Allomorphs in the Igbo Language: An Optimality Theory Approach

Thecla Udemmadu

Abstract

Allomorphs are any two or more morphemes that have different forms but perform the same grammatical functions in different linguistic environments. The optimality theory claims that the Universal Grammar is a set of violable constraints and that language-specific grammars rank these constraints in language-specific ways. The linguistic phenomenon has not been approached in the Igbo language from the optimality point of view. This research work therefore, attempts to analyze how this morphological terminology is applicable to the Igbo language. Optimality theory of Prince and Smolensky (1993) was the adopted theoretical framework and data for the study were collected through generation of words from the researcher's intuitive knowledge of the language. The findings were that using the GEN and EVAL of the input and output of optimality theory that there are many allomorphs in the language due to variant realization of infinitives, gerunds, past tense markers, particles, noun agents, noun instruments, among others. The allomorphs were necessitated due to the fact that the language under study is a rule governed language strictly under the command of vowel harmony.

Introduction

Igbo language is one the three major languages in Nigeria and has grown to the status of national language but not a lingua franca. It is at the Southeast geo-political zone of Nigeria and has more than 25million native speakers according to the 2007 census. The Igbo language is classified as a Niger-Congo

language and belongs to the Kwa sub-group of languages spoken in Sub-Saharan Africa. Igbo is in the family of Niger-Congo languages called Kwa by European linguists, which includes many Nigerian and West African languages like Ashanti, Akan, Yoruba and Benin (Edo). Kwa languages are marked by a vowel harmony system, which contrasts sets of vowels in which the tongue root is either advanced or retracted (Bendor-Samuel, 2016).

The Phonological rule of the Igbo language otherwise known as law of vowel harmony which says that in the word formation, all the vowels in a word must come from the same class of vowels; stressing that there should be no mixture of vowel classes in a word. Meanwhile, the vowels in the language are divided into light and heavy vowels;

Light vowels	Heavy vowels
A	e
ị	i
ọ	o
ụ	u

Table I

The spelling convention also says that any vowel coming after a pronoun in a construction must be from the same vowel group with that pronoun. This means that a pronoun from the light vowel group must be followed by a vowel from the light vowel group and vice verse. Bearing this in mind let us look at the allomorphs in the language.

The work is discussed under the following sub-headings: concept of allomorph, theoretical study where the issue of optimality theory is discussed, allomorphs in the Igbo language, then, findings and conclusion.

Concept of Allomorph

In linguistics, an allomorph is a variant form of a morpheme, that is, when a unit of meaning varies in sound without changing meaning. Lieber (2009:158) states that allomorphs are phonologically distinct variants of the same morpheme. By phonologically distinct, it means that they have similar but not identical sounds. And when it is said that they are variants of the same morpheme, it means that these slightly different-sounding sets of forms share the same meaning or function. For example, the negative prefix *in-* in English is often pronounced *in-* (as in *intolerable*), but it is also sometimes pronounced *im-* or *il-* (*impossible, illegal*) as English spelling shows. Since all of these forms still mean 'negative', and they are all attach to adjectives in the same way, they are allomorphs of the negative prefix.

According to Bussmann (1996:17), allomorph can be described as concretely realized variant of a morpheme. The classification of morphs as allomorphs or as the token of a particular morpheme is based on similarity of meaning and complementary distribution: for example, [s], [z], and [tz] are considered allomorphs of the plural morpheme. Malmkjer (2002:356) says that when a morpheme is recognized by semantic and distributional criteria without its form being identical, it is referred to as an allomorph. Also Fromkin, Rodman and Hyams (2003:276-282) state that English is not the only language that has morphemes that are pronounced differently in different phonological environments. Allomorphy exists in most languages, for example, the negative morpheme in the West African language Akan also has three nasal allomorphs: [m] before *p,* [n] before *t,* and [ŋ] before *k.* Crystal (1987:90) notes that variant forms of a morpheme are known as allomorphs. An allomorph is one of two or more complementary morphs which manifest a

morpheme in its different phonological or morphological environment. The allomorphs of a morpheme are derived from phonological rules and any morphophonemic rules that may apply to that morpheme. In the same vein, www.Britannica.com/topic/allomorph (2016) writes that morphs that are in complementary distribution and represent the same morpheme are said to be allomorphs of that morphemes, example, the regular plurals in English nouns are formed by adding one of three morphs on the form of singular: /s/, /z/, or /iz/ (in the corresponding written forms both /s/ and /z/ are written –s and /iz/ written –es. Just as an allophone is a variation of a single phoneme, an allomorph is a variety of a single morpheme says the www.lincoln.edu/english/linguistics/allomorphs. Lincoln (2016) states that an allomorph is an alternate pronunciation of a phonological form of a morpheme in a particular linguistic environment.

According to Anagbogu, Mbah and Eme (2001) a morph is a physical form representing some morpheme in a language. For example in the word 'gain**ed**', 'ed' is a physical form representing the past tense morpheme. Sometimes the morph may have other forms which represent the morpheme. These other morphs are called allomorphs. For example, the plural morpheme has three different realizations /z/, /s/ and /iz/ in the following words: stones, chalks and churches respectively. The above set of morphs can be classified as allomorphs because although they shared the same meaning, they never occur in identical context. They are therefore said to be in complementary distribution.
All the above explanations are pointing to the fact that allomorphs are the variants of same morphemes that have different forms and exist in different linguistic environment. The most important facts about the allomorphs are that the

morphemes must be semantically the same, phonologically different and morphological vary.

Theoretical Framework

Some linguists have propounded different theories of morphology among them is Hocket (1954) as quoted by Maxwell (1998) who divided theories of morphology into two classes: Item-and-Arrangement (in which both roots and affixes are treated as morphemes), or Item-and-Process (in which roots are morphemes but affixes are rules).

Under an Item-and-Arrangement theory, roots and affixes are both treated as morphemes, with at least one allomorph of each stored in the lexicon.

The above theories are not most adequate to the topic under discussion. Another theory is optimality theory.

Optimality Theory

Malmkjer (2002:367) quotes Russell (1997) as saying that Optimality theory was developed in the 1990s and introduced in Prince and Smolensky (1993) and McCarthy and Prince (1993a). The theory includes two basic claims; the Universal Grammar is a set of violable constraints; that language-specific grammars rank these constraints in language-specific ways. Constraints define what is universal, while constraint violations characterize markedness and variation. Two formal mechanisms, GEN and EVAL, regulate the relation between input and output. GEN (for generator) creates linguistic objects, EVAL (evaluator) checks the language-specific ranking of constraints (called CON) and selects the best candidate for a given input from those produced by GEN. Optimality theory has been influential mainly in phonology. In a morphological analysis, it provides a way of dealing with morpheme ordering and with mappings between syntactic and morphological categories.

Mbah (2014) says that optimality theory studies constrain imposed on wellformedness and it has three parameters; Gen (Generator) which forms the candidates. The candidates are arbitrary formed from possible phonotactic of the imput; Eval (Evaluator) is the output whereby each member of the set is evaluated or tested against the conditions of wellformedness. Example, in Igbo, the evaluator can relate to such factors as tone, reduplication, vowel harmony, syllabic structure (Consonant structure); Con (Constraints) forms the rules to be observed by the output of the Gen if all the rules imposed on the derivand are fulfilled, then the output is selected as the optimal candidate

Brown (2004:308) notes that Optimality theory (OT) is a general approach to modeling human linguistic knowledge which has a significant impact on various fields of linguistics, and one of those fields is morphology, the study of word formation. In generative phonology, it is standard to assume that a morpheme's surface alternants are derived by regular phonological processes from a single underlying representation which is called phonologically conditioned allomorphy. The approach to allomorphy developed in optimality theory combines an old idea with a new one. The old idea is that the allomorphs are lexically listed as suppletive alternants. The new idea is that the same markedness constraints that are responsible for regular phonological processes also choose among the alternants.

The theory can be used for investigating allomorphs in the Igbo language.

Allomorphs in the Igbo language
The allomorphs in the language are so enormous when the verb roots are inflected which can result in the formation of infinitives, gerunds, past tense, participle, agent noun and instrument.

Infinitive- An infinitive in the English language will almost always begin with 'to' followed by the simple form of the verb, like this, to + verb= infinitive. Because an infinitive is not a verb, one cannot add 's, es, ed, or ing' to the end. Infinitives can be used as nouns, adjectives or adverbs www.chompchomp.com/terms/infinitive.htm. (2016).

Infinitive is realized in the Igbo language by prefixation of a corresponding i/i̱ to any verb root. That is i/i̱ = infinitive

In the Igbo language, the GEN which creates linguistic objects generates prefixes like 'i' and 'i̱'. The two prefixes are the possible morphemes used in the realization of infinitive in the language. They are the constraints. EVAL which checks the language-specific ranking of constraints evaluates the possible competitors in the input and comes out with a competing candidate that best satisfies the acceptable requirements of the grammar of the language in question.

The EVAL(uator) has to follow the phonological rule of the language and the adequate tone mark of the constraints. The tone mark is H S/L. It could be seen in examples below:

Prefix	verb root	Outcome	Tone mark	Gloss
1. i	De	Ide	H S	To write
2. i̱	gu̱	i̱gu̱	H S	To read
3. i	Ri	Iri	H S	To eat
4. i	Si	Isi	H S	To cook
5. i̱	Da	i̱da	H L	To fall
6. i	So	Iso	H L	To follow
7. i̱	Nwa	i̱nwa	H L	To tempt
8. i̱	Ta	i̱ta	H S	To chew
9. i̱	Wa	i̱wa	H S	To break
10.i	Zu	Izu	H S	To steal

Table 2

The 'I' and 'ị' are allomorphs because semantically they are the same; both can be prefixed to the verb root to form infinitives, also their forms are different and they are phonological variants of the morpheme, and they cannot be used interchangeable in the linguistic environment.

'i' and 'ị' can also form allomorphs in another grammatical environment. They can be used as second person singular pronoun. In as much as they perform the same grammatical function they cannot be used interchangeably. They are used in different phonological contexts irrespective of the fact that they are applied in the same semantic context. This is governed by selection of constraints by the EVAL of optimality theory following the phonological rule of the language. For instance,

11.   *I* riri nri
        You(sg) eat pst food
        You ate (food)
12.   *Ị* ga-eri nri
        You aux pref verb root food
        You(sg) will eat (food)

It is quite ungrammatical to use them interchangeably, to have something like
 13.   * *Ị* riri nri or
14.   * *I* ga-eri nri

Gerund- Gerunds are words that are formed with verbs but act as nouns. They are very easy to spot in the English language, since every gerund is a verb with –ing tacked to its tail. There is no exception to this rule www.gingersoftware.com/content/grammar-rule/noun/gerunds/ .

In the Igbo language, gerund is a verbal derivation realized by prefixing a corresponding o/ọ to a reduplicated verb root following the phonological rule of vowel harmony, thus,

O/ọ + vr x 2 = gerund

for instance,

prefix	Verb root	Verb root	outcome	Tone mark	Gloss
15. O	Ri	Ri	Oriri	LHH	Feasting
16. ọ	gụ	gụ	ọgụgụ	LHH	Reading
17. O	Kwu	Kwu	okwukwu	LHH	Talking
18. ọ	sụ	sụ	ọsụsụ	LHH	Speaking
19. O	Mu	Me	omume	LHH	Acting
20. O	Si	Si	Osisi	LHH	Cooking
21. ọ	gị	Ga	ọgiga	LHH	Moving
22. ọ	wụ	Wa	ọwụwa	LHH	Breaking
23. O	Gbu	Gbu	ogbugbu	LHH	Killing

Table 3

o/ọ are allomorphs here because they are semantically same, functionally the same but morphologically and phonologically different and cannot be interchanged in constructions. In other words, they are selective. They are selective because they both are possible competitors and inputs created by GEN under optimality theory. The EVAL processed the outputs based on the principle governing the spelling rule of the language and came up with the results stated above. Violation of the above means ungrammaticality in the Igbo language, for instance, to write ọriri, osụsụ etc. are anomaly in the language.

In different linguistic environments under different semantic situations, o/ọ functions as third person singular pronouns. They perform the same grammatical and semantic function in different linguistic contexts. Actually, one cannot be

exchanged for the other due to the phonological rule guiding the language. For example,

24.   O dere ihe
      S/he vr-pst something
      S/he wrote something
25.   Ọ gara ahịa
      S/he vr-pst market
      S/he went to the market

The pronouns cannot be used the other way round in the above linguistic environment to have,

26.   *Ọ dere ihe
27.   *O gara ahịa

Participle is a verbal that needs an auxiliary to augment its meaning. In the Igbo language, it is generated by prefixing a corresponding a/e to the verb root following the phonological rule of the language.

a/e + vr = particle

   For instance,

Prefix	Verbroot	Outcome	Tone mark	In Igbo structure	gloss	In English structure
28. A	Ga	Aga	LH	*Ike aga ahịa	go	*Ike go to market
29. A	sụ	asụ	LH	* Ha asụ akwa	wash	*They wash clothes
30. A	chọ	achọ	LH	*Ebere achọ ego	look for	*Ebere look for money
31. A	gwọ	agwọ	LH	*Dibịa agwọ ọrịa	heal	*Doctor heal sickness
32. E	Ri	Eri	LH	*Ngozi eri nri	eat	*Ngozi eat food
33. E	De	Ede	LH	*ụmụakwụkwọ ede ihe	write	*Students write something
34. E	Go	Ego	LH	*Ụzọ ego akwa	buy	*Uzo buy clothes
35. E	Chu	Echu	LH	*Nneọma echu	fetch	*Nneoma

				mmiri		fetch water
36. E	Zo	Ezo	LH	*Ọ ezo ego ya	hide	*He hide his money

Table 4

'a' and 'e' are allomorphs because they are of different forms but semantically the same. The selection of a corresponding morpheme can be explained by the GEN of the optimality theory which generates inputs and competitors (morphemes; 'a', 'e') including tones. The optimal candidate is chosen by EVAL using the phonological rule of the language. Wrong selection of the tone results to another lexical item with different semantic notion. For instance, the tone of a particle 'aga' (work) is LH, but if the tone changes to HS is gives the meaning 'needle',if it is changed to LL is means 'barrenness' and so on.

Indefinite Pronouns- Indefinite pronouns are words which replace nouns without specifying which noun they replace such as someone, somebody, etc. in the English language. www.englishplus.com/grammar.00000027.htm . The indefinite pronouns in the Igbo language are 'a' and 'e'. Each of them is used in a particular linguistic environment because they are selective. The selective nature of the morphemes is determined by the EVAL which evaluates the inputs and the competitors formed by the GEN. The selected candidate (using the phonological rule of the language) forms the optimal candidate. Alteration of the rule means anomaly. Because they select their linguistic environment, one cannot be used in the place of the other despite the fact that they have the same semantic connotation. Hence, they are allomorphs. This could be seen in the below examples:

37.   *A kụrụ aka*
       Someone hit-pst hand
       Someone knocked

38. *E* kwuru okwu
     Someone talk-pst talk
     Someone spoke

It is ungrammatical to say,

39. **E kụrụ aka*
40. **A kwuru okwu*

The 'a' and 'e' in the examples 28-36 are different from 'a' and 'e' in the examples 37 and 38. The former (28-36) are particles while the later (37-38) are impersonal pronoun. They are of different allomorphs because they are not performing the same grammatical functions although their forms are the same.

Past tense- Past tense indicates that an action is in the past relative to the speaker or writer www.grammar.ccc.commet.edu/grammar/tense/simple_past.htm . It is the use of verb to express something that happened before the writer/speaker started writing/ making his utterance. In English –ed is the past tense marker.

In the Igbo language, the formula for past tense is,

$-rv_2$ = past tense,

where ' – ' is a sign of suffix, 'r' is a constant /r/ sound, 'v' is the vowel of the verb root while ' $_2$ ' is to differentiate the tense from other '–rvs' like the aspect. The past tense could assume various variants as in:

Verb root	/r/	V	outcome	Tone mark	Gloss
42. Ga	r	A	Gara	LL	Went
43. Re	r	E	Rere	LL	Sold
44. Ri	r	I	Riri	LL	Ate
45. sị	r	ị	sịrị	LL	Said
46. Zo	r	O	Zoro	LL	Hid
47. fọ	r	ọ	fọrọ	LL	Remained
48. Kwu	r	U	kwuru	LL	Said
49. tụ	r	ụ	tụrụ	LL	Threw

Table 5

Therefore, -ra, -re, -ri, -rị, -ro, -rọ, -ru, -rụ are allmorphs denoting past tense. It is so because one cannot take the place of another in constructions to have something like,
*gare, *reri, *rirụ, *siro, *zori, *forọ, *kwurụ, and *tụra
The competitors are –re, -ri, -rị, -ra, -ru, rụ, -ro, -rọ. They are all inputs by GEN including different tones. EVAL uses the phonological principle of the language to select the optimal candidate.

Allomorphs in the language can be found in Agent Noun. An agent noun denotes a person who performs an action. Most agent nouns end in either '-er' (standard) or '-or' in the English language (for words derived directly from Latin e.g. debtor, employer, lecturer, performer, director, teacher, etc www.grammarist.com/grammar/agent-recipient-noun.   An agent noun is a person that performs a regular action or a person's career.

In the Igbo language, the agent noun is realized by prefixing a corresponding o/ọ to the verb root and the addition of a noun complement. The correct prefixation is determined by the selection by the EVAL from GEN which supplies the inputs and the competitors. The optimal candidate emerges from the phonological rule of the Igbo language.
o/ọ + vr + Ncompl =Agent Noun
 It is obvious in the examples below:

Prefix	Verb root	Noun complement	Outcome	Tone mark	Gloss
50. O	De	akwụkwọ	ode akwụkwọ	LH HHH	Secretary
51. O	Si	Nri	osi nri	LH LH	Cook
52. O	Me	Nka	ome nka	LH LL	Craftman
53. ọ	gụ	Egwu	ọgụ egwu	LH LH	Singer
54. O	Kwu	Okwu	okwu okwu	LH LH	Speaker
55. ọ	sụ	Akwa	ọsụ akwa	LH LL	Washman

Table 6

From the above examples, it is very obvious that 'o' and 'ọ' are allomorphs in those contexts because of their different forms and the same semantic undertone.

A similar area where allomorph is obvious in the language is in Instrument Noun. Instrument noun is a tool or other device, especially one without electrical power, used for performing a particular piece of work www.dictionary.cambridge.org/dictionary/English/instrument (2016). Instrument noun is the equipment a worker uses in carrying out his duty.

In the Igbo language, noun instrument is obtained by prefixing a corresponding m/n to the verb root and the addition of a noun complement.
m/n + vr + Ncompl = Instrument Noun
This could be seen in the following:

Prefix	Verb root	Noun complement	Outcome	Tone mark	Gloss
57. M	wa	nkụ	Mwa nkụ	LH LH	Firewood breaker
58. N	si	Nri	Nsi nri	LH LH	Cooker
59. M	vọ	Isi	mvọ isi	LH LH	Comb
60. N	gwu	Ala	Ngwu ala	LH LL	Digger
61. M	kpa	ọkụ	Mkpa ọkụ	LH LH	Matches
62. N	ti	Mkpu	Nti mkpu	LH LH	Serine

Table 7
Plurals in the Igbo language can form allomorphs. Pluralize is cause to become more numerous, cause to be made up of several different elements www.oxforddictionaries.com/definition/english/pluralize (2016).

The plural markers in the Igbo language are 'ndị' and 'ụmụ'. They cannot be used interchangeably. For instance,

Singular	Plural
63.nwa akwụkwọ	ụmụ akwụkwọ
a student	Students

Table 8

Here 'ụmụ' and 'ndị' plural markers cannot be interchanged in this context. In the context of derogatory statement 'ndị' can be used for students to have 'ndị akwụkwọ'. But here, it does not mean students rather it is a way of ridiculing someone who claims to be a student. A student who is a truant and who performs poorly in his examinations could be cajoled as 'ndị akwụkwọ' in the context of mockery. Another example is,

Singular	Plural
64. nwa nne	ụmụ nne
a sibling	Siblings

Table 9

'ụmụnne' is the plural form of 'nwanne'. When 'ndị nne' is used, it does not connote the plural of 'nwanne' (sibling) instead it is the plural of a mother as in below:

Singular	Plural
65. Onye nne	Ndị nne
A mother	Mothers

Table 10

It is true that 'ndị nne' is a plural but it is not a plural of a sibling, instead it is a plural of a mother, so 'ndị' and 'ụmụ' cannot be interchanged here. The selection of the optimal candidate is dependent of different variables including the semantics and connotation of the words involved. The GEN generates all the variables and semantic variables. EVAL picks

the optimal candidates based on the connotative and contextual meanings of the inputs and competitors. A particular linguistic element has a particular semantic denotation. A change in any of the competing linguistic item automatically affects the semantics of the word. The same is applied to this example,

Singular	Plural
66. Onye nna	ndị nna
A father	Fathers

Table 11

'Ndị nna' (fathers) is the plural form of onye nna (a father) but if 'ndị' is substituted with 'ụmụ' to get 'ụmụnna' the meaning of the word is altered because 'ụmụnna' means kindred which is made of both young and old, married and unmarried males from a particular family lineage, but 'ndị nna' is specifically married men from anywhere maybe when they formed an association of fathers.

Also, this example below points to the fact that 'ụmụ' and 'ndị' are allomorphs,

Singular	Plural
67. Nwa nnụnụ	ụmụ nnụnụ
A bird	Birds

Table 12

Here 'ụmụ' can never be exchanged because when you say 'ndị nnụnụ' it has no semantic connotation in the Igbo language.

'Ụmụ' are 'ndị' are allomorphs. They connote plural but their forms are different and they operate under specific and

selective linguistic environment depending on the input that succeeds as an optimal candidate.

Findings and Conclusion

The issue of allomorph is expedient in the Igbo language. It was observed that the language has so many allomorphs ranging from the formation of infinitive, gerund, past tense, participle to derivation of different types of noun from the verb root. It also involves the expression of plurals. The optimality theory approach uses the phonological principle of vowel harmony and spelling rules of the language to pick up the optimal candidates. The researcher concludes by recommending that the above discussed allomorphs in the language under study should be well studied and assimilated so as to achieve performance and competence in the language.

Thecla Udemmadu
Department of Igbo, African and Asian Studies
Nnamdi Azikiwe University, Awka, Nigeria

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