

VOWEL HARMONY IN ANAM IGBO: AN OPTIMALITY THEORY

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CHAPTER ONE

BACKGROUND OF THE STUDY

One of the three major languages spoken in Nigeria is Igbo. The language is spoken by the Igbo people, and ethnic group in the south East of Nigeria. So many has been written about this particular ethnic group but in some aspect of their life, not really much has been done. It is widely believed that the study of Igbo language is still relatively in its infancy. Many aspects of the language have not been given due attention especially the dialects.

This has been observed by a number of scholars. Armstrong (1972) notes that no detailed study of Igbo language has ever been published. Also, Ikekaonwu (1986) writes "... Up till now, this yawning academic vacuum has not to my knowledge been filled"

Anam is one of the dialects of Igbo language with very special future but unfortunately, nothing has been written about it. This might be as a result of historical disadvantage as the people trace their origin to Igala land, so, possibly, they are not considered the Igbo people. Another reason may be the geography of the place. In this chapter, I'll discuss the geographical location of Anam people and their occupation. Methodology and the theoretical framework used, statement of the problem, purpose of the study and the significance of the study.

1.1 GEOGRAPHICAL LOCATION OF ANAM PEOPLE

Anam, a community of 8 Cape towns is situated across River Omambala, North of famous Onitsha city (gateway to the East, Onitsha is also the largest in West Africa). West of Otuocha, the head quarters of Anambra East LGA and East of Asaba, the Delta state capital across the famous River Niger, on the East by River Omambala, on the Northeast by River Ezichi and Eziagulu otu Aguleri in Anambra East LGA and on the land by Echeno, Ika and Omabo, both in Ibaji LGA of Kogi State, as well as well as Inoma and Nzam both are Igala speaking area of Anambra West LGA.

Diachronic and toponomical studies have shown that, though geographically circumscribed by these rivers, Anam has cultural, economic and biological ties that extends beyond Anambra state in places like Delta, Edo, Kogi, Enugu, Benue, Imo, Abjia, plateau States even as far as Cameroun, Equitorial Guinea, Niger etc. The entire land mass of Anam is estimated to be in the region of 240 square kilometers.

(https://en.m.wikipedia.org/wiki/Anam,_Nigeria)

1.2. AGRICULTURAL PROWESS / OCCUPATION OF ANAM PEOPLE

Anam is well known for farming and fishing. Anam land is fertile, its waters and rivers are replete with a teeming number of a great variety of fishes. The people are predominantly able farmers who farm round the season producing up to 70% of the whole food stuffs in Anambra State. Major crops produced in Anam in large quantities includes yam, cassava, okro, rice, corn, groundnut, potatoes etc. Anam rice is well sought after as it contains little or no gravel. The cornucopia of yearly farm harvest of the Anam people is directly linked to the abundance mentality of the people that no matter what, food will always be available. This may also explain their being generous to a fault when showing hospitality to neighbors and strangers.

Apart being well known for their farming capability, Anam people are well known to be traders, businessmen, academicians, craftsmen, public and civil servants. Due to their various professions, there have been a growing influence in Anam (Akpeh 2002).

1.3. PURPOSE OF THE STUDY

The purpose of this study is to investigate the vowel harmony system of the Anam dialect of Igbo.

This study envelopes basically the whole of Anam part of Anambra state. The scope of this study shall be limited to the vowel harmony system of Anam people.

To know if they are exactly the same with those of the standard Igbo.

To see the difference between Anam vowel harmony system and standard Igbo.

To contribute to the growth of Anam dialect in particular.

1.4 SCOPE OF THE STUDY

This work is confined in Anam which includes its nine communities in the present Anambra West Local Government Area, Anambra State.

1.5 SIGNIFICANCE OF THE STUDY

This work will show the exact vowels of Anam. This will assist anyone coming in contact with the dialect for the first time to know if it has all the vowels of the standard Igbo, less or more.

Finally, this will project the dialect which in turn would be making a contribution to Igbo language.

CHAPTER TWO

LITERATURE REVIEW

INTRODUCTION

Vowel harmony is a phonological process whereby words with identical phonological characteristics co-occur in words.

In this chapter, I will be reviewing different works done on vowel harmony based on the concepts of empirical review.

2.1 The Concept of Vowel Harmony

Vowel harmony is a type of assimilation which takes place when vowels come to share certain features with contrastive vowels elsewhere in a word or phrase (Crystal 1992:168).

Katamba (1989:211) defines vowel harmony as a phonological pattern in which some domain typically the word share one or more phonological features like lip rounding or tongue position.

This is considered a long distance process, since vowels can harmonize across intervening consonants and even certain non harmonizing vowels. These are different ways for languages to exhibit vowel harmony. Tangale a Chadic language spoken in Nigeria (Ethnologue, 2009) exhibits harmony with an open-close or high-low distinction which can also be analysed in terms of the feature [+ATR] (Hulst and Weijer 1995:509-510).

In addition to knowing what features can harmonize, it can be important to understand how vowel harmony systems function. This can be framed in terms of a distinction between stem-controlled systems and dominant-recessive system. In the former, stems determine how affixes harmonize, in the latter, there is a given harmonic feature that dominates or takes precedence regardless of whether it appears in a stem or an affix (Bakovic, 2000:11).

Languages with stem controlled harmony tend to add affixes in only one direction and the direction of harmony typically matches that (Kramer,2003:113), though Clements (1977) notes that harmony can be bidirectional causing both prefixes and suffixes to harmonize with the stem.

Vowel harmony is a phonological state in which the vowels in a given domain share or harmonize for a particular feature. (Kenstowicz, 1994:347) he stated that it is typical for all vowels of a given language to participate in the harmonic constraints. These harmonic constraints can either be advanced tongue root [+ATR], [high], [back] or [round].

Harrison, (2000:11) defines vowel harmony as a constraint by which vowel agree with other vowels in terms of other phonological features. The phonological features can be height, back or round.

Vowel harmony is a phonological process by which neighbouring vowels in some domain (typically, the word) agree with each other in terms of some distinctive feature or features. In many languages with a vowel harmony process, the harmonic feature appears to propagate outward from the innermost morphological constituent. In the most straight forward case, the harmonic feature values of any and all affix vowels simply alternate in agreement with the harmonic feature value of the nearest vowel of the root to which the affixes are attached.

Vowel harmony is a system of long-distance assimilation where one vowel in a domain (often a word) causes some or all other vowels in the domain to share a particular feature. These features are typically height, frontness/backness, roundedness, nasality or position of the tongue root. Vowel harmony has been the object of linguistic inquiry for decades, harmony systems have been analyzed within numerous and varied frameworks.

Vowel harmony takes place when vowels in some phonological domain obligatorily share the same value of a vowel feature (Casali 2008:496). ATR, advanced tongue root, is a phonological feature among vowels in many African languages. When vowels in some phonological domain undergo alternation or assimilate in order to share the same value of that feature, it is called ATR harmony. Spread of harmony often takes place within specific morphological domains e.g. a whole word, or a segment of a word, according to the dominance

rules that control in what way vowels have to undergo alternation (Archangeli and Pulleyblank 2007:363). Languages with dominant vowel harmony divide vowels into two harmony sets, where one set is dominant and triggers vowels of the targeted set to assimilate.

2.1.1. THE HARMONIC DOMAIN

The grammatical or morphological word is not necessarily the ideal domain in which to understand vowel harmony, due to cases like compound words which may not exhibit vowel harmony as a unit but would do so individually. It is based on evidence from compound words and Hungarian vowel harmony that Hall (1999:3) made the argument for the prosodic (or phonological) word as the domain for vowel harmony and other phonological rules. It is therefore a more appropriate harmonic domain than the grammatical word.

Ursula (2004) carried out a study on a diachronic analysis of Ndut vowel harmony. Ndut is spoken in Senegal and belongs to the Cangin languages, a subgroup of the West Atlantic languages (Sapir 1991). Unlike the other Cangin languages, Noon, Laela and Saagi, Ndut, exhibits apparently bi-directional vowel harmony. However, a phonological analysis suggests that there are two independent phenomena that have to be kept separate: regressive vowel assimilation, which is probably a very archaic feature of the Atlantic languages,

and progressive root – controlled harmony, which may be a contact – induced innovation. The findings of the study reveal that Ndut operates regressive and progressive harmony. In addition, vowel harmony in Ndut is a contact – induced phenomenon.

2.1.2.TONGUE ROOT HARMONY

In languages described as having “tongue root” harmony, vowels harmonize for features that correspond to the position of the tongue root or pharyngeal expansion/compression. In these languages, following common phonological description, vowels may be advanced, articulated with the tongue root in an advanced position or ‘retracted’, articulated with non-advanced or retracted tongue root. The relevant phonological dimension of distinction that has been proposed is [+ATR] originally from (Halle and Stevens 1969) with advanced vowels sharing [+ATR] and retracted vowels [-ATR]. This is the standard way of describing the phonetic basis and the phonological feature in question. But work done by Lindau (1978), using radiographic and acoustic data, and by Tiede (1996) using MRI data indicates that the relevant difference is in terms pharyngeal expansion versus compression which can be achieved in different ways one of which is by positioning the tongue root in the way implicated by [±ATR].

Quinn-Wreidt (2013) conducted a study on vowel harmony in Maasai. Maasai is an Eastern Nilotic language spoken in Kenya and Tanzania. The findings reveals that Maasai has nine vowels band is a language dominant recessive harmony which operates on the the advanced tongue root [ATR]. The only exception is the low vowel /a/, which is an opaque. It does not harmonize and blocks the spread of harmony if it is followed by [+ATR] vowels.

A study of vowel harmony in Bale was carried out by miller (2009). The study examines [ATR] harmony as manifested across morpheme boundaries within nouns in Bale. The findings reveals that the vowel harmony system in Bale displays a nine vowel inventory with a feature dominance of [+ATR] vowels which spread their feature both leftward and rightward to recessive [-ATR] vowels.

Lindau, Jacobson, and Ladefoged (1972) investigated and compared the articulatory correlates of several African languages: Igbo, Twi (Akan), Ateso, DhoLuo as well as English and German. As the authors report on the same data for Igbo (Ladefoged 1964), Akan (1976), and DhoLuo (Jacobson 1978).

An investigation was carried out on the articulatory correlates of Akan, a kwa language spoken in Ghana and the Ivory Coast by (Lindau, 1976). Akan operates on nine vowel inventory with four pairs of [\pm ATR] and a low vowel which is neutral. She found that the[+ATR] vowels in Akan differed from their [-ATR]

vowels in that the larynx was significantly lower for [+ATR] than for [-ATR] vowels except for one speaker for whom there was zero larynx height between /i/ and /I/. She found no statistical difference in tongue height for [±ATR] vowel pairs. However, she did find that the width of the pharynx (measured anteriorly/posterior, not laterally) varied significantly between [+ATR] and [-ATR] vowels. She also found a correlation between the tongue root advancement and the lowering of the larynx as the tongue root advanced, the larynx lowered. For this reason, she suggested that the feature might better be called (expanded) rather than [ATR] as “ATR” addresses only one mechanism of pharyngeal cavity expansion (Lindau 1978, 1979).

Jacobson (1978) studied DhoLuo, a Nilotic Saharan language spoken in Kenya and Tanzania. DhoLuo has a ten vowel inventory all of which form [±ATR] pairs. Jacobson traced x-ray films from eight speakers producing the [±ATR] vowels of DhoLuo and found that the [+ATR] vowels were generally produced with the body of the tongue a little higher than for [-ATR] vowels. However, he reports that the most reliable indicator of the difference between the vowel pairs is the width of the pharynx. He measured from the pharyngeal wall to the most advanced part of the tongue root in front of the epiglottis. He found that the pharynx was much wider in the production of the [+ATR] than for the production

of [-ATR] vowels. He also found the larynx lower in the production of [+ATR] vowels.

Jacobson (1980) continued the investigation of the production of [±ATR] vowels in Nilo-Saharan languages with Shilluk spoken in south Sudan, a language closely related to DhoLuo. X-ray tracings of negatives indicate that like in DhoLuo, the body of the tongue is higher for [+ATR] vowels and lower for [-ATR] vowels. Shilluk did show a slight difference in the height of the larynx for [±ATR] vowels. Like DhoLuo, the larynx was higher for [-ATR] vowels than for [+ATR] vowels but this difference was smaller than the larynx height difference in DhoLuo.

Jacobson (1980) also reported data from Dinka, another language related to DhoLuo and Shilluk. The x-ray tracings indicate that for the front vowels, there is a correlation between the height of the body of the tongue and the [ATR] quality of the vowel. The [+ATR] vowels are pronounced with the tongue higher than the [-ATR] vowels. However, Jacobson failed to find this relationship for back vowels. Similarly, he found that for the front vowels, the [+ATR] were produced with the larynx lower than the [-ATR]. Like DhoLuo and Shilluk, the [+ATR] vowels in Dinka were produced with a wider distance between the wall of the pharynx and the root of the tongue. Jacobson found evidence that for the [+ATR] vowels, not only was the tongue root further forward, but the walls of the pharynx were also expanded to create a larger pharyngeal cavity.

Tiede (1996) points out the limitation of using x-ray techniques to study the production of vowels. By their nature, x-rays are only able to demonstrate one plane. Differences in the advancement of the tongue root or expansion of the pharyngeal wall can be seen in an anterior or posterior direction and raising or lowering of the larynx can be seen but lateral variation cannot be captured. To overcome this limitation, Tiede performed Magnetic Resonance Imaging (MRI) investigation of the production of [±ATR] vowels in Akan. He confirmed that Akan [+ATR] vowels were produced with advancement of the tongue root, as well as with raising of the larynx. However, he also found that the volume of the pharyngeal cavity was also maintained for [+ATR] vowels by tensing the pharyngeal walls to prevent the pharyngeal cavity from narrowing. Conversely, he found the diameter of the pharyngeal cavity to be constricted during the production of [-ATR] vowels. This indicates that the expansion and contraction of the size of the pharyngeal cavity is not just width (tongue root advancement) or height (lowering or raising the larynx), but also lateral as well.

Gick et al (2006) utilized ultrasound techniques to visualize the articulatory correlates of [±ATR] vowels in Kinande, a Bantu language spoken in the Democratic Republic of the Congo. Kinande has been described as having seven vowel phonemes; only the high vowels come in [±ATR] pairs phonemically. It

had previously been reported that the mid vowels harmonized in [+ATR] contexts, and that the low vowel was invariant.

Hudu et al (2009) used ultrasound to investigate the position of the tongue root for [±ATR] vowels in Dangbani, a Niger-Congo language spoken in Ghana. Like Fuck et al (2006), they found the position of the tongue root to vary between the [±ATR] pairs. The [+ATR] vowels were produced with the tongue root advanced by an average of 5mm compared to [-ATR] vowels.

Edmondson and Esling (2006) also employed more modern techniques to investigate the physiological properties of [±ATR] vowels. They investigated the state of the glottis in Alan and Kabiye, a Niger-Congo language of Benin, Togo and Ghana. They found that the [-ATR] vowels were pronounced with some constriction of the aryepiglottic folds and epiglottis. This variation might be the source of the reported laryngeal difference between [±ATR] vowels, with [+ATR] vowels reported to be more "breathy" and [-ATR] vowels more "creaky".

2.1.3. ACOUSTIC CORRELATES OF [+ATR] AND [-ATR]

The acoustic correlates for [±ATR] vowels have been studied since the 1960s. Dozens of studies have indicated that although other acoustic correlates are active in different languages, the best acoustic correlates to distinguish [±ATR] vowels is the height of the first formant. [+ATR] vowels have a lower F1 than [-

ATR] . Halle and Stevens (1969) attribute this to the increased size of the pharyngeal cavity for [+ATR] vowels, which causes the resonant frequency for the formant to be lower than for the [-ATR] vowels, which are produced with a smaller pharyngeal cavity. The first formant is used to differentiate between [\pm ATR] vowels. In many languages, there is overlap between the [-ATR] high vowels than the mid [-ATR] vowels.

Allison (2012) investigated the vowel harmony system in Uwu, a language spoken in a small community known as Àyèrè in Ìjùmú LGA Kogi State. The findings reveals that Uwu operates in partial harmony system consisting of seven oral vowels and five nasal ones. Uwu's harmonic spread is root-controlled, and the direction of spread in Uwu is leftward since affixes in the language are mainly prefix. The neutral vowels in Uwu are opaque though, there are few cases where the neutral vowels harmonize with vowels to their either sides. It is then concluded that the neutral vowel in Uwu can be transparent or opaque.

Paul Kroger (2008) carried out a study on vowel harmony in Kimaragang. Kimaragang is a member of Dusunic family, a cluster of closely related languages belonging to the Northeast Borneo subgroup of western Malayo Polysian. Generally, Dusunic languages exhibits a four basic vowel harmony system. The back mid vowel is represented as /o/, which is normally unrounded or only slightly

rounded in most Dsunic languages. Kimaragang uses slightly more rounding for this vowel with the pronunciation ranging from [o] in stressed or long syllables to [ɔ] in short Press-Stress syllables. From his findings, it is seen that Kimaragang vowel harmony is an example of unidirectional dominant recessive harmony system, in that the dominant vowel /a/ always spreads from right to left, whether from suffix to root or from root to prefix.

2.2. IGBO VOWEL HARMONY SYSTEM

Igbo language is a language spoken in Nigeria by people who are located predominantly in the south eastern part of Nigeria. The south eastern part of Nigeria consists of five states that are known as the core Igbo – speaking states. They are Abia, Anambra, Ebonyi, Enugu, and Imo. Igbo people can be seen in some parts of other states, the states are Delta, Rivers, Bayelsa, and Akwalbom. Linguistically, belongs to the new Benue – Congo of the Niger – Congo language family. Igbo language exhibits a complete vowel harmony system which is based on the advanced tongue root [+ATR] and [-ATR] features.

Ladefoged (1964) studied Igbo, a Niger-Congo language with a stem-controlled system of ATR harmony. He traced frames of the cineradiology film of the steady states of the “tense” versus “lax” vowels and found that the “tense” vowels are pronounced with the root of the tongue moved further forward

than for the “lax” vowels. This advancement increases the size of the pharyngeal cavity for the ATR vowels. He cautions that the descriptions “tense” and “lax” are for expence and should not be taken to mean that “tenseness” and “laxness” are the distinguishing characteristics of the pronunciation of the vowels.

Welmers (1973) made an attempt in classifying Igbo vowels into sets. He avers that Igbo vowels are divided into two: set A which is [+ATR] or set B which is [-ATR]. Example:

Set A.	Set B
e, o, u, i	a, ɔ, ɛ, ɪ

He went further to state that all vowels used in a word come from just one of the two sets as shown in the examples below:

Set A	Set B
Ò m̀rì (he wanted)	Ó r̀r̀r̀ (he built)
Ò r̀r̀ (he ate)	Ó nẁr̀r̀ (he died)

In agreement with this classification, Hyman (1975:234) quoting Stewart (1967) asserts that in constructing words in Igbo, all vowels formed within word boundaries are chosen from one of these sets.

Emenanjo (1978) in his book "elements of Igbo modern grammar" also classified the eight standard Igbo vowels into two harmonic groups in such a way that within any single (non compound), word, only vowels of one group may occur.

Okomu (2020) examines the vowel harmony in Ukwani, an Igboid language spoken in the Northern part of Delta state. The study reveals that Ukwani like Anam has a nine vowel system which is neatly divided into two mutually exclusive sets: [-ATR] and [+ATR] with /a/ partly neutral since it can co-occur with both sets. Standard Igbo has eight vowel system divided into two sets as shown in the table below:

Tableau 1: Igbo vowel distribution

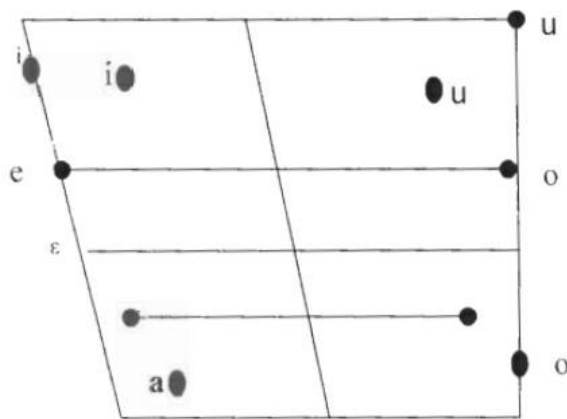
	i	ɪ	e	a	u	ʊ	o	ɔ
[High]	+	+	-	-	+	+	-	-
[Round]	-	-	-	-	+	+	+	+
[+ATR]	+	-	+	-	+	-	+	-

2.3 ANAM VOWEL HARMONY SYSTEM

In some western dialects of Igbo, such as Anam Igbo culture area, the vowel system contains 9 vowels with an additional mid front vowel [ɛ] as the [-

ATR] counterpart of [e] and the low-vowel is transparent to harmony (Welmers 1973, cited in Zsiga 1997:232). The tableau below illustrates the 9 vowel system of Anam dialect of Igbo:

Tableau 2. Anam vowel chart:



Akpeh (2002) investigated the sound system of Anam. The study looked at the sound system of and the importance of segments of this dialect were established through interviews and direct contact with the native speakers. Those interviews were tape recorded and used in the establishment of the segments and tones. She went further to prove that the rule of Vowel harmony in Anam goes beyond the word in isolation.

CHAPTER THREE

METHODOLOGY AND THEORETICAL FRAMEWORK

INTRODUCTION:

In this chapter, I will be discussing on the method of my data collection and the theoretical framework used for this work.

3.1. METHODOLOGY

The method of data collection for this work consists of two basic sources. The first is from SIL COMPARATIVE AFRICAN WORDLIST(SILCAWL). The second source is that I collected a voice recording of a competent native speaker of Anam dialect pronouncing those words.

3.2. THEORETICAL FRAMEWORK

Introduction

This study is based on the optimality theory (OT) of Prince and Smolensky (1993). Optimality theory provides an excellent paradigm for the analysis of vowel harmony. Where traditional generative phonology proposes an ordering of rules, optimality theory places constraints on the surface form of the output. It is assumed that the correct ordering of constraints will always produce the correct output. Constraints are divided into two categories: faithfulness which preserves lexical

distinctions and markedness which discourages "undesirable" sets of features. OT has three basic components as follows:

1. GEN.

This is the GENERATOR. Inputs are fed into this component. The GEN generates the possible outputs that could be the end product of the entire process.

These possible outputs generated by GEN are known as candidates. The candidates all compete to become the optimal (or most preferred) option.

2. CON.

This contains the CONSTRAINTS in languages. These constraints are universal and are ranked differently in different languages, depending on what a language permits and how strictly it forbids certain occurrences. The constraints have, among others the following characteristics.

I. Universality: Universal Grammar provides the constraints, and they are universal in nature. The constraints are present in all languages.

ii. Violability: Constraints can be violated but the violation should be minimal.

iii. Ranking: The constraints are ranked in some hierarchy that depends on the different languages. This ranking usually determines the degree of violation, and it

also determines the grammar of the language. (Prince and Smolensky, 1993: 1483; McCarthy and Prince, 1994a:3, 2001:6).

The notion of ranking presumes that the constraints are in hierarchical order of strict dominance. Since the constraints can be violated, the candidates that violate the highly ranked ones perform worse than the ones that do not violate such high ranked constraints, even if the candidate violates more of the lower ranked constraints. The candidate that wins does not have to satisfy all the constraints.

In a given language, a constraint may be ranked so high that it must be satisfied at all times, and may be ranked so low that its effect is not felt when it is violated. It may also fall into any of the intermediate ranks.

iii. EVAL

This is the EVALUATOR component of the theory. It evaluates the operation and checks the candidates in relation to the constraints. It, thereafter, considers the degree of violations committed by the candidates and chooses the best candidate (that is, the optimal candidate) which is seen as 'the winner'. This winning candidate is the final output. This is said to be the definition of optimality.

The optimality operation takes the form below:

Underlying form GEN CON EVAL

Input (picked from the lexicon) or options Generator (Generates an infinite set of possible outputs known as candidates) constraints (this acts on the candidates) Evaluator (this judges the candidates)

Any candidate that violates the highest ranked constraints is said to have committed a 'fatal violation', and therefore ruled out. The optimal candidate is the one that does not violate higher ranked constraints. As McCarthy and Prince (1994a) point out,

"... even dominated constraints may be visibly active under appropriate circumstances". (P.29). This situation is known as 'emergence of the unmarked', and shows that the hierarchy of the constraints is a product of their relevance to the language.

CHAPTER FOUR

DATA PRESENTATION AND DATA ANALYSIS

INTRODUCTION

Every language has the phonemic representation of sounds in that language. In this chapter, I will be presenting my data and analysing them using optimality theory.

ANAM DIALECT		ENGLISH
Úmé	[ume]	Breathe
Ímí	[imi]	Nose
Ìkù	[nku ɲa]	Eye brow
Ílé	[ilɛ]	Tongue
Ísí	[isi]	Head
Írú	[ihu]	Face
Ísù údé	[isu ude]	Groan (with pain)
Úméjí	[umedzu]	Liver
Nkùmé	[nkume]	Lungs
Mmeé	[mnee]	Blood
Ízì ímí	[izi imi]	Blow nose
Úzélé	[uzɛɛ]	Sneeze
Ézē	[ɛzɛ]	Teeth
Ónú	[onu]	Neck
Úkwù	[ukwu]	Waist
Ótúbò	[otubo]	Navel
Élílí ótúbò	[elili otubo]	Umbilical cord
Íké	[ike]	Buttocks

Íkpù	[ikpu]	Vagina
Òjì íkpù	[odzi ikpu]	Clitoris
Ùrú	uru	Semen
Òonù	[ònù]	Bile/gall
Ógbé ímí	[ogbe imi]	Bridge of nose
Ñgwù	[ng ^w u]	Shoulder
Ívē uvele	[ivε uvele]	Sneeze
Íkù úmé	[iku ume]	Breath
Étùtù	[etutu]	Hiccough (n)
Ídè ñkò	[Ide nko]	Belch
Óbù	[obu]	Heart

Ñwámìlì	[ɲ ^w amili]	Urine
Ñsì	[nsi]	Feaces
Ñtábi ányá	[ntabi anya]	Blink
Íkwò ọlá	[ik ^w o ɔla]	Snore
Ịnwùbì ányá	[in ^w ubi anya]	Wink
Úmé ọkú	[ume oku]	Pant
Ịmá òvè	[ima ove]	Blow (with mouth)

Iḡuḡuḡmíli	[iḡu ḡu míli]	Spit
Ikwa ụkwála	[ik ^w a ɔk ^w ala]	Cough
Ọlụkwúọkpà	[ɔlɔk ^w ɔ ɔkpa]	Thigh
Iḡoló	[iḡolɔ]	Shin
Íkiri ụkwú	[ikiri ɔk ^w ɔ]	Heel
Mkpisiọkpà	[mkpisi ɔkpa]	Toe
Ụmù ọkpú	[omɪ ɔkpɔ]	Bone marrow
Ọkpú	[ɔkpɔ]	Bone
Ọkpú ísí	[ɔkpɔ isi]	Skull
Íté ọkpà	[ite ɔkpa]	Calf of leg
Ọḡiliga	[ɔḡiliga]	Rib
Ógwè àzú	[ogwe azu]	Spine/back bone
Àkụlò	[akɔlɔ]	Kidney
Ngiliávó	[ngili avɔ]	Intestine
Àkpà nḡámilí	[akpa ŋ ^w amili]	Bladder

Ákwàlà	[ak ^w ala]	Muscle
Ọnụ́ mímílí	[Ono mili]	Saliva
Ọchì	[ɔʃi]	Anus
Ámụ	[amu]	Penis
Mkpụlúámụ	[mkpulu amu]	Testicles
Áká nà ọkpà	[aka na ɔkpa]	Libs
Áká	[aka]	Arm
Ábù	[abu]	Armpit
Mkpètà áká	[mkpeta aka]	Upper arm
Ñkù áká	[nku aka]	Elbow
Óbù áká	[obu aka]	Palm(of hand)
Áká ọkpó	[aka ɔkpɔ]	Fist
Mkpìsìáká	[mkpisi aka]	Finger
Ísì áká	[isi aka]	Thumb
Àkpà áká	[akpo aka]	Knuckles

Mvó áká	[mvɔ aka]	Nails
Okpà	[ɔkpa]	Leg
Ísí ọ̀sù	[isi ɔsɔ]	Hip
Ányá mímílí	[ɔnɔ mɪlɪ]	Tears (n)
Ílì ntì	[nli ntɪ]	Ear wax

OT ANALYSIS

Here, I will be analyzing my data using Optimality theory. This theory was presented by prince and Smolensky (1993). In the cause of my analysis, I will be looking at the OT constraints. The first constraint is the AGREE [ATR] a markedness constraint.

AGREE [ATR]: Adjacent segments must have the same value of the features. Such constraint is phonetically grounded in the fact that differing values of [ATR] by definition, requires movement of the tongue root. AGREE [ATR] is violated if two vowels with no intervening vowels (intervening consonants are allowed) do

not share a particular [ATR] value. This constraint is especially a relevant constraint for Igbo language.

The second constraint is the IDENT [ATR] a faithfulness constraint.

IDENT [ATR]: A segment in the input must have a correspondent in the output. This is very relevant in Igbo vowel harmony analysis. Since Igbo operates on [ATR] features, I will use these constraints to identify the ATR segments. I will start with [+ATR] features. I will be looking at some [+ATR] words as pronounced by different people.

☞: it identifies the optimal candidate. The candidate that obeys the rules of the constraints more.

Tableau 1

	/imi/	AGREE [ATR]	IDENT [ATR]
☞	[imi]		

	[imi]	*!	*
--	-------	----	---

In the above tableau, [imi] becomes the optimal candidate as it obeys the constraints more.

Tableau 2

	/umedzi/	AGREE [ATR]	IDENT [ATR]
	[ɔmedzi]	*	*!
☞	[umedzi]		

[umedzi] becomes the optimal candidate because it doesn't violate the constraint.

Tableau 3:

	/εze/	AGREE [ATR]	IDENT [ATR]
	[εze]	*	
☞	[εzε]		
	[eze]	*	

In the above tableau, [εzε] becomes the optimal candidate since it obeys the constraint more. Let's look at tableau 4

Tableau 4:

	/lke/	AGREE [ATR]	IDENT [ATR]
--	-------	-------------	-------------

	[ịkɛ]	*!	*
	[ikɛ]	*	*
☞	[ike]		

The correct output is selected by the ranking from the above tableau.

Tableau 5:

	/nkume/	AGREE [ATR]	IDENT [ATR]
☞	[nkume]		
	[nkɔme]	*	*!

Fortunately the above tableau rankings gives the correct output.

Tableau 4

	/ile/	AGREE [ATR]	IDENT [ATR]
--	-------	--------------	--------------

☞	[ile]		
	[i̇le]	*!	*
	[ilɛ]	*	*

From the above tableau, [ile] becomes the optimal candidate since it didn't violate the AGREE [ATR]. Based on the rankings from the above tableau, it gives the correct output.

Tableau 5:

	/ikpu/	AGREE [ATR]	IDENT [ATR]
	[i̇kpu]	*	*
☞	[ikpu]		
	[ikpɔ]	*!	*

The above tableau gives the correct output. Based on this fact, let's look at the [- ATR] features

Tableau 6:

	/abʊ/	AGREE [ATR]	IDENT[ATR]
☞	[abʊ]		
	[abu]	*!	*

The above tableau still give the correct output.

Tableau 7:

	/ɔʃi/	AGREE [ATR]	IDENT[ATR]
☞	[ɔʃi]		
	[oʃi]	*!	*

The correct output is selected by the ranking order from the above tableau.

	/ɲ ^w amili/	AGREE [ATR]	IDENT[ATR]
	[ɲ ^w amili]	*!	*
☞	[ɲ ^w amili]		

This tableau gives the correct output by the ranking order. This because [ŋ^wamɪli] obeys the constraint more.

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