips like hearing voices? *Cognition*, 129, 3, 471-493.
- Mackey, D. G. (1992). Constraints on theory of inner speech. In D. Reisberg (ed.) *Auditory imagery*, pp 121-149. Elbaum: Hillsdale N. J.
- Martin, N., D. A. Gagnon, M. F. Schwartz, G. S. Dell, & E. M. Saffran (1996). Phonological felicitation of semantic errors in normal aphasic speakers. *Language and cognitive processes*, 11, 257-282.
- Messenger, J. C. (1962). Anang art, Drama and social control. *African studies bulletin*. 5, 2. 35-54.
- Michael, I. & Obot, J.U. (2007). *The orthography of the Anaang language manual* VIII. Abuja: NERDC
- Michael, I. (2014). The use of proverbial ideophone in Anaang, Southern Nigeria. *International journal of Applied linguistics & English literature*, 3, No 5, 71-81.
- Nickels, L. (1995). Getting it right? Using aphasic naming errors to emulate theoretical models of spoken word production. *Language and cognitive processes*, 10, 13-45.
- Oppenheim, G. M. (2013). Inner speech as a forward model? *Behavioral & Brain Sciences* 36, 4, 369-370.
- Udoh, I. I. (1998). *The effects of duration on intonation of Anaang learners of English*. A Ph.D Dissertation, University of Calabar, Calabar.

- Okpewho, I. (1982). *African oral literature. Backgrounds, character & continuity*. Bloomington: Indiana University Press.
- Postma, A. (2000). Detection of errors during speech production: a review of speech monitoring models [REVIEW]. *Cognition* 77, 2, 79-132.
- Rapp, B. & M. Goldrick (2000). Discreteness and interactivity in spoken word production. *Psychological review*, 107, 460-499.
- Sardat, J., Martin, C., Costa, A., & Alario, F. (1994). Reconciling the phonological neighborhood effects in speech production through single trial analysis. *Cognition* 53, 2, 91-127.
- Sevald, C. A. & Dell, G. S. (1994). The sequential cuing effects in speech production. *Cognition*, 53, 91-127.
- Shattuk-Hufnagel (1992). The role of word structure in segmental serial ordering. *Cognition* 42, 213-259.
- Stremberger, J. P. (1990). Word shape errors in language production. *Cognition* 35, 2, 123-157.
- Vitevitch, M. (2002). The influence of phonological similarity neighborhoods on speech production. *Journal of experimental psychology: learning and cognition* 28, 735-747.
- Wilshire, C. E. (1999). 'The tongue twisters' paradigm as a technique for studying phonological encoding. *Language and speech*, 42, 57-82.

Appendix

Data on Anaañ tongue twisters

Tongue twisters with alternating segments in the same phonetic environments

- i. Akpõñ isídàkkaké ikpõñ akpõñ, akpõñ akpédàkkà akpõñ akpõñ akpõñ akpá.
A caretaker cannot abandon his ward, lest the ward will die.
- ii. Akáda ñkádá íchinné ubòk kéèkpád akáda ñkádá.
A crafty person cannot cheat another crafty man.
- iii. Akoókó ñkókó ádiá ètòk ètòk, ábùm ínùà ké ñtòñdiá s'ikpõñ.
You earn as you work.
- iv. AAkpók fáp ékpád akpáb, fáp fiõnnò.
The lizard slip, as you climb a giant tree.
- v. Akpòkòèkòd akpókó èkòd akíkò únén.
A cock with a bald head.

Use of words with similar phonemes in the same phonetic environments

- v. Mkpá!nuún Mkpá!nuún káppá òkòd ùfién káppá òkòd ùdóm.
Confusion, confusion, confusion.
- vi. Mkpùtáatáppá táppá yòhòèkpáñ.

Touch anybody that comes your way.

- vii. Mmótò mbàkalá átò jén mbàkalá k'úsùñ mbàkalá ágwòd.
White man's car hits white man's child on a white man's road and killed.
- viii. Tùm diáidiá tùm díduk- As you go out, come back in safety.

Tokens with repeated words

- vi. Ámáámáná, áte' ámáámáná, mímáámáná mímáámáná mímáámáná.
Before Abraham I was.
- vii. Ètòñkàakád áttíppéñsúkàakád, ñsúkàakád áttíppé íbòñ.
One thing leads to another.
- viii. Íkòròsl áde Íkòròsl Íkòròsl íkànná íkòròsl.
All motor cycles have the same quality.
- ix. Mmótò mbàkalá átò jén mbàkalá k'úsùñ mbàkalá ágwòd.
The white man's car hit a white man's child on a white man's road.
- x. Ntaátàntáatám, ntaátáutód.
I eat all forms of insects.

Repetition of words/segments at irregular pattern

- xi. Abòm ùchán ubòk ùfòk ùkòt.
Breaking the wash hand basin of the in-law.
- xii. Afía áfòñ áfòñ áfòñ áfòñ.
White material is good for moonlight outfit.
- xiii. Ágwó ágwòk éwók ísìwòkkòñgwók.
You cannot be talking (boasting) while swimming.
- xiv. Ákók á!tón ájùppó ákók á!tón, ákók á!tón ájùppòñsúkàràrà.
A man who hates his own brothers.
- xv. Ámá ágwó ánam ágwó.
It is a friend that betrays his best friend.
- xvi. Ámáámá ákémánjá, njá ákémákwò.
Amaama loves Nya, Nya loves Ikwo.
- xvii. Ámáánén ábòhò, ánéénén ákènéúnén.
When you are too rigid, you die in your rigid way.
- xviii. Íchíp útùd úbiòm úfòk ánné.
The palm kernel in my grandmother's kitchen.
- xix. Íkòlkòt áfàñ á!tùdò ké íkòt áfàñ.
Do not tell it to a third party.

- xx. Úkeèd àjld ldiàèdià úduà (èdià úduàèdià úduàèdià úduà).
We all eat yams from the market.

Phonological representation of selected pattern of repetitions

- xxi. Ágwó ágwòk éwòk ísíwòkkò ñgwòk →

- i. /ágwó ágwòk égwòk ísígwòkkò ñgwòk/ [unmarked]
- ii. /ñgwòk ñgwòk ñgwòk ísíñgwòkkò ñgwòk/ /a/ → [ŋ]
- iii. /ñgwòk ñgwòk ñgwòk íkíñgwòkkò ñgwòk/ /ísi/ → [íkí]
- iv. /ágwòk ágwòk ágwòk ísígwòkkò ágwòk/ /k, ŋ/ → [kò, ð]

- xxii. Ágwó ñkádá íchínné úbòk kéèkpàd àkádá ñkádá →

- i. /ágwó ñkádá ífínné úbòk kéèkpàd àkádá ñkádá/ [unmarked]
- ii. /ágwó àkádá íkínné úbòk kéèkpàd àkádá àkádá/ /t, b/ → [k], /ŋ/ → [a]
- iii. /ágwó ñtádá ítínné úbòk kéèkpàd àtádá ñtádá/ /t, k/ → [t]

- xxiii. Ákòk á!tón ájùppó àkòk àtón, àkòk á!tón ájùppó ñsúkàràrà →

- i. /ákòk á!tón ájùppó àkòk àtón, àkòk á!tón ájùppó ñsúkàràrà/ [unmarked]
- ii. /ákòk á!kón ájùkkó àkòk àkón, àkòk á!kón ájùkkó ñsúkàràrà/ /t, pp/ → [k, kk]
- iii. /átòk á!tón ájùttó àtòk àtón, àtòk á!tón ájùttó ñtúkatàrà/ /pp, k, s/ → [tt, t, s]

- xxiv. Àkoókko ñkòkkó àdià ètòk ètòk, àmùm ínua ké ntón àdià s'íkpon

- i. /àkoókko ñkòkkó àdià ètòk ètòk, àmùm únua ké ntón àdià siìkpon/ [unmarked]
- ii. /àkoókko kòkkó àdià atok atòk, ànin ínua kekpon àdià kepon/ /ŋ/ → [Ø]
- iii. /àkoókko kòkkó àdià àtòk tòk, ànin ínia te tòn, àdià te tòn/ /e/ → [a]

- xxv. Ákpòn ísídàkkaké íkpòn ákpòn, ákpòn ákpédàkkà ákpòn ákpòn, ákpà →

- i. /ákpòn ísídàkkaké íkpòn ákpòn, ákpòn ákpédàkkà ákpòn ákpòn, ákpà/

- ii. /ákpòn íkpídàkkaké íkpòn ákpòn, ákpòn ákpédàkkà ákpòn ákpòn, ákpà/
- iii. /ákpòn íkpíkàkkaké íkpòn ákpòn, ákpòn ákpékàkkà ákpòn ákpòn, ákpà/ → /s, d, k/ → [kp]

- xxvi. Imúk ékpè ákpòkkò úbòk isòñ

- i. /Imúk ékpè kpòkkò úbòk isòñ/ /a/ → [Ø]
- ii. /Imúk ékpè kpekke ibòk isòñ/ /u/ → [i]
- iii. /emek ékpè kpekke ibòk isòñ/ /i/ → [e]