An Optimality Approach to the Study of Syntactically Derived Nominals in Yoruba

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Abstract
Most of the existing studies on nominal derivation in Yoruba exclusively employed rule-driven derivational frameworks, such as Government-Binding theory and Minimalist framework. This paper attempts an application of Optimality Theory to the study of nominal derivation in Yoruba, following the assumption that the well-formedness of derived nominals in natural language is ultimately governed by an interaction of conflicting constraints. It examines two categories of syntactically derived nominals: minimal projection and extended projection. Findings show that Yoruba, being a language which subscribes to the head parameter value *head-first*, ranks the alignment constraint ALIGN-LEFT very high. This is in conjunction with the markedness constraint which requires that every structure or projection is headed (OB-HD). Whereas minimally projected nominals satisfy STAY and NO-LEX-MVT, extendedly projected nominals violate them because the former category of nominals generally does not allow movement.

Keywords: nominals, minimal projection, extended projection, Yoruba, Optimality Theory

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1. Introduction

When Optimality Theory (OT) first appeared on the linguistic scene in the 1990s, the level of grammar to which it was first applied was phonology due to the fact that it was originally designed as a phonological theory. However, over time, it was assumed that the theory was (and still is) an encompassing theory of grammar. For this reason, scholars have successfully attempted to test the tenets of OT against non-phonological phenomena, particularly syntax. Notable among such works include Golston (1995), Müeller (1997), Keer and Baković (1997) as well as Grimshaw (1997), just to mention a few. In the words of Kager (1999, p. 347),

> the idea of the OT approach to syntax is that the diversity of syntactic structures across languages reflects differences in the rankings of universal and violable constraints.

This present study is therefore aimed at unravelling the hierarchy of relevant constraints governing the well-formedness of syntactically derived nominals in the Yorùbá language.

Nominals are grammatical constituents that behave and function like canonical nouns. In human language, they fall into three broad categories: underived, morpho-phonologically derived, and syntactically derived, although the present study focuses on the latter category. It goes without saying that works on nominal derivation in Yorùbá are not uncommon in the existing literature. Studies such as Adewole (1995), Ilori (2010) and Eleshin (2017), among many others, are testaments to this fact. However, majority of the existing studies employed rule-driven derivational frameworks. Interestingly, efforts in linguistic research in the past three decades have been largely directed towards exploring the possibility of analyzing the features of language from the angle of constraints rather than rules, based on the assumption that the former unite the description of individual languages with linguistic typology in a more profound way than the latter. Therefore, it becomes paramount in this study to examine how constraints interact in the formation of Yorùbá nominals that are driven by lexical and

extended projections. The analysis is largely founded on Grimshaw's (1997) proposals in her OT-based account of *wh-movement*, *subject-verb inversion* and *do-support* in English.

2. Syntactically Derived Yorubá Nominals

Strictly for the purpose of this study, syntactically derived nominals in Yorùbá are those nominals that are generated via a syntactic projection from the lexical stratum to the maximal stratum in which structural modifications take place. These kinds of nominals are in turn sub-categorized into two: nominal lexical projections and nominal extended projections. According to Yusuf (1997, p. 8), syntactically derived Yorùbá nominals (SDYN) constitute syntactic categories that code the participants in the event or state described by the verb. Exclusively construed as noun phrases in most of the existing studies, SDYN are headed by nouns and it is by virtue of this headedness that the phrases are called noun phrases. Similarly, Yusuf (2010, p. 266) posits that "the noun phrase is made up of a noun head and its required or optional satellites; and such satellites may include another noun or a derived noun." The examples in (1) are from Yusuf (2010).

(1) a. Ọmọ ẹran
        child animal
        'kid'

     b. Ilé ìwé
        house book
        'school'

     c. Owó orí
        money head
        'tax'

     d. Ìyá àgbà
        mother elder
        'grandma'

    e. Ètò ìṣèlú
      arrangement governing-town
      'politics'

    f. Ìyàwó gbogbo èèyàn
      wife   all   person
      'loose woman'

All the examples in (1) are instances of nominals derived by nominal lexical projection in that the headword projects to a phrasal level with its complement. With respect to the combination of constituents in the structure of Yorùbá noun phrases, Yusuf (2010) asserts that the headword (i.e., the noun) comes first and the modifiers follow. Similarly, Sanusi (2012) argues that Yorùbá head nouns are post-modified thereby producing 'headfirst' as a parameterization of the headedness principle in the Government and Binding theory. "The headword is the single word that can stand for the whole construction; it is the single lexical item that can replace the whole phrase" (Yusuf, 1997, p. 8).

    Yusuf (1997) submits that SDYN can be found in different constituents in the sentence – in the subject position, in the object position, or as object of the preposition. Yusuf (2010) also establishes that nouns name things while noun phrases function as subjects and objects of verbs and prepositions, thereby coding participants in the discourse. Let us consider example (2), taken from Yusuf (1997, p. 25), for an illustration.

(2)   *Adé* pa   *ejò* ní *oko*
         Adé   kill snake in   farm
         'Adé killed a snake in the farm'

The italicised noun phrases (or nominals) in (2) function as subject of the sentence, object of the verb and object of the preposition, respectively. Other examples of Yorùbá noun phrases are italicised in (3) (Arokoyo, 2010).

(3) a. *Olú* gbá *ilẹ̀*
        Olú sweep floor
        'Olú swept the floor'

    b. *Tolú* pọn *omi*
        Tolú fetch water
        'Tolú fetched water'

    c. *Ṣadé* rọ <u>epo</u> sí *inú mọ́tò*
        Ṣadé put oil   into car
        'Ṣadé put oil in the car'

    d. *Ṣadé* da *omi* láti *inú ike*
        Ṣadé pour water from inside bowl
        'Ṣadé poured water from the bowl'

    e. *Olú* fi *ọ̀bẹ* gé *iṣu*
        Olú use knife cut yam
        'Olú cut the yam with a knife'

The italicised constituents in (3a-e) generally function in different capacities (e.g., as subject of the sentence, object of the verb and object of the preposition). What (3) shows is that Yorùbá noun phrases can be made up of either a single word (the headword) or a group of words.

   There is another category of Yorùbá nominals that are syntactically derived via extended projections. These projections are higher than the lexical projections. While the lexical projections ensure that the head noun obligatorily project from the lexicon with its idiosyncratic lexical items, the extended projections, on the other hand, require that the head noun project with a clausal complement, that is, an extension of the lexical entry. In a nutshell, nominal extended projections in Yorùbá are grammatical constructions comprising the head noun and a relative clause (Yusuf, 1999; Awobuluyi, 2013), that is, noun phrases housing complementizer phrases to become full noun clauses. Examples in (4) were reproduced from Yusuf (1999) and Awobuluyi (2013).

(4)a. *Olùṣọ́gbà kọ́lẹ́ẹ̀jì wa tí ó darúgbó*   kò   wá   ibi   iṣẹ́
        guard   college our that 3SG become-old NEG come place work
        'The old security guard of our college did not come to work'

      b.   Ìwé   tí   mo rà
          book that I   buy
          'the book that I bought'

      c.   Lílọ   tí   ó lọ
          going that he go
          'the trip which he made'

      d.   Èdè   tí   ó   pè
          language that he   call
          'his/her response' [sic]

      e.   Ibi tí   ó   wà
          place that he be-in
          'the place where he is'

In (4a), the italicized constituent constitutes the external nominal (i.e., subject noun clause) whereas the entire structures in (4b-e) are noun clauses. Observe that in each of the examples, the head noun is accompanied or post-modified by a complementizer phrase whose projection is licensed by the functional category *tí* 'that/which/who'.

    The derivation of the two categories of Yorùbá nominals briefly reviewed above have hitherto been examined in the context of syntactic theories, particularly Government & Binding and Minimalist theories. However, this study proposes a constraint-based approach within the ambit of a general theory of grammar – Optimality Theory – with a view to providing a more principled account of the parameterization of the concept of 'headedness' in the Yorùbá syntactic domain. The basic tenets of the theory are summarized in the next section and its application to the syntax of English by Grimshaw (1997) is reviewed afterward.

3. Optimality Theory

Optimality Theory was propounded in 1993 by Alan Prince and Paul Smolensky as a theory of Universal Grammar. Hameed and Abdurrahman (2015) describe the theory as follows:

> Optimality Theory is a modern linguistic theory that aims at describing and explaining languages in a new framework. It is considered to be a radical departure from the derivational model of the previous versions of generative phonology. It assumes that grammars of individual languages draw their basic options from a set of universal constraints. It achieves universality by the ranking and the reranking of such constraints. These constraints are considered to be a detailed description of linguistic phenomenon in different languages. (Hameed & Abdurrahman, 2015 p. 13)

Before the evolution of constraint-based theories, the leading phonological frameworks as at the 1960s, 70s and 80s saw grammar as a mechanism in which a form is derived from another by an ordered set of rules. Such theories include Generative Phonology, Auto-segmental Phonology, Metrical Phonology, and Lexical Phonology, all of which were derivative in their procedure of analysis. Following Downing (2009, p. 1), "The rise of Optimality Theory shifted attention from theories of representations to a constraints-based theory of phonological processes and their interactions". The motivation for the radical shift is not far-fetched: the generative framework of representations was based on re-write rules, but, as McCarthy (2008, p. 1) observed, "re-write rules can explain lots of phenomena, but they do a poor job of explaining how phonological systems fit together". Thus, resolving this problem led to making recourse to constraints while dispensing with rules.

There are three functions or components which play crucial roles within the framework of OT: Generator (GEN), Constraints (CON) and Evaluator (EVAL) (Oyebade, 2018, p. 155; Ajiboye, 2020, p. 31). GEN defines the set of alternatives to pick from; these choices are known as

the candidates comprising the input, the output and the correspondence between them. CON is the mechanism for picking one candidate at the expense of another; its key properties include universality, ranking and violability. The CON component specifies that there is one universal set of constraints for all languages of the world; they are, however, ranked on language-particular basis and their violations are inevitable as no candidate necessarily satisfies all of them. Finally, EVAL receives the candidate set from GEN, evaluates it using some constraint hierarchy, and selects its most harmonic or optimal member as the output of the grammar (McCarthy, 2007). Such form is the actual, observable linguistic item in the language.

3.1. OT and Syntactic Phenomena

As earlier mentioned, OT has been variously applied to the syntactic component of grammar over the years. However, only Grimshaw (1997) is reviewed here due to its relevance to the present study; hence, the present analysis builds on some of the proposals advanced therein. Grimshaw's (1997) analysis of extended verbal projections in English covers three phenomena: patterns of wh-movement, subject-verb inversion, and do-support. The analysis is intended to demonstrate how the principle of economy of derivation and representation (in Minimalist Syntax) which is manifested in the domain of extended verbal projections can be reduced to the interaction of syntactic constraints. Grimshaw's analysis is naturally integrated with the general principles of OT and also analogous to OT analyses of phonological phenomena involving economy, such as epenthesis (Kager, 1999).

With respect to extended verbal projections in English, Grimshaw claims that syntactic inputs are defined in terms of lexical heads and their argument structure but otherwise devoid of syntactic structure. That is, no syntactic projections are represented in the input – the assignment of such structures is carried out by GEN in the output. Thus, Grimshaw defines the input for verbal extended projections as follows:

(5) **Input**
    a.   A lexical head plus its argument structure
    b.   An assignment of lexical heads to its arguments
    c.   A specification of the associated tense and semantically meaningful auxiliaries

She uses the sentence 'What did Mary say?' as a case study. According to her, the input of this sentence is defined by the lexical head 'say' which is a predicate taking two arguments, plus an assignment of two lexical heads *Mary* and *what* to these arguments, as shown in (6).

(6)   say (x, y)
               x = Mary
               y = what
               tense = past

Concerning the specific representational vocabulary of syntactic theory within which GEN must keep while generating the candidate analyses for the above input, Grimshaw defines GEN as a function which generates all possible analyses of an input within the structural requirements of the X-bar theory. In other words, candidate analyses that are submitted for evaluation by the constraint hierarchy must all be proper X-bar structures. Generation of candidate analyses on the basis of a given input in OT is ultimately guided by the principle of *containment* proposed by Prince and Smolensky (1993). The principle, within the realm of phonology, requires that no element be literally removed from the input. This implies that any output form must contain all the elements present in the input. In this way, faithfulness of the output to the input is achieved. The operation of containment within the domain of syntax is stated along two dimensions by Grimshaw: (i) competing candidates are evaluated as analyses of the same lexical material; (ii) competing candidates to be generated for a single input must be semantically equivalent. In other words, each analysis of the input competes with other analyses of the same input and all these analyses must have non-distinct semantic representations. In summary, the structure of any syntactic candidate analysis posited by GEN on the

basis of a given input must strictly conform to the principle of containment.

Given this characterization, Grimshaw presents some candidate analyses that are derivable by GEN on the basis of the input of the sentence 'What did Mary say?', as shown in (7).

(7) a. [IP Mary [VP said what]]
    b. [CP what [IP Mary [VP said t]]]
    c. [CP what said$_i$ [IP Mary [VP e$_i$ t]]]
    d. [CP what did$_i$ [IP Mary e$_i$ [VP say t]]]

The four possible outputs in (7) are all extended projections conforming to X-bar structure. According to Grimshaw, an extended projection is a unit consisting of a lexical head and its projection plus all functional projections erected over the lexical projection. By and large, every candidate analysis of an input must be an extended projection conforming to the minimal X-bar theory defined as: *Each node must be a good projection of a lower one, if a lower one is present.*

Grimshaw's (1997) analysis of the interactions of wh-movement, subject-verb inversion and do-support in English basically aims at accentuating the principle of economy which is strongly held in Universal Grammar (UG). The economy principle simply says: *Do only when it is necessary.* Thus, movement of wh-elements or lexical heads is triggered only when such is necessary. For instance, head movement of the auxiliary occurs in order to generate interrogative sentences while subject-auxiliary inversion is disallowed in the construction of simple declarative sentences. By and large, economy principle is generally embraced in OT simply because "representational complexity never wins unless it brings a bonus in terms of lesser violations" (Kager, 1999, p. 364).

4. Data Presentation and Analysis
In this section, attention is devoted to Yoruba nominals that are syntactically derived via projection from a lexical head noun – Noun Phrase and Noun Clause. The analysis is hinged upon the tenets of OT. Consider the data in (8) for illustration.

(8)   a.   bàbá   dúdú   yẹn
               father   black   that
               'that dark-in-complexion father'

        b.   ìyàwó gbogbo èèyàn yìí
               wife   all   people this
               'this loose woman'

        c.   aṣọ pupa kan
               cloth red   one
               'one red cloth'

        d.   ibi   tí   ìyá   àgbà wá
               place that mother elder come
               'the place where the old woman came'

        e.   ọkọ̀ tí bàbá Wálé rà
               car that father Wale buy
               'the car that Wale's father bought'

        f.   aṣọ tí mo wọ̀
               cloth that I   wear
               'the cloth that I wore'

The data in (8) demonstrate how nominals are derived in Yoruba via syntactic projection from the lexical headword to a maximal node, that is, the phrase or the clause. The adaptation of the term 'derived' in this context is akin to the conceptualization of operation *Merge* in the minimalist framework where two items, each of which is a form in isolation in the lexicon, are independently selected and eventually merged into a syntactic unit. Along this line of theoretical orientation, the nominal constituent *aṣọ pupa kan* 'one red cloth', for example, is a product of syntactic derivation in that the bare noun *aṣọ* 'cloth' is merged with the adjective *pupa* 'red' at the initial stage, and the resulting structure *aṣọ pupa* 'red cloth' is then merged with the

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determiner *kan* 'one' in the final derivation of the given nominal structure. Note that the first word in each example in (8) constitutes the headword while the proceeding constituents are functioning as post-modifiers. On this premise, a generalization suffices: syntactically derived nominals in Yorùbá are consistently formed via post-modification of a head noun. Items (a-c) are instances of minimal projections (Noun Phrases) while items (d-f) illustrate extended projections (Noun Clauses). The next question is: What is the nature of the input of SDYN within the framework of OT?

I propose that syntactic inputs of SDYN are defined in terms of lexical heads (found at initial position) and their specifiers, but are otherwise void of syntactic structure (i.e., extended projection, such as CP). In other words, no syntactic projections take place in the input; rather, they are generated by GEN in the output (see (11a)). This definition is summarized in (9).

(9)   A lexical head at initial position
        A lexical head plus its specifier(s)
        An assignment of lexical heads to its specifier(s)

Therefore, all instances of nominals in the language whose candidate analyses are generated via syntactic operations are evaluated on the basis of the input defined in (9) and in relation to their relationship with the markedness and faithfulness constraints governing their syntactic formation. Using the phrase *bàbá dúdú yẹn* 'that dark-in-complexion father' as an illustration, the input can be substantially defined as follows:

(10)   bàbá   →   lower (lexical) node
        bàbá dúdú   →   higher (minimal) projection
        bàbá dúdú yẹn   →   maximal projection

The phrasal node *bàbá dúdú yẹn*, which is a maximal projection, is a good projection of the lower node *bàbá* 'father'. This clearly shows that the structural requirement of the X-bar theory which stipulates that *each node must be a good projection of a lower one, if a lower one is present*

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is strictly met. By extension, any candidate that is generated must meet this structural requirement before it can be admitted into the candidate set for evaluation. Put in another way, all candidate analyses of SDYN that are derivable by GEN must be proper X-bar structures.

The various syntactic operations that may be performed by GEN on the input to generate the candidate analyses are stated in (11).

(11) a. Introducing (extended) projections conforming to the X-bar theory
   b. Introducing functional heads which do not appear in the input due to their lack of full semantic interpretation (e.g., the complementizer *tí* 'who/which/that/whom/whose').
   c. Introducing empty elements (e.g., traces), as well as their co-indexations with other elements.
   d. Moving or permuting lexical elements.
   e. Replacing an input element with another element in the output.
   f. Introducing a new element in the output which is not originally present in the input.
   g. Removing some input element in the output.
                                      (Adapted from Grimshaw, 1997)

In consonance with the general prose definition given earlier in (9), the input of the phrase *bàbá dúdú yẹn* is characterized in (12).

(12)   bàbá (x, y)
        x = dúdú (adjectival-specifier)
        y = yẹn (determiner-specifier)
        {bàbá (x, y), x = dúdú, y = yẹn}

The relevant constraints are defined in (12) while the ranking is proposed in (13).

(13) a. OBLIGATORY HEADS (OB-HD): A projection has a head. By implication, every syntactically derived Yorùbá nominal must have a noun as its head.
     b. ECONOMY OF MOVEMENT (STAY): Trace is forbidden. The function of this constraint is to militate against any

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movement per se, or, in the case of gradient violation, to select the shortest movement, that is, the one that has the minimal number of intermediate steps. STAY, a general anti-movement constraint, subsumes all kinds of movement, including wh-movement and movement of lexical and functional heads.

c. NO MOVEMENT OF A LEXICAL HEAD (NO-LEX-MVT): A lexical head cannot move. Being a specific anti-movement constraint, the effect of NO-LEX- MVT is that a lexical head (for example, a lexical noun) must stay in the projection that it heads (i.e., NP).

d. ALIGN (STRUCTURE, LEFT; HEAD, LEFT) (ALIGN-LEFT): The lexical head of every projection must be positioned to the left edge of a structure, i.e., the initial position. This syntactic alignment constraint controls languages whose parametric setting or value for the head parameter is head-first. Yorùbá belongs to the category of such languages.

e. ALIGN (STRUCTURE, RIGHT; HEAD, RIGHT) (ALIGN-RIGHT): The lexical head of every projection must be positioned to the right edge of a structure, i.e., the final position. This syntactic alignment constraint controls languages whose parametric setting or value for the head parameter is head-last. This constraint is violated in Yorùbá.

f. LEXICAL PRESERVATION-INPUT, OUTPUT (LEX-PRE): The lexical items in the input must be preserved in the output. This constraint kicks against literal removal (deletion) of an input lexical item in the output, and it corresponds to the phonological faithfulness constraint MAXIMALITY (MAX).

g. LEXICAL DEPENDENCY-INPUT, OUTPUT (LEX-DEP): The lexical items in the output must have their correspondents in the input. That is, incorporation or introduction of new lexical items in the output that are not present in the input is banned. This constraint corresponds to the phonological constraint DEPENDENCY (DEP).

h. IDENTITY-INPUT, OUTPUT (LEXICAL ITEMS): Corresponding input and output lexical items must be identical.

Shortened as IDENT(LEX), this constraint bans substitution of an input lexical item with another in the output, and it corresponds to IDENT-IO(F) in phonology.
i. NOMINAL-SPECIFIER (NOM-SPEC): The specifier of a headword must be a noun.
j. ADJECTIVAL-SPECIFIER (ADJ-SPEC): The specifier of a headword must be an adjective.
k. DETERMINER-SPECIFIER (DEP-SPEC): The specifier of a headword must be a determiner.
l. MULTIPLE-SPECIFIERS (MULTI-SPEC): The specifiers of a headword must be more than one.

(14) OB-HD, ALIGN-LEFT, NO-LEX-MVT >> STAY >> LEX-PRE, LEX-DEP, IDENT(LEX) >> NOM-SPEC, ADJ-SPEC, DET-SPEC, MULTI-SPEC >> ALIGN-RIGHT

The ranking in (14) is a total one in that it accounts for all cases of minimal projection involving nominals in Yorùbá. It has three undominated constraints at the top and one lowest-ranked constraint at the bottom. This implies that all instances of nominal minimal projection in Yorùbá must have a head at the initial position, and any kind of movement within the projection to ensure well-formedness must not affect the lexical head. In other words, any other element may move but not the head. The analysis of *bàbá dúdú yẹn* is presented in Tableau 1, together with a partial ranking carved out from the comprehensive one proposed in (14). Note that the winning candidate is indicated with an arrow in all the tableaux, and the candidate is placed on top for ease of reference. In the tradition of combination tableau format which is the one adopted in this study, a 'W' under a constraint indicates that the given constraint favours the winner while an 'L' signifies that the constraint favours the particular loser with which the symbol is used.

Tableau 1: OB-HD, ALIGN-LEFT, NO-LEX-MVT >> STAY >> LEX-PRE, IDENT(LEX) >> MULTI-SPEC >> ALIGN-RIGHT

{bàbá (x, y) x = dúdú, y = yẹn}	OB-HD	ALIGN-LEFT	NO-LEX-MVT	STAY	LEX-PRE	IDENT(LEX)	MULIT-SPEC	ALIGN-RIGHT
→ a. [NP bàbá [AP dúdú yẹi]]								*
b. [NP bàbá [AP dúdú]]					*W		*W	*
c. [DP yẹni [NP bàbá dúdú ei]]				*W				*
d. [NP bàbá [AP dúdú yìí]]						*W		*
e. [AP dúdúi [NP bàbá ei yẹn]]			*W	*W				*
f. [NP bàbái [NP ei [AP dúdú yẹn]]]			*W	*W				*
g. [NP ei [AP dúdú yẹn [NP bàbái]]]		*W	*W	*W				L
h. [NP e [AP dúdú yẹn]]	*W				*W		*W	*

The winner in Tableau 1 is candidate (a) in that it fares better than the rest by satisfying all the constraints except ALIGN-RIGHT. The other candidates are ruled out for one reason or the other. Candidate (b) deletes one of the lexical items (*yẹn* 'that'), leading to a violation of LEX-PRE; (c) moves the determiner *yẹn* from the final position to the initial position. This leads to a violation of STAY, a general anti-movement constraint. Candidate (d) violates IDENT(LEX) for replacing the input *yẹn* with *yìí* 'this'; (e) violates both anti-movement constraints for moving the adjectival lexical head *dúdú* 'black' from its

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in-situ position; (f) does the same thing to the nominal lexical head *bàbá* 'father', leading to a fatal violation of NO-LEX-MVT and STAY. Candidate (g) is the worst in that it violates three highly ranked constraints by having its head at the final position through movement. The last candidate also loses out for not having a nominal lexical head.

The phrase *ìyàwó gbogbo èèyàn yìí* 'this loose woman' is analyzed in Tableau 2.

Tableau 2: OB-HD, ALIGN-LEFT, NO-LEX-MVT >> LEX-PRE, LEX-DEP, ALIGN-RIGHT

{ìyàwó (x, y, z) x = gbogbo, y = èèyàn, z = yìí}	OB-HD	ALIGN-LEFT	NO-LEEX-MVT	LEX-PRE	LEX –DEP	ALIGN-RIGHT
→ a. [NP ìyàwó [AP gbogbo èèyàn yìí]]						*
b. [NP e_i [AP gbogbo èèyàn yìí [NP ìyàwó_i]]]		*W	*W			L
c. [NP ìyàwó [AP gbogbo wa]]				**W	*W	*
d. [NP e [AP gbogbo èèyàn yìí]]	*W			*W		*

The second candidate in Tableau 2 resorts to movement of the lexical head *ìyàwó* 'wife' from its initial position to the final position. Thus, a fatal violation of NO-LEX-MVT is incurred. This also leads to a violation of the undominated syntactic alignment constraint ALIGN-LEFT which requires the head to be at the initial position. Candidate (c) deletes two lexical items (*èèyàn* 'human being' and *yìí* 'this'), and therefore violates LEX-PRE. The candidate then resorts to introduction of an extraneous lexical item *wa* 'our' which is not originally present in the input. This move obviously violates LEX-DEP, a faithfulness constraint which bans insertion of lexical items in the output which do

not have correspondents in the input. Candidate (d) also loses to candidate (a) for violating the undominated constraint OB-HD in that it does not have a nominal lexical head. It deletes the head noun to create its headless nominal structure. This in turn leads to a fatal violation of LEX-PRE. In a nutshell, candidate (a) wins.

Moving to the analysis of nominal structures derived via extended projection, the clause *ọkọ̀ tí bàbá Wálé rà* 'the car that Wale's father bought' is selected. The input is defined in (15).

(15)   ọkọ̀ (null specifier)

The specifier is null because syntactic (extended) projections, such as the CP *tí bàbá Wálé rà* 'that Wale's father bought', are banned from being specified in the input; they can only be generated in the output by the GEN function, as earlier emphasized. This conforms to Grimshaw's (1997) proposal with respect to the definition of inputs for English verbal extended projections. The candidate analyses and the ranking are presented in Tableau 3.

Tableau 3: OB-HD, ALIGN-LEFT >> LEX-PRE >> NO-LEX-MVT >> STAY, LEX-DEP >>   ALIGN-RIGHT

ọkọ̀ (null specifier)	OB-HD	ALIGN-LEFT	LEX-PRE	NO-LEX-MVT	STAY	LEX -DEP	ALIG N-RIGHT
→ a. [NP ọkọ̀i [CP tí [IP bàbá Wálé [VP rà ei]]]]				*	*	*	*
b. [NP e [CP tí [IP bàbá Wálé [VP rà]]]]	*W		*W	L	L	*	*
(**?**) c. [IP bàbá Wálé [VP ra ọkọ̀]]						*	

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In Tableau 3, EVAL chooses candidate (a) as the winner over candidate (b) because the former fares better than the latter on the hierarchy. Although (b) does not make recourse to movement of any sort, it violates OB-HD for not having a lexical head, and also LEX-PRE for deleting the supposed head. Given the ranking, candidate (c) beats the winner (that is, candidate (a)) comfortably in that it satisfies all the constraints except LEX-DEP. It is important to note that this candidate could not violate ALIGN-LEFT and ALIGN-RIGHT because it is an Inflectional Phrase (IP) and the head of an IP is an inflection which occupies neither the initial nor the final position. However, choosing candidate (c) over candidate (a) would have been a wrong choice, taking into consideration the containment principle which stipulates that candidate analyses must compete with one another on the basis of the same input and all the candidates must not be semantically distinct. Looking at candidate (c), one observes that it violates the containment principle simply because it is a projection whose semantic construct is distinct from the other two candidates. It is an IP while the others are NPs. Therefore, it does not belong to the candidate set on the basis of the given input. Scenarios such as this have a prime place in OT. It is generally assumed in OT that GEN has the freedom to generate an infinite number of structural outputs on the basis of a given input so long that they are kept within the restrictions guiding the universal vocabularies of linguistic representation. However, restrictions on the function of GEN are controlled by the containment principle in the following way: Even if GEN is free to generate any conceivable output candidates for some input, the candidates must be analyses of the same lexical material and the competing candidates that are generated for a single input must be semantically related. The ranking in Tableau 3 is further justified in Tableau 4 where another losing candidate is compared with the winner.

Tableau 4: OB-HD, ALIGN-LEFT >> LEX-PRE >> NO-LEX-MVT >> STAY, LEX-DEP >> ALIGN-RIGHT

ọkọ̀ (null specifier)	OB-HD	ALIGN-LEFT	LEX-PRE	NO-LEX-MVT	STAY	LEX-DEP	ALIGN-RIGHT
→ a. [NP ọkọ̀i [CP tí [IP bàbá Wálé [VP rà ei]]]]				*	*	*	*
b. [NP bàbá Wálé [CP tí [IP ó [VP rà ọkọ̀]]]]		*W		L	L	*	*

In Tableau 4, the second candidate decides to position the head noun at the final position. This then leads to a fatal violation of ALIGN-LEFT. Phrasal and clausal structures or projections in Yorùbá do not only have obligatory heads, the heads must occupy the initial position of their respective projections. This is the reason behind the domination of ALIGN-LEFT over ALIGN-RIGHT in the entire grammar of the language. In fact, ALIGN-LEFT is ranked so high that some constraints may be violated, e.g., STAY and NO-LEX-MVT, in order to ensure its satisfaction. This is exactly the case with the first candidate – it resorts to movement of the lexical head so as to ensure the satisfaction of ALIGN-LEFT. This again confirms the veracity of OT's assumption that no perfect candidate exists; the candidate that wins must have violated some constraint, but its choice as the winner is governed by the fact that it fares better on a given ranking than its fellow competitors.

The final analysis in this paper concerns the clause *aṣọ tí mo wọ̀* 'the cloth that I wore'. The input of this nominal is defined by the presence of the lexical head noun *aṣọ* 'cloth' with a null specifier. Of course, this implies some loss of correspondence between the input and the output, thereby violating LEX-DEP, a faithfulness constraint kicking against introduction of lexical items in the output which are not lexically represented in the input. Nevertheless, such violation is inconsequential

because LEX-DEP is dominated by some well-formedness constraints. The analysis is provided in Tableau 5 using the same ranking proposed hitherto for SDYN involving extended projections.

Tableau 5: OB-HD, ALIGN-LEFT >> LEX-PRE >> NO-LEX-MVT >> STAY, LEX-DEP >> ALIGN-RIGHT

aṣọ (null specifier)	OB-HD	ALIGN-LEFT	LEX-PRE	NO-LEX-MVT	STAY	LEX-DEP	ALIGN-RIGHT
→ a. [NP aṣọᵢ [CP tí [IP mo [VP wò̀ eᵢ]]]]				*	*	*	*
b. [NP e [CP tí [IP mo [VP wò̀]]]]	*W		*W	L	L	*	*
c. [NP èmi [CP tí [IP ó [VP wọ aṣọ]]]]		*W		L	L	*	L

Tableau 5 justifies the ranking employed so far for Yorùbá nominals whose derivation involves extended projections. One notices that the first candidate wins again for being more harmonic with the ranking than its other two competitors. Although it violates the two anti-movement constraints by moving the lexical head, it still emerges as the winner having beaten candidate (b) on OB-HD and LEX-PRE, and candidate (c) on ALIGN-LEFT. The insight that can be drawn from this analysis is that proper headedness and proper positioning of the headword takes priority over and above avoidance of movement. Avoidance of movement may lead to a fatal violation of ALIGN-LEFT whereas movement may be required in order to satisfy ALIGN-LEFT. This symmetrical relationship between ALIGN-LEFT and STAY in Yorùbá is a demonstration of conflict which can be resolved by ranking ALIGN-LEFT over STAY: ALIGN-LEFT >> STAY.

5. Conclusion

This paper has examined how nominals are derived syntactically in Yoruba via minimal and maximal projections, from OT perspective. Specifically, it has examined the relevant constraints that interact to produce the optimal forms of such category of nominals. It showed that Yoruba, being a language which subscribes to the head parameter value *head-first*, ranks the alignment constraint ALIGN-LEFT very high in conjunction with the markedness constraint which requires that every structure or projection should be headed (OB-HD). The study discovered that the well-formedness of syntactically derived Yorùbá nominals is partly governed by markedness constraints and partly, the containment principle. Markedness constraints ensure that the output is well-formed in accordance with the structural requirements of the grammar whereas the containment principle (similar to correspondence principle in OT-phonology) stipulates that candidate analyses should compete with one another on the basis of the same given input, and all these candidates must be semantically equivalent. In other words, no elements may be literally removed from the input, and no semantically meaningful elements may be introduced in the output. The containment principle therefore couches two constraints: LEX-PRE and LEX-DEP.

For nominals involving minimal projection, both constraints are never violated. For those involving extended projection, however, LEX-DEP is consistently violated because extended projections are never specified in the input but are introduced in the output. Both types of projections obey the markedness constraint OB-HD and the alignment constraint ALIGN-LEFT. However, whereas 'minimal' nominals satisfy STAY and NO-LEX-MVT, 'extended' nominals violate them because the former category of nominals generally does not allow movement but the latter must move the lexical head from the final position to the initial position in order to obey the highly ranked constraint ALIGN-LEFT. Given the fact that application of OT to Yorùbá syntax is a relatively new linguistic enterprise, it is therefore hoped that this work will trigger further studies in OT-Syntax in Nigerian languages in general and Yorùbá studies in particular.

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