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CONSTRAINT-BASED EXPLANATION OF NOMINAL COMPOUNDS IN IBEME IGBO

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Abstract
This paper examines nominal compounds in Igbo Ibeme with the view to analyzing the morpho-phonological processes that underlie nominal compound formation as well as explain these processes from a constraint –based perspective. It adopts the optimality theory (a constraint ranking theory) in accounting for the interactions between morphology and phonology in the realization of nominal compounds. The investigation adopted the descriptive design and the use of oral interviews involving a wordlist in data collection. Introspection also featured as a native speaker of the lect. Findings reveal that nominal compounds have two forms in Ibeme Igbo: phonologically sensitive and insensitive compounds. While the sensitive class show high ranking of phonological constraints over morphological constraints, the reverse is the case for insensitive class. It concludes that nominal compounds in Ibeme Igbo and indeed Igbo are better not phonologically identified (but better semantically identified), giving that nominal compounds which fulfill SBC (tagged 'real' nominal compounds) are phonologically immune and as such have least ranking of phonological constraints in line with the principle of OT that constraints are language universal but their ranking is language specific.
Key Words: Compounding, Nominal, Optimality Theory, Constraints

Introduction

Compounding is essentially a word formation process in language. Matthews (1978) and Anagbogu (1995) claim that there are some languages which do not have compounding as a word formation device. Igbo is not one of the languages. Scholars like Green and Igwe (1963), Welmers (1970), (1973), Nwaozuzu (1991), Oluikpe and Nwaozuzu (1995), Nwaozuzu (2005) among others agree that Igbo has compounds as linguistic device. Emenanjo (2015, p205) opines that "compound nouns no longer appear to exist in Igbo" and that they belong to the diachrony of Igbo. He however submits that noun compounding is still productive in some dialects.

Nominal compounding in Igbo has been studied from different perspectives (Green and (Igwe 1963, Welmers (1970, 1973), Nwaozuzu 1991, Oluikpe & Nwaozuzu 1995, Anagbogu 1995 ,Nwaozuzu 2005, and Emenanjo 2015). As far as we are aware, no serious study has been done on nominal compounding in Igbo from the Constraint-based or Optimality theory perspective. The choice of Optimality theory in this study is influenced by the observation of Archangeli (1997 p.3) that "the explanatory power of the Optimality theory has been successful in accounting for reduplication and *even compounding facts in a number of languages, where it has supplied insightful answers to age long descriptive and theoretical questions in numerous cases"*(Emphasis is mine). We therefore provide an optimality based account of morpho-phonological interactions in nominal compounding with insights from Ibeme Igbo.

Ibeme Igbo is a variety of Igbo spoken in Ibeme clan of Obi-ngwa LGA in Abia State. Nwaozuzu (2008) makes no clear mention of Ibeme in her classification of Igbo dialects (having subsumed it under Ngwa- major dialect of the SEGD) but the assumption is that by classifying all the dialects/speech forms spoken in "Obi-Ngwa, Isiala-Ngwa, Ukwa East and West LGAs" (p. 100) as among the South Eastern Group of Dialects (SEGD);Ibeme which is widely spoken in four vast communities in Obi-Ngwa is part of the SEGD. However, it has been established that Ibeme is a separate dialect area.(Onwukwe, Ndimele & Onukawa,2015).

In presenting data for this study, the tone convention adopted is that of Green and Igwe (1963) where low and step tones are marked leaving high tones unmarked.

Study Objectives/Methodology

The objectives of this study were to:

(1) Analyze the morpho-phonological processes that underlie nominal compound formation in Ibeme Igbo
(2) Explain the processes from a constraint-based perspective

In order to achieve these objectives, the study adopted the qualitative paradigm involving interviews of some native speakers of Ibeme Igbo using wordlist as a guideline. Introspection also featured as the researcher is a native speaker of the dialect. Data collected were analyzed descriptively showing the constraints and how they interact in the nominal compound formation.

Constraint-Based (Optimality) Theory

Prosodic morphology has been the testing ground for theoretical developments in phonology over the past twenty years or more from auto-segmental theory to optimality theory. Prosodic morphology to this end has been reformulated in such a way that it is conceived of as a theory of constraints interaction. There have been developments in prosodic morphology in 1990's. One of such development is in respect to Optimality Theory (O T). McCarthy and prince (1993) aptly capture it thus:

> Much current work in prosodic morphology is set within Prince and Smolensky's (1993) optimality theory. Optimality theory asserts that grammar consist of hierarchies of universal constraints that select among candidate output forms; constraint interaction is via this language – hierarchy in which lower – ranking constraints are violated when violation leads to satisfaction of a higher – ranking constraints. Since the constraints are universal, the grammar of a particular language consist of a ranking of the universal constrains set (p. 295.).

Prosodic morphology claims that constraints are essentially universal and of general formulation, with a great potential of disagreement among the well formedness of analysis. Prince and Smolesky (1993) are of the view that an individual grammar consists in the ranking of universal constraints. They note that constraints are not language-specific but universal. The difference across and within languages has therefore been attributed to variations in the ranking of the same constraints. To this end, Archangeli (1997 p.11) observes thus: "Optimality theory views universal grammar as a

set of violable constraints and the grammars of specific language as the language –particular ranking of those constraints''.

According to McCarthy and Prince (1993, 1994) who expanded the OT of Prince and Smolesky(1993), the theory has theses and components. They present the theses and they are as follows:

(a) "Universality- universal grammar (UG) produces a set of CON of constraints which are universal and present in all grammars
(b) Violability – constraints are violable , but violation is minimal
(c) Ranking – The constraints of CON are ranked on a language specific basis, the notion of minimal violation is defined in terms of this ranking. A grammar is a ranking of the constraints set.
(d) Inclusiveness – The constraints hierarchy evaluates a set of candidate analyses that are admitted by very general considerations of structural well-formedness.
(e) Parallelism –The best satisfaction of the constraints hierarchy is computed over the whole hierarchy and the whole candidate set. There is no serial derivation" (1993,p132)

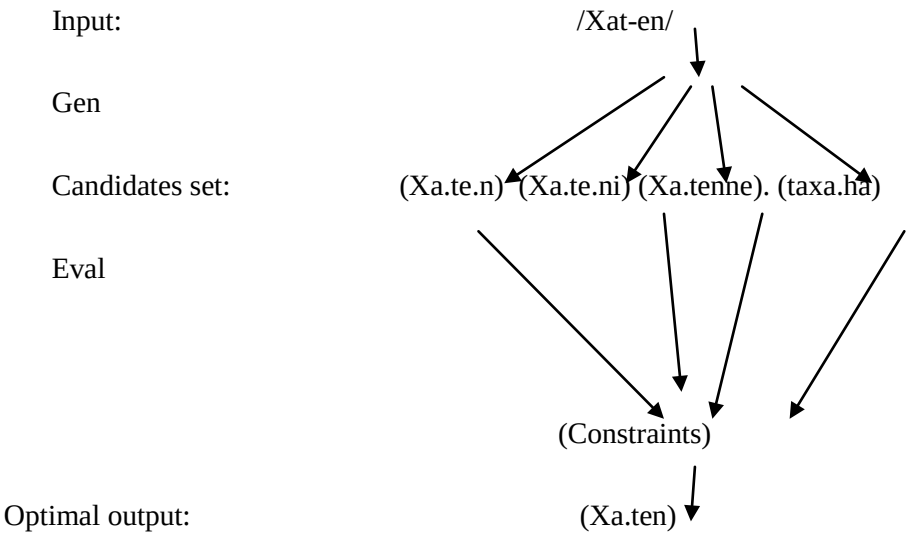
Under violability, minimal violation is defined in terms of the ranking of constraints. In OT, the optimal form is selected by a set of well-formedness constraints ranked in hierarchy of relevance, so that a lower ranking constraint may be violated to secure a higher –ranking one. Inclusiveness means that the candidate analyses are generated by general consideration of structural well-formedness. Finally, parallelism means that there is no serial derivation; all the possible candidate analyses produced are evaluated according to the constraint hierarchy. The candidate that passes the higher –ranking constraint is the output form or optimal form. McCarthy and Prince (1993, 1994) present the following as basic components of the theory:

1. "GEN takes an input, and generates the list of possible outputs, or candidates.
2. CON provides the criteria in the form of strictly ordered violable constraints, used to decide between candidates
3. EVAL chooses the optimal candidates based on the constraints, and this candidate is the output" (1994, p90).

In OT, the relation between input and output is mediated by two formal mechanisms, GEN and EVAL. GEN (for General) creates linguistic objects and notes their faithfulness relations to the input under consideration. EVAL (for Evaluator) uses the language's constraint hierarchy to select the best candidate(s) for a given input forms among the candidates produced by GEN. The constraints hierarchy for a language is its own particular ranking of CON, the universal set of constraints.

The rules of GEN, EVAL, and CON are illustrated in fig 1 below which schematically presents how OT determines the optimal syllabification for the input /Xat-en/. The input feeds into GEN, which creates candidates. The candidates are considered by EVAL, which select the optimal candidates for the set.

Fig 1: (A Schematic of OT.) (Adapted from Archangeli, 1997 p.14)



The candidate /Xat-en/ is fed into the system as an input, the GEN generates candidates from the input and the EVAL evaluate them through the ranking of constraints to have an optimal candidate as the output.

Optimality theory supposes that there are no language-specific restrictions on the input. This is called richness of base. Every grammar can handle every possible input. Given an input, GEN generates an infinite number of candidates, or possible realization of that input. A language's grammar (its ranking of constraints) determines which of the infinite candidates will be assessed as optimal by EVAL.

As reported in McCarthy and Prince (1994) "GEN is a function which relates the input to a set of candidate representations, any one of which may be the optimal output form for the specific input. GEN is restricted in that it can only generate linguistic objects, ones composed from the universal vocabulary that similarly restricts input. GEN is quite creative, being able to add, delete and rearrange things without restrictions. Since there are no restrictions, the candidate set created by GEN for any given input is infinite" (p132).

CON, according to McCarthy and Prince (1994) as universal set of constraints, is posited to be part of our innate knowledge of language. What this means is that every language is made up of the same set of constraints. This assumption leads directly to a characterization of the universal aspects of human language: all languages have access to exactly the same set of constraints. This is the formal means by which universal aspect of human language: all languages have access to exactly the same set of constrains. EVAL is the mechanism which selects the optimal candidate(s) from the candidate set created by GEN. EVAL makes use of a ranking of the violable constraints. They further hold that given two candidates A and B, A is better than B on a constraint if A incurs fewer violation than B. Candidate A is better than B on an entire constraint hierarchy if A incurs fewer violations of the highest-ranked constraint distinguishing A and B. A is optimal in its candidate set if it is better on the constraint hierarchy than all other candidates. For example C1, C2, and C3, where C1 dominates C2, which dominates C3, (C1,>>C2,>>C3), A is optimal if it does better than B on the highest ranking constraint which assigns them a different number of violations. If A and B tie on C1, but A does better than B on C2, A is optimal even if it has 100 more violation than B.

This comparison is often illustrated with a tableau. The pointing fingers or arrow (as used in this paper) marks the optimal candidates and each cell displays and asterisk of each violation for a

given candidate and constraints. Once a candidate does worse than another on the highest ranking constraints distinguishing them, it incurs a very crucial violation (Marked in the tableau by exclamation mark). Once a candidate incurs a crucial violation there is no way for it to be optimal even if it outperforms the other candidates on the rest of CON. This is represented below;

S/N	INPUT	CON. 1	CON. 2	CON. 3
a.	Candidate A	*	*	***
b.	Candidate B	*	**!	

Previous Accounts of Nominal compound in Igbo

Nominal compounds have been studied from different perspectives. We focused only on works on the mopho-phonological aspects of the compounds. Green and Igwe (1963), Welmers (1970, 1973) are notable. Welmers merely included in his discussion of Igbo grammar, some aspects of Igbo compound verbs. He mentions the fact that the first component of the so-called compound verb in Igbo is an independent verb root, and that the second component can be another verb root or affixes. Green and Igwe (1963) share the same view of Welmers. They list a number of lexical items based on tone, which they refer to as compound verbs in Igbo.

Adopting the Polysemy theory, Nwaozuzu (1991) and Oluikpe and Nwaozuzu (1995) identify that "a contextualized item (x) will produce more than one meaning (1-nth). Each will have an identifiable grammatical form; but at least out of the grammatical forms will be identical with the grammatical form of the input". Applying this to some lexical inputs, they realized compounds and genitival constructions as different senses of a word when contextualized. They present the following example:

1.	**Lexical input**	**Semantic realization**	**Grammatical realization**
	ulọ akụ	Akụ's house	Genitival
		House of wealth	Genitival
		bank	compound

They conclude that nominal compounds and genitival structures in Igbo are structurally identical. That, it is therefore the polysemy model which helps to realize through contextualization both nominal compounds and genitival constructions from N+N structures in Igbo and other languages. They indirectly discard the phonological criteria in distinguishing nominal compounds and genitival structures.

In terms of morpho-phonological analysis of nominal compounds in Igbo, Anagbogu (1995) analyzes the Strong Boundary Condition (SBC) for compounds using Igbo language as a scaffold. He cites Allen (1977) as observing that any compound in language (particularly nominal compounds) must fulfill the Primary Compound Formulation Rule (PCFR) which states thus: PCFR $[\#\ X\ \#]_N - [\#\ Y\ \#]_N$ _____ [# X #][#Y#]

He explains the symbols thus; PCFR produces compound with double word boundaries stated thus X##Y. An output of PCFR is claimed to be semantically transparent, i.e, it possesses a complete predictability of the range of possible meanings for a given primary compound. The presence of the double word boundary checks exceptional or non-general semantic composition. This claim as cited in Anagbogu (1995 p.247) is formalized below:

Strong boundary condition for compounds (SBC)

> In the compound 'x', no semantic amalgamation process can involve x and y'. Where semantic amalgamation process refers to any process of meaning formation which involves loss or deformation of meaning.

The crux of SBC as captured by Anagbogu (1995) is that compounds produced via SBC are phonologically stable and semantically transparent (i.e.) they contain no idiosyncrasies. They have double internal word boundaries. According to Anagbogu (1995) while citing Allen (1977), the SBC ensures or stipulates that "there should be double internal word boundaries" for compounds thereby making such compounds immune to phonological alterations and that compounds that do not fulfill the SBC are not true compounds in every sense of the word.

He analyzes nominal compounds in Igbo in terms of those sensitive to phonological changes and insensitive to phonological changes. For the former group, he identifies assimilation and or tonal changes. He observes that the compounds of the former group are classified as "apparent" compounds in that they are not derived through PCFR which normally possess double internal word boundaries which shield them from phonological distortions and the attendant semantic opacity. "A weak or a single internal boundary like the one in the apparent compound or in the suffix- like compound cannot achieve this:" (p.253). For the latter group, these phonological phenomena are forbidden by the SBC with its strong double boundaries. He argues that whenever the compounds are produced through the operations of PCFR, the compound members must remain intact and undisturbed phonologically and semantically. We find his analysis very interesting and particularly the test of the SBC in Igbo language which seems to have provided clearer perspective to discussions on phonological implications of derivation of nominal compounds in Igbo. We hope to adopt this in analyzing nominal compounds in Ibeme Igbo partly as a way of substantiating or otherwise his claim that SBC is universal in application.

In a recent study, Emenanjo (2015) observes that noun compounding is one of the contentious issues in Igbo studies. He identifies that there are some morphophonological processes in the realization of noun compounds such as vowel elision, vowel assimilation, syllabic nasal elision, and tone change and vowel dissimilation. The present study from a constraint perspective shall provide explanation of how these processes interact in the nominal compound formation with insights in Ibeme Igbo.

Nominal Compounds in Ibeme Igbo

We adopt Nwaozuzu (1991) and Oluikpe and Nwaozuzu's (1995) polysemy model in identifying nominal compounds in Ibeme Igbo and more importantly in distinguishing them from genitival constructions. Analysis of the semantic categorization and syntactic perspectives of nominal compounds is beyond the scope of this study. We are rather concerned with morpho-phonological features/aspects in the realization of nominal compounds in Ibeme Igbo.

We subscribe by analysis to PCFR (and SBC) (c.f Allen (1977) and Anagbogu (1995) hence in Ibeme Igbo, we identify two forms of nominal compounds: those that are sensitive to phonological changes and those that are insensitive to phonological changes. In line with these two forms, we present examples in Ibeme Igbo and analyze how they belong to either phonologically sensitive or insensitive nominal compound groups:

3. (a)

(i) *ndi + ọ̀gụ̀* ⟶ *ndọ̀gụ̀/ndɔgʊ /*

'people' 'fight' *'fighter'*

(ii) nwa + ìgbe ⟶ *nwīgbē /n^{w}igbe/*

'offspring' 'box' *personal name (female)*

(iii) hụ + okụ → *họkū /hɔkʊ /*
'body' 'hot' *'fever'*

(iv) okporo + ụzọ̀ → *okporụ̀zọ̀ /okporʊzɔ/*
'path' 'road' *'main road'*

(b)
(i) onye + ozī → *onyozī /oɲozi/*
'person' 'message' *'messenger'*

(ii)mkpụrụ + òbì → *mkpụròbì /mkpʊrobi/*
'fruit' 'mind' *heart*

(iii) Teète + ukwu → *teètekwu /teetek^{w}u/*
'father' 'great' *'grandfather (maternal)'*

(c)
(i) nwerè + di → *nwerē dī*
'wife' 'mother' *'co-wife'*

(ii) ok^{h}e + ne → *ok^{h}enē*
'great''mother' *'grandchild (maternal)'.*

(iii) nwa + te → *nwatē*
'child' 'father' kinsman

(iv) Ùkọ̀rọ̀ + bèkeè → *ùkọ̀rọbèkeè*
'okro''european/western' *'paw-paw'*

(v) m̀gbụ̀ + mayi → *m̀gbụ̄mayì*
Vagina wine dregs

Examples in 3 (a) show regressive assimilation, vowel elision and tonal changes in the noun compound formations. The regressive assimilation involves the first vowel of the second noun (N_2) assimilating or taking the features of the last vowel of the first noun (N_1). And because of the backward direction of the assimilation process, it is said to be regressive. Vowel elision occurs in the derived compounds. Tone changes could be seen in high tone of the last syllable of N_1 dropping to low in 3a (i), low and high tones of N_2 changing to down-step in 3a (ii), high tone of the last syllable of N_2 changing to down-step in 3a (iii) while high tone in the first syllable of N_2 changes to low tone in 3a (iv) among others. We observe from the data that while assimilation (regressive) rule is as a result of vowels on both sides of the internal boundary thereby changing the quality of the vowel on the left side of the boundary, tonal alternations can be seen to adhere to the tone rules in associative constructions. (see Emenanjo, 2015)

Examples in 3b show regressive assimilation for (i) and (ii) and progressive assimilation for (iii), vowel elision involving these vowels /o/ in (i-ii) and /e/ in (iii). There are no tonal changes in the derived compound forms which reflect native speaker's intuitive knowledge of Ibeme Igbo. Examples in 3(c) show no assimilation because of the presence of two different segments in the word boundary positions, i.e consonant and vowel but the tone changes adhere to the tone rules in associative constructions (see Emenanjo, 2015). These morpho-phonological processes in the realization of these

examples (3a(1-iv) could be explained by the fact that there was no Strict Boundary Condition (SBC) in these samples which make them prone to phonological alterations. And for these reasons which are in line with Angbogu (1995), we typify them as cases of phonologically sensitive nominal compounds.

The following (4) were identified as nominal compounds that do not allow both assimilation and tonal change thus insensitive to phonological change in Ibeme Igbo.

4. (i) *isi/i ʃ i/ kwụkwọ̄* ⟶ *isikwụkwọ̄*
head book/soup intelligent/brilliant

(ii) *Ok^{h}e + madụ̀* ⟶ *Ok^{h}emadụ̀*
Male human An elder

(iv) *okpo + bèkeè* ⟶ *okpobèkeè*
road European/western 'main road'

Examples in 4 above do not show case of assimilation because of the combination of segments in the last syllable inN_1 and first syllables in N_2 of the nouns. This combination is that of vowel-consonant pattern which makes it impossible for any assimilation process to take place. The examples are also immune to tone changes and this is in line with the Emenanjo's (2015) tone changes in associative constructions in Igbo. For the example in (i-iii), the N_1 (*isi*,*ok^{h}e*,*okpo*) belong to tone class 1 (HH) of disyllabic nouns and they "retain their tone as the first noun of the associative construction" (p115) likewise N_2 (*kwukwu*, *madu, and bekee*), which belong to tone class V (HS), III (HL), and IV (LL) respectively of disyllabic nouns and they "retain their tones as the second noun of the associative construction"(p115). Based on these, we typify them as 'phonologically insensitive' nominal compounds in Ibeme Igbo.

Adopting the polysemy theory as used by Nwozuzu (1991), Oluikpe and Nwaozuzu (1995) and Nwaozuzu (2005), we understand that when a word is contextualized, there are different meanings and a functional shift. Each meaning has an identifiable grammatical form: but at least one of the grammatical forms will be identical with the grammatical form of the input. This is the main tenet of the polysemy model. In relation to the samples in 3 and 4, other grammatical realizations which could be derived from the N + N structures are genitival constructions. So, as in Igbo language, N + N constructions when analyzed semantically (using polysemy theory) can be grammatically realized as genitival constructions and compounds in Ibeme Igbo. This is consistent with the views of Omachonu& Abraham (2012) on the Igala language.

We further hold that the samples in 3 and 4 are nominal compounds in Ibeme Igbo giving that they meet the semantic criteria for defining compound hood- (some criteria which have been highly appealed to in the analysis of Igbo Compounds in current literature). These semantic criteria as captured in Nwozuzu (1991, pp. 10-13) indicate that "a nominal compound is one with two or more isolatable free constituents whose overall meaning conforms to at least three of the following semantic criteria (i) unity of concept (ii) semantic specialization (iii) permanent aspect and, (iv) unitary representation of concept". By unity of concept, it means a compound denotes single new idea rather than a combination of ideas suggested by the original words (the constituents) thereby naming a new semantic whole as in 3. By semantic specialization, it means that the compound refers to a combination of words which has acquired a special meaning in a language to the extent of being adjudged as, at least, having become partly lexicalized and semantically specialized that its specific referent is no longer readily predictable from the surface constituents as in *mgbumayi* 'dregs" as specific to Ibeme dialect and culture. Similarly, by permanent aspect, it means the bond between elements that form a compound must be intimate, irreversible and permanent and not just a casual

association. For instance, *ụkọrọbekee* is permanently referring to "paw paw", like wise '*nwate*' can only refer to 'kinsman'.

Lastly by unitary representation of concept, it means that none of the elements or constituents of a compound can semantically and wholly stand in for the compound singlehandedly in the grammar of the language. For instance, *ụkọrọ* cannot stand for 'paw paw', like wise '*Teete'* cannot stand for 'grand-parent (male)'(maternal)' etc.

Constraint-Based Explanation

It is important that before identifying some examples of nominal compounding which we analyzed and some of the constraints that will feature in their analysis, we highlight some tenets of OT which are of specific importance in the analysis of compounds. One of the new basic tenets of prosodic morphology and by extension Optimality theory as stated in McCarthy and Prince (1993b, p.138) is that "if some morphological domain is to be prosodically conditioned, then in that domain, Prosody dominates or ranks higher than morphology". This is represented with the ranking schema. P>>M where 'P' stands for prosody and 'M' stands for morphology. This could apply conversely.

We proceed with OT analysis by first identifying the constraints in line with two universal constraints of McCarthy and Prince (1993). The following are the constraints.

(A) Faithfulness (FAITH)- This is an identity constraint that requires the identity of linguistically related forms essentially between inputs and outputs.

(B) ALIGNMENT (ALIGN) – This is often called Generalized Alignment and is subsumed in the Anchor Constraint family of McCarthy of Prince (1993). It stipulates the positions (left L, Right R) of linguistically related forms in difference to another.

(C) OBLIGATORY CONTOUR PRINCIPLE (OCP)- This constraint prohibits the contiguous occurrence of identical tones at the left edge of the base or across stem/root boundary as in compounding of a linguistic structure. It often triggers tonal alterations in derivations.

(D) No V-HIATUS – A constraint that prohibits a sequence of adjacent vowels in a construction.

We therefore proceed with the account of the 'phonological sensitive and insensitive' nominal compounds in Ibeme Igbo.

TABLEAU 1: |teètekwu| 'Grandfather'

$N_1 + N_2 = NC$	NO V-HIATUS	OCP	ALIGN (N_1. L, N_2. R)	FAITH
(a) teete+ukwu=teeteukwu	*!	*!		
(b) teete+ukwu =ukwoteete			*!	**
(c) teete+ukwu =ukwuteete			*!	*
(d)➔teete + ukwu =teetekwu				*

RANKING SCHEMA: NO V-HIATUS>>OCP>>ALIGN>> FAITH

TABLEAU 2: |họkụ| |hɔkɔ| 'fever'

$N_1 + N_2 = NC$	NO V-HIATUS	OCP	ALIGN (N_1.L, N_2. R)	FAITH
(a) ➔hụ +ọku =họku				*
(b) hu +oku =hụoku	*!	*!		
(c)hu +ọku =ọkụhu			*!	
(d) hu +oku =okohu			*!	*

RANKING SCHEMA: NO V-HIATUS>>OCP>>ALIGN>> FAITH

In tables 1 and 2 (tableau 1& 2), the samples (a)- (d) are candidates fed into the input system as conceived by OT. The EVAL component evaluates them based on the constraints listed in the columns in order to generate an optimum candidate in the derivation of the noun compounds,

(teetekwu 'grandfather') and (*họọku-'fever'*). We provide the analysis of table 1. For the candidates (a-d), sample (a) shows no assimilatory process and tone changes in the formation of the noun compound while (b) and (c) shows wrong morphological form whereby N_2 becomes N_1. These do not capture the morpho-phonological processes in the derivation of the compound noun (teetkwu 'grandfather'). 'No assimilation' process rule is conceived in OT as 'No V-Hiatus' which is a constraint that forbids the occurrence of adjacent vowels- a condition/situation that triggers assimilation. 'No tone changes' rule is conceived in OT as 'OCP' which forbids identical tones across word boundary or associative constructions. Again, the morphological form of the nouns is conceived in OT as 'ALIGN' which generates the right morphological form of the nouns in the derivation of the compound noun. Sample (d) is seen as the output of the process (a reason for which it is marked with the arrow) because, it does not violate the constraints that allow for assimilation (NO V-Hiatus), tone changes (OCP) and the right morphological form (ALIGN) for the derivation of *teetekwu* even though it violates a least ranked FAITH constraint.

Explaining the analysis in table 1 which also applies to table 2 from the OT perspective, it is seen that prosodic features/constraints (NO V-HIATUS and OCP) rank higher than morphological features/constraints (ALIGN and FAITH) in line with the OT principle that if morphologically domain is phonologically conditioned, then phonology (Prosody) ranks higher than morphology. For instance, in simple terms, it means that there must be assimilation process, tone changes and right morphological form maintained (in this order of occurrence) for the nouns (*teete*) and (*ukwu*) to combine to form (*teetekwu* 'grandfather'). Secondly, OCP constraint and NO V-HIATUS provide the environment for the progressive assimilation in tableau 1 and regressive assimilation in tableau 2. Also, we notice that the optimal candidates (d-for table 1 and a, for table 2) are those that do not incur any violation of the highly-ranked constraints (NO V-HIATUS, OCP and ALIGN).

We observe that Obligatory Contour Principle (a phonological constraint that allows for tone changes in an associative construction) being highly ranked shows that these structures are not solely immune to phonological alterations hence supporting the opinion of Anagbogu (1995) which we share here that such structures are "phonologically sensitive'. This is so because the ranking of a constraint explains the interaction of the morpho-phonological processes in the derivation of a compound. Further justifying the ranking, ALIGN constraint is a highly ranked constraint in compounding in Ibeme Igbo. We observe too that the ALIGN constraint reflects some semantic criteria in compounding as stated by Nwaozuzu (1991); which is why it is so highly ranked. One of the criteria is permanent aspect which stipulates that the bond between constitutents or elements that form a compound must be intimate, irreversible and permanent and not just a casual association. This represents part of the workings of the ALIGN constraint as it ensures irreversibility of the order of the constituents in deriving a specific meaning. Typifying the ALIGN constraint in the data is that the N_2 (*ukwu, oku*) cannot be in the position of N_1 (*teete, hu*) for the derivation of *teetekwu* and *hooku.*

In the same vein, let us consider tableau 3 below for the OT analysis of 'Phonologically insensitive' nominal compounds. These fulfill the Strict Boundary Condition (SBC) necessary for the derivation of 'real' nominal N_1N_2 compounds.

TABLEAU 3: |okpo bekee| 'main road'

$N_1 + N_{2=NC}$	ALIGN (N_1. L, N_2. R)	FAITH	OCP	No. V-HIATUS
(a) okpo+bekee =bekeeokpo	*!			*
→ (b) okpo+bekee=okpobekee				
(c) okpo+bekee =ukorubekee		*!		
(d) okpo+bekee =bekeeokporu	*!	*!	*	*

RANKING SCHEMA: ALIGN>>FAITH>> OCP>>V-HAITUS

The samples (a-d) in table 3 above serve as inputs for the derivation of the noun compound *okpobekee* 'express road'. Samples (a) and (d) are contrary to the right morphological form of the two nouns to realize the compound noun as N_1 and N_2 are juxtaposed. Also, (c) does not depict the morphological form of N_1 for the realization of the compound noun and these capture the morphological aspect of the derivation. However, the phonological aspects (assimilation and tone changes) as conceived in OT as 'NO-V-Hiatus and OCP' constraints do not apply in the forms of the samples because of the presence of two segments at the word boundary which would not allow assimilation and for the fact that the constituent nouns retain their tones in associate constructions in the compound noun *okpobekee.* This is reflected in their being least-ranked as demonstrated by their position in the schema (ALIGN>>FAITH>>OCP>>V-HIATUS). Sample (b) is the optimal candidate, ie. that which fulfills the processes and obeys the constraints as ranked. This is so because in the sample, the morphological form of the constituent nouns are retained which forecloses the phonological aspects of assimilation and tone changes leading to the derivation of *okpobekee*. This in OT means that ALIGN AND FAITH constraints must not be violated for the optimal candidate to be realized in the derivation of the noun compound *okpobekee.*

From the OT perspective, it is observed that the major tenet of OT is again buttressed whereby morphology (ALIGN AND FAITH) ranks higher than phonology (NO-V-Hiatus and OCP), depicting that the realization of the compound noun *okpobekee* 'expressway', is not phonologically conditioned.

Our OT analysis of nominal compounding in Ibeme Igbo as done here has implications for particularly morphological studies in nominal compounding and compounding generally. In terms of morphological studies in nominal compounding, we hold that if the Allen's (1977) Strict Boundary Condition (SBC) and primary Compound Formulation Rule (PCFR) which is claimed to be language universal and has been attested by a number of studies across languages (Allen 1977 on Welsh, English, Anagbogu (1995) Igbo, Omachonu& Abraham (2005) Igala, etc.) is anything to go by, then we can make some imputations. First, for the phonologically insensitive nominal compounds which we observe that they fulfill the SBC and hence tagged 'genuine' compounds; they are immune to phonological changes because from our OT account, phonological constraints are least-ranked in Ibeme Igbo in their derivation as in the analysis of *teetekwu*. This is in line with the OT principle that constraints are universal but the ranking of the constraint is language specific. Similarly, for those that are tagged phonologically sensitive which defile SBC, their nature is reflected in the ranking of constraints in Ibeme Igbo where phonological constraints rank higher than other (morphology) constraints as in the analysis of *Okpobekee.*

Similarly, in terms of general studies on nominal compounding in (Igbo) language, the notion that phonological criteria in determining nominal compounds or compoundhood is not largely favoured as opposed to widely embraced semantic criteria (championed by Nwaozuzu (1991), Oluikpe and Nwaozuzu (1995) etc.) seems to have been substantiated by our OT analysis. The apparent failure of the phonological criteria account is more revealing in our OT analysis which indicates that 'genuine' nominal compounds in Ibeme Igbo reflect least-ranking of phonological constraint.

Summary and conclusion

We have been able to provide insights with Ibeme Igbo into constraint-based explanation of nominal compounds. We identified that the morpho-phonological rules/processes that underlie nominal compound formation in Ibeme Igbo are vowel assimilation, vowel elision and tone changes. We identified (by subscription to Anagbogu 1995) that nominal compound formation may allow phonological changes in which case we produce 'phonologically sensitive' compounds or may be immune to phonological changes (phonologically insensitive) with examples in Ibeme Igbo. In addition, we tested the samples of these two forms of noun compounds using the compound test frame

as espoused by Nwaozuzu, (1991). The constraint –based explanation reveals that the identified morpho-phonological processes that underlie noun compound formation are explained in the light of either morphological or phonological constraints which are ranked in a particular order for the derivation of the compounds. We identified NO-V Hiatus constraint as that which forbids assimilation, OCP as constraint which triggers tone changes, ALIGN and FAITH which stipulate that the morphological form of the inputs (constituent nouns) must be the same at the output level (nominal compound).We further identified two forms of ranking order which typifies the analysis of morpho-phonological processes in the derivation of 'phonologically sensitive' and 'insensitive' noun compounds. We found that while the sensitive class shows high ranking of phonological constraints (No-V Hiatus and OCP) over morphological constraints (ALIGN and FAITH), the reverse is the case for insensitive class.

The study concludes drawing from the import of the constraint-based explanation that that nominal compounds in Ibeme Igbo and indeed Igbo are better not phonologically identified (but better semantically identified), given that nominal compounds which fulfill SBC (tagged 'real' nominal compounds) are phonologically immune and as such have least ranking of phonological constraints in line with the principle of OT that constraints are language universal but their ranking is language specific. We recommend further constraint –based studies involving other forms of compounds in other dialects to substantiate our claims in this study.

References

Allen,M.R.(1977). Morphology Investigation. *Unpublished doctoral Dissertation. The University of Connecticut.*

Anagbogu, P.(1995). The strong boundary condition for compounds: The Igbo perspective. In E. N. Emenanjo& O-M, Ndimele (Eds). *Issues in African languages and linguistics .Essays in Honour of Kay Williamson*. Pp. 246-257 Aba: NINLAN.

Archangeli, D &Langendeon, D. (1997).*Optimality theory: An overview*. Oxford: Blackwell.

Emenanjo, N.E (2015). *A Grammar of Contemporary Igbo: Constituents, Features and Processes*. Port Harcourt: M & J Orbit communications

Green, M. M. &Igwe G.E. (1963). *A descriptive grammar of Igbo*. Berlin: AKademic-verlag.

McCarthy, J & Prince, A. (1993).Generalized Alignment. In G. Booij and J, Van-Marle (Eds).*Yearbook of Morphology.* Dorrecht: Kluert. Pp.79-154

McCarthy, J & Prince, A. (1994). The Emergence of the Unmarked: Optimality Theory in Prosodic Morphology. *NELS, 24*, pp.333-379.

Nwaozuzu, G.I.(1991). Igbo nominal compounds: A Semantico- Typological Analysis. *Ph.D Thesis, Department of Linguistics, Igbo and Other Nigerian languages, University of Nigeria, Nsukka.*

Nwaozuzu, G.I.(2005). Igbo nominal compounds: A semantic-categorization. In O-M, Ndimele (Ed).*The study of languages and linguistics in Nigeria*. Pp. 721-745 Aba: NINLAN.

Nwaozuzu, G. I. (2008). *Dialects of the Igbo Language*. Nsukka: University of Nigeria Press ltd.

Oluikpe, B.O.A & Nwaozuzu, G.I. (1995), Igbo Nominal compounds: Fact or Fiction? In E.N Emenanjo& O-M, Ndimele (Eds).*Issues in African Languages and Linguistics.Essays in Honor of Kay Williamson*. Aba: NINLAN. Pp. 229-237

Omachonu, G.S & Abraham, D.A (2005). Compounding in Igala: Defining Criteria, Forms and Functions. *Language Studies.* 2(1), 12-19

Onwukwe. D.C., Ndimele, R.I &Onukawa, M.C.(2015).Ibeme as Dialect of Igbo. *Journal of Linguistics Association of Nigeria (JOLAN),18(11)*

Prince, A. & Smolensky, P. (1993). Optimality Theory: Constraint Interaction in Generative Grammar. New Brunswick: Rutdges Center.

Welmers, W.E. (1963). The derivation of the Igbo verb base. *SAL 1*. 49-59