

## **The Formalisation of Igbo Copula Construction Using Logical Symbols**

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### **Abstract**

The aim of this study is to analyse the formalisation of Igbo copula construction using logical symbols. However, its specific objective is to formalise the Igbo copula construction using logical symbols. This study adopts the descriptive analytical method of data analysis. The data were generated through intuitive reasoning, the researchers being native speakers of the language. Three genuine copula verbs were identified. They are 'bụ/wụ', 'nọ' and 'dị'. These copula verbs translate the English verb 'be'. The copula verb 'bụ' functions to identify an entity; 'nọ' depicts location of animate subjects with human attribute while 'dị' identifies the qualities of

arguments and or location of inanimate subjects and animate subject without human attributes. Complementation determines the actual meaning of these verbs. In their logical formulation, these verbs may be formalised in two ways. If the verbs are assumed to be predicators, the complements are represented as arguments while if the verbs are taken to be copula verbs, the complements are equatives. The argument terms are reduced to their initial small letters while the predicators are written in the upper case letters.

**Key Words: Igbo, Copula, Copula Construction, Logical Symbols**

## **Introduction**

The copula verb is also called the copulative verb. This is often considered a part of the predicate; then, the remaining is called the predicative expression. A copula is a kind of verb in grammar, which connects the subject in a sentence to a modifier or complement and functions as a linking verb. In some other languages, the copula verbs according to Wikipedia may show more resemblances to pronouns, as in Classical Chinese and Guarani, or may take the form of suffixes attached to a noun, as in Beja, Ket, and Inuit languages.

Copula constructions can assume the position of the predicative expression and the subjects are reversed in some languages. In theoretical analysis, the subject in such sentences is usually divided into a subject noun phrase and a predicate verb phrase. Copula verbs do not function as action words and thus do not have adverbs as modifiers.

Verb agreement is another issue of concern when both the subject and the predicative expression are noun phrases. For example, in the English language, the copula normally agrees with the preceding phrase even when it is not logically the subject. The copula may be used to express identity when predicates are formed. The noun phrase, that is, subject and its complement, have the same referent or expression of an identical concept. They also may be used to express their membership of a class or a subset relationship. Equally, they may be used to express or show some property, relation or position, permanent or temporary.

Most languages have one main copula, although some like Spanish, Portuguese and Thai languages have more than one, and some have none. In the case of English, this is the verb “to be”. While the term copula is generally used to refer to such principal forms, it may also be used to refer to some other verbs with similar functions, like ‘become’, ‘get’, ‘feel’ and ‘seem’ in English. These may also be called “semi-copulas” or “pseudo-copulas”.

The word copula is a word derived from the Latin word *cōpula*, which means ‘link’ or ‘tie’ two different things. A copula verb is a verb or verb-like word. ‘Copula’ in linguistics is generally used as a word used to link the subject of a sentence with the predicate. The predicate could be a subject complement.

The copula verb ‘be’ in the English language has eight suppletives. The suppletives are be, am, been, is, are, being, was, were. A copula construction particularly in the English language is the type of construction, which is formed using the copula verb. However, in Igbo the ‘be’ verb in English

may be translated by other verbs other than the general copula verbs in the language.

‘Predicate’ in grammar refers to the part of the sentence, which excludes the subject noun phrase. It is a word or combination of words, which includes the verb, objects, or phrases governed by the verb that makes up one of the two main parts of a sentence. Predication is attributing claims to the subject. Equally, it is a branch of logical semantics, which uses symbols to explore relationships between and within propositions. The predicator usually governs the predicate. The copula verb is not regarded as a predicator in a sentence

The verb is one grammatical category that appears to be language universal. In Igbo, the verb is so central that some scholars have called it a verb centred language (see Nwachukwu, 1985, Mbah, 1999, 2011, 2018). It is so called because while it is possible to form other grammatical categories from the verb, the reverse is not the case. Because of the central role the verb plays in the language, there is no grammatical category that has generated scholarly interest as the verb. Very many studies have been done on the Igbo verb (for instance, see Green & Igwe, 1963, Nwachukwu, 1983, Mbah 1999, 2018, Uchechukwu, 2015, Ogwudile 2017, Ndiribe, 2018).

One of the early in-depth studies was carried out by Green and Igwe (1963). It was however descriptive and taxonomic. The work defines the verb, the negative and declarative forms, the auxiliary verb forms, the affixes and the nomino-verbal forms. It further discusses the clausal patterns of Igbo. Okonkwo (1974) also did another work on the Igbo verb. It focuses on the definition of the concept of verb, its parts, the associated tenses and the major cognate objects and verbs of

incomplete predication. Further to this work is Nwachukwu (1983), a collection of papers on the verb. The study discusses the concept of verb, its classification, its derivational morphology, its inflectional patterns and non-finite forms.

It goes further to analyse transitivity in relation to the Igbo verb. It investigates the status of the auxiliaries, motion verbs and selection restrictions. Mbah (1999) also discusses the verb, its formal property, its complements and projections. He uses modular syntactic paradigm to analyse the verb. Uchechukwu (2011, 2015) also analyses the verb from the descriptive and cognitive points of view respectively. Ogwudile (2017) is a detailed analysis of the Igbo dynamic verb using analogical mapping as a framework. There are other articles, theses and dissertations, which have discussed the Igbo verb. However, none of them has focussed on the copula verb from the point of view of logical semantics.

Many scholars have conducted researches on stative verbs in Igbo. In a study done by Nwaozuzu (1981), she observes that in most Indo-European languages especially English, stative verbs are not normally used in the progressive aspects. She also observes that they (that is, stative verbs) occur in the simple tense. Equally, she says that in the Igbo language, certain verbs are considered as stative verbs especially when their rV suffix is used to express the present tense.

In the same vein, Mbah (2008) conducts a study on two forms of existential in the Igbo language. The study also looks at how the semantic relations of location and integral predication are encoded by 'nwere' and 'dị'; how the semantic relations that are potentially ambiguous are disambiguated by associating each with either of the two types of predication in the Igbo language.

Furthermore, Mbagwu (2013) conducts a study where he identifies two groups of Igbo verb - locatum and location verbs, with the objective of determining their features morphologically. Mbagwu finds out that the verbs are morphologically distinguished by locative affixes. In another study, Uchechukwu (2015) examines and present features of the Igbo copula verb. However, he analyses the verbs on the basis of their functions in varieties of copulative sentences.

Heusinger, Maieborn&Portner (2011) observe that the semantic approach to connectivity was developed by Jacobson (1994), Sharvit (1999), Cecchetto (2000), and Heller (2002, 2005). The semantic approach to connectivity holds that there is no hidden syntactic structure in specificational clauses, nor any post-LF transformations, and that the apparent lack of syntactic licensing is real. They draw the general conclusions that c-command is not a necessary condition for anaphor licensing, variable binding, or NPI licensing, nor is sisterhood required to license de dicto readings of NPs. The task then is to explain why unlicensed reflexives, bound variable pronouns, NPIs, and de dicto readings are possible in specificational clauses, but (typically) not in non-specificational clauses.

Jacobson (1994) provides an account of bound variable connectivity in copula clauses. The account is couched in variable-free semantics with categorical grammar syntax and differs radically from the others at this; there is no c-command at any level of representation. In fact, there is no binding relation between the two elements. Instead, the effect of binding that was observed in the relevant interpretation of the sentence is the result of equating functional interpretations of the pre- and post-copula phrases.

Mikkelsen (2008) notes that in copula, connectivity refers to a phenomenon where an element is present or interpreted in a way that is normally associated with a certain syntactic configuration seemingly without that configuration obtaining. The existence of connectivity effects with copula-like predicates has received little attention. Various authors, including Sharvit (1999), den Dikken, Meinunger and Wilder (2000), and Cecchetto (2000), have pointed out the existence of anti-connectivity effects, which are like connectivity effects in that the normal licensing conditions are not met in the specificational clause, unlike the regular connectivity. The licensing conditions are also not met in the simple clause paraphrase. This is illustrated for reflexive binding taken from Schlenker (2003).

None of the above named scholars has investigated the copula construction with respect to predication in the Igbo language. This gap has made the present researchers investigate the nature of the copula verb in predication in the Igbo language.

### **Statement of the Problem**

The study of copula construction and its formalisation of the Igbo copula construction using logical symbols have not been given sufficient attention. Only a few works exist on the topic. The studies that exist are taxonomic and descriptive. No study has been carried out, to the best knowledge of the researchers, on the correlation of the Igbo copula construction to those of English and relating them to symbolic logic.

The general use of copula in a sentence is to link the subject of a clause to the predicate. Often times, the copula verb is considered to be part of the predicate while the remainder is

called a predicative expression. The complement of the copula is the predicative expression accompanying the copula.

However, from the above, Igbo copula construction has not been given serious attention by researchers and linguists. The problem of this study, therefore, is to examine how copula verbs may be formalised in Igbo predicate structures using logical symbols. It is this gap that this study intends to fill.

### **Scope and Delimitation of the Study**

The scope of the study on copula construction is wide and varied. Copula verbs and their clauses may be studied from the point of view of morphology, syntax, semantics, etymology, pragmatics or sociolinguistics. This study delimits the above scope to semantics, specifically logical semantics. The study intends to examine how the typical English copula verbs are realised in Igbo and how these verbs may be formalised in logical semantics.

### **Objective of the Study**

The main purpose of this study is to formalise copula constructions using predicate calculus in the Igbo language logical symbols. However, the specific objective of the study sought to:

- i. Formalise the Igbo copula construction using logical symbols.

### **Research Question**

To actualise the objective of this study, the following research question was formulated to guide the research:



- i. To what degree do the Igbo copula constructions lend themselves to logical symbolisation?

## **Methodology**

In this section, the research methodology is discussed bearing in mind the following: research design, area of study, research instrument, sources of data collection and method of data analysis.

The research design adopted for this study is a descriptive analytical design. According to Nworgu (2015), a descriptive design aims at collecting data on a subject and describing it in a systematic manner, the characteristic features or facts about the subject. In this type of design, facts about any given phenomena are ascertained.

The content area of study is interface of syntax and semantics in copula construction with major emphasis on the formalisation of Igbo copula construction using logical symbols.

The instruments used in this research are intuition, books, printed journals, e-journal and published books. These are materials that have relevant information for this study.

This research adopts primary (introspection) and secondary source methods. The data were collected through intuitive reasoning, the researchers being native speakers of the language. As native speakers of Igbo, principles which native speakers intuitively employ in speech are adopted. The secondary data formed the main data for the study. These secondary data were got from texts, printed journals, research

works like dissertation and thesis. The data were collected from personal libraries, public libraries and the internet. Moreover, information was collected from printed documents and electronically stored materials. Materials from these sources were read and interpreted so as to determine the availability of the appropriate data (information) required for this study.

The data collected were analysed using qualitative analysis. Deductions were made descriptively from subjecting the data to principles of logical symbolisation.

This section discusses the relationship of the English copula verb with those of Igbo language, the syntactic restrictions of copula construction in the Igbo language and formalisation of the Igbo copula construction using logical symbols.

### **Data Presentation and Analysis**

In this section, linguistic constructions are reduced to symbols. Here, the Igbo copula verbs are treated separately. The first copula verb ‘wụ’ or ‘bụ’, which is equivalent to ‘be’ is used to show identity. Examples:

1a. Ogechukwubụ /wụnwaanyi.  
Ogechukwu is child female.  
‘Ogechukwu is a female child’.

1b. Ikenna bụ /wụagu.  
Ikenna is lion.  
‘Ikenna is a lion’.

1c. Nneka bụ /wụezigbommadu  
Nneka is good person

Nneka is a nice person.

In the logical representation of the above expressions, 'Ogechukwu', 'Ikenna' and 'Nneka' are arguments and are represented in small letters, while 'nwaanyi', 'agu' and 'ezigbo' are represented in upper case. As shown below, the predicate calculus of the above expressions are respectively:

2a. Ogechukwubu /wunwaanyi.

O NWAANYI

2b. Ikenna bu /wugagu.

i AGU

2c. Nneka bu /wuezigbommadu

n EZIGBO

In logic, according to Hurford and Heasley (1983:141), predication formulae strip sentences of everything but names and predicators. Forms such as articles, tense markers and certain prepositions are stripped on account of two reasons; namely serious principle and convenience. The former is because logic concentrates on truth. Stripping sentences of omissible forms is convenient because they do not affect the meaning of the structure after deletion.

The second copula verb 'di' carries out two functions. First 'di' translates the sense of 'being describable in terms of' and occurs only with descriptive nouns as can be seen in example 3c-d. Secondly, 'di' expresses location for inanimate nouns or all non human animates as can be seen in example 3a-b.

3a. Ochedin'ebe a.

It be PREP place here

'it is here'

3b. Ego din'akpa.

Money be PREP pocket.

‘there is money in the pocket’.

3c. Chika dīmma.

He be well.

‘he is well’

3d. Ifennadinjọ

Ifenna be bad

‘Ifenna is bad’

In the logical representation of the above expressions, ‘Oche’, ‘Ego’, ‘Chika’ and ‘Ifenna’ are represented in small letters, while ‘ebe a’, ‘akpa’, ‘mma’ and ‘njọ’ are represented in upper case. As shown below, the predicate calculus of the above expressions are respectively:

4a O dīn’ebe a.

o NA e

4b. Ego dīn’akpa.

e NA a

4c. Chika dīmma.

c MMA

4d. Ifennadinjọ

i NJỌ

In 4a-c, the argument terms are reduced to their initial small letters while the predicates are written in the upper case letters. In 4a-b, the copula verb and demonstrative are deleted leaving only the arguments and predicates. In 4c-d, the argument term ‘mma’ and ‘njọ’ are adjectival nouns; as the verb is a copula verb, it is treated as a predicate.

The third copula verb, ‘nọ’ expresses location for animates including humans. The noun or phrase indicating the place is introduced by the preposition ‘na’ ‘in, at, on’.

5a. Ngozino n’ụlọ.

Ngozi be PREP house.

‘Ngozi is at home’.

5b. Obinnanọna Nike

He/she be PREP Nike

‘He/she is at Nike’

5c. Adannanọn’ahịa.

Adanna be PREP market

‘Adanna is at the market’.

In the logical representation of the above expressions, ‘Ngozi’, ‘Obinna’ and ‘Adanna’ are as argument represented in initial small letters, while ‘ụlọ’, ‘Nike’ and ‘ahịa’ are represented in the upper case. As shown below, the predicate calculus of the above expressions are respectively:

6a. Ngozino n’ụlọ.

n NA ụ

6b. Obinna nọna Nike

o NA n

6c. Adannanọn’ahịa.

a NA a

However, some verbs held to be dynamic verbs in the Igbo language can also have the same meaning as copula verbs when translated in the English language. When used in a sentence, it can give the same meaning as ‘be’ when translated into the English language. The following examples are used to illustrate them before reducing them to predicate calculus.

7a. Okeketroogo

Okeke be tall

Okeke is tall

7b. Okekegbaraagba

Okeke be fat

Okeke is fat

7c. Ugomaramma

He/she be beautiful

He/she is beautiful

7d. Ezeperempe

He/she be small

He/she is small

When translated to the English language, example 7 is realised as copula constructions. However, in the Igbo world view, the verbs are not copula verbs. ‘To’ means ‘grow’, ‘gba’ means ‘fatten’ while ‘ma’ and ‘pe’ mean ‘know or hit broadly’ and ‘cut a measure of’ respectively. In the Igbo world view, therefore, they are not copula constructions. In a situation where they translate into copula constructions, they express stative conditions. This interpretation is not denotative. It is therefore possible to symbolise some Igbo verbs in two ways of logical formulation.

8a. Okeketroogo

(1) o TO o

(2) o OGO

8b. Okekegbaraagba

(1) o GBA a

(2) o AGBA

8c. Ugomaramma

- (1) u MA m
- (2) u MMA

8d. Ezeperempe

- (1) e PE m
- (2) e MPE

In example 8 a-d, both the denotative and connotative meaning can be reduced to predicative formulae. Following the denotative interpretation arising from the Igbo world view, the verbs are transitive verbs and therefore are not copula. In other word, the verbs are not predicators, hence the first (o TO o, o GBA a, u MA m and e PE m) logical formulation. Furthermore, if the meaning is constructed figuratively in which case copula meanings are realised, then the complements of the verbs are realised as adjectival. They are therefore symbolised as predicators. This is result in the second predicate formulae (o OGO, o AGBA, u MMA and e MPE).

Connectives according to Mbah (2014) are mostly entities that combine two or more independent propositions. They can also be called co-ordinate conjunctions. When structures that involve connectives are symbolised, the compound structure is disambiguated. The following examples are used to illustrate connectives.

9a Emekachorọ Ada ma o buNneka  
Emeka want Ada or Nneka

9b IkechukwunaOkeketiriObinnaihe  
Ikechukwu and Okeke beat Obinna thing

The propositions can be disambiguated as follows:

10a Emekachorọ Ada

Emeka want Ada

Ma o bu

10b EmekachoroNneka

Emeka want Nneka

10c IkechukwutiriObinnaihe

Ikechukwu beat Obinna thing

10d OkeketiriObinnaihe

OkeketiriObinnaihe

10e IkechukwunaOkeketiriObinnaihe

In the logical representation of the above propositions, 'Emeka', 'Ada' and 'Nneka' and 'Okechukwu', 'Okeke' and 'Obinna' are represented in the initial lower letters, while 'choro' and 'tiri' are represented in the upper case in their original citation form using the symbol 'V' to join the two propositions as shown below:

11. Emekachoro Ada ma o buNneka

Emeka want Ada or Nneka

Emeka want Ada V Nneka

12. e CHQ a; V e CHQ n

13. IkechukwunaOkeketiriObinnaihe

Ikechukwu and Okeke beat Obinna thing

Ikechukwu and Okeke beat Obinna

Ikechukwu&Okeke beat Obinna

14. i BEAT o & o BEAT o

15. I & o TI oi



Furthermore, in commutativity of conjunction, the co-ordinators are equally ranked entities. The order of the joined elements is not necessary and they may vary without losing any meaning from the original construction. The following examples below are used to illustrate commutativity of conjunction.

16. Ike, Chika, Ifechi, Amaka, Tochinda  
Ike, Chika, Ifechi, Amaka, Tochi and Ndidi see Chideraa  
Ike, Chika, Ifechi, Amaka, Tochi and Ndidi saw Chideraa

17. Ike, Chika, Ndidi, Tochi, Amaka  
Ndidi, Tochi, Ifechi, Amaka, Chika na Ike  
Amaka, Ndidi, Ike, Ifechi, Tochinda Chika  
Ifechi, Amaka, Tochi, Chika, Ike na Ndidi  
Tochi, Ifechi, Chika, Ndidi, Ike na Amaka

The above illustration can be represented logically or symbolically as:

18.  $i \cup c \ \& \ c \cup i \ \& \ a \cup t \ \& \ t \cup a \ \& \ n \cup c$

Finally, deductions can be said to be True (T) or False (F) when a conjoined statement is deduced or inferred. In this case, premises and conclusions are formulated from constructions. When the element(s) in the premise is/are equal to the element(s) in the conclusion, such statement is said to be valid (Mbah, 2014). This is illustrated below:

19. Amakachurummiri X - Premise  
Amakachurummiri Y – Conclusion

The below statement is said to be valid because the elements given as premise are more than the conclusion. In other words, when the element in the conclusion is not more than

the elements in the premise, such statement is valid. See below for example:

20. Amakachurummiri X na Amakasaraakwa Y - Premise  
 Amakachurummiri Z - Conclusion

When the elements in the conclusion are extraneous to a more than the elements in the premise, such a statement is said to be invalid.

21. Amakachurummiri X - Premise  
 Amakachurummiri & Amakasaraakwa Z - Conclusion

The above formulations can be represented symbolically or logically. This is usually done using symbols to represent the whole sentence. The sentences are called indices. They are shown below respectively: 22.  $\underline{X} = \text{Valid}$

Y

23.  $\underline{XY} = \text{Valid}$   
 Z

24.  $\underline{X} = \text{Invalid}$   
 YZ

The formulaic representation of linguistic constructions, compounded premises and conclusions can be unpacked. See illustrations below for clarification:

25. Nnekasirinri (X), Nnekazaraulo (Y) na Nnekasaraakwa (Z)  
 Nneka cook past food (X), Nneka sweep past house (Y) and Nneka wash past cloth (Z)  
 Nneka cooked food (X), Nneka swept house (Y) and Nneka washed cloth (Z)

The above valid constructions can be unpacked as following:

26.  $\underline{X \ \& \ Y \ \& \ Z}$

$X \& Y \& Z$

$$27. \frac{X \& Y \& Z}{X}$$

$$28. \frac{X \& Y \& Z}{X \& Y}$$

$$29. \frac{X \& Y \& Z}{Y \& Z}$$

### Summary

The summary of the study is based on the findings of this study. It was found out that various linguistic constructions were shown in examples 1a, 1b and 1c and equally represented in predicate calculus as can be seen in examples 2a, 2b and 2c for the copula verb 'bu' where predication formulae strip sentences of everything but names and predicators. Logical representations of expressions are represented in small letters as can be seen in examples 3a, 3b, 3c and 3d. In examples 4a, 4b, 4c and 4d, argument terms are reduced to their initial small letters while the predicators are written in the upper case letters. Examples 4a, 4b, 4c and 4d were for the copula verb 'di' while examples 6a, 6b and 6c were used to show copula verb 'no'.

Equally, some verbs in the Igbo language are dynamic in nature. These verbs can have the same meaning as copula verbs when translated in the English language to give the same meaning as 'be'. Examples were shown in 7a, 7b, 7c and 7d. However, a situation where they are translated into copula constructions, they express stative conditions as can be seen in example 8a, 8b, 8c and 8d. From the Igbo world view, they

are transitive verbs and therefore not copula verbs. Their interpretation is not denotative and possible for symbolisation in two ways.

As can be seen in examples 8a, 8b, 8c and 8d, both the denotative and connotative meaning can be reduced to predicative formulae. The denotative logical symbolisation are shown in 8a (1), 8b (1), 8c (1) and 8d (1) while connotative logical symbolisation are represented in 8a (2), 8b (2), 8c (2) and 8d (2).

Connectives are symbolised when the compound structure is disambiguated as can be seen in examples 9a and 9b. Propositions can also be disambiguated equally as seen in examples 10a, 10b, 10c and 10d. Propositions are represented in the initial lower letter while predicates are represented in the upper case in their original citation form using “V” to join the two propositions together as shown in examples 11, 12, 13, 14 and 15.

In commutativity of conjunctions, co-ordinators are ranked equally. The order of the joined elements is not always necessary, therefore, they may not lose any meaning from the original construction as can be seen in examples 16 and 17 and represented symbolically in example 18.

Deductions may be said to be True (T) or False (F) in a conjoined statement when deduced or inferred. Usually, premises and conclusions are formulated from constructions. As shown in example 19, a statement is valid if the element(s) in the premise was/were equal to the element(s) in the conclusion and as well as if the element in the conclusion is not more than the elements in the premise as shown in example 20. In example 21, the statement is invalid because

there are more elements in the conclusion than in the premise. Their logical representation can be seen in examples 22, 23 and 24 respectively. Equally, the formulaic representation of linguistic constructions, compounded premises and conclusion can be as illustrated in example 25 and unpacked in examples 26, 27, 28 and 29.

## **Conclusion**

In line with the findings above, it is pertinent to say that the objectives of this work have been achieved. The study shows that the Igbo copula verbs were shown in various constructions like statements and propositions. Equally, they were represented symbolically or logically as the case may be for each construction. Examples abound in the work for formalisation of the Igbo copula constructions using logical symbols.

## **Recommendation**

The study recommends that further studies on the construction and predication of copula verbs in dialects in the Igbo language be carried out to know variants of ‘bụ’, ‘dị’ and ‘nọ’. Furthermore, studies done on them can be shown in logical symbols.

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