Squibs

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Bimoraic Word Minimality Condition in Chitonga: OT Analysis[1]

1. Introduction

In many languages, there is a minimum placed on the size of a word (McCarthy & Prince 1986). For example, in Mohawk (Michelson 1988), every content word must contain at least two syllables. In Fijian (Hayes 1995), every word must contain at least two moras. Many Bantu languages are reported to have a general, if not absolute, prohibition on words with one syllable (Mtenje 1986; Kanerva 1990; Myers 1995; Harford 1999; Mkochi 2004). To avoid such forms, various languages employ different strategies in order to satisfy the general bisyllabic condition. With data from Chitonga (Southern Bantu), a Malawian language classified by Malcom Guthrie (1948) into Zone N Group 10 Number 15, we suggest in this paper that what counts prosodically for a verb (stem) to be well-formed in Chitonga is for it to be minimally bimoraic (two moras), and not necessarily the bisyllabic minimality condition. This claim is recast within Optimality Theory (OT), which shows that the minimal word condition in Chitonga straightforwardly stems from the ranking of relevant constraints in the language.

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2. The Problem

As cited in Hyman and Mtenje (1999), it has been agreed generally that the minimal word in Bantu is bisyllabic (cf. also Myers 1990; Kanerva 1990; Mutaka & Hyman 1990; Downing 1996). For instance, just like in other Bantu languages, Chitonga[2] requires that a verb (or any surface word) consist of at least two syllables. The verbs in (1) are monosyllabic and are therefore not phonological words:

(1) *-swa 'break!'*
-lya 'eat!'
-phwa 'get dry!'
-fwa 'die!'
-wa 'fall down!'

The basic and less controversial strategy to prevent monosyllabic morphemes from becoming monosyllabic words is epenthesis. Epenthesis involves prefixing of vowels to a monosyllabic morpheme. In Chitonga, monosyllabic verbs such as those in (1) will always attach an epenthetic /i/ in the imperative mood as shown in (2).

(2) *i-swa* 'break!'
i-lya 'eat!'
i-phwa 'get dry!'
i-fwa 'die!'
i-wa 'fall down!'

As Mtenje (2004) shows, we know that these verbs are indeed monosyllabic because they can occur without the prefix /i/ as imperatives with the honorific or second person plural pronoun suffix *-ni* as in *swa-ni* 'break!', *lya-ni* 'eat!', *phwa-ni* 'get dry!', *fwa-ni* 'die!', and *wa-ni* 'fall down!'.

The data in (3), however, show that the mora, not the syllable, must be the relevant unit for defining prosodic minimality constraints in Chitonga.

[2] The author is a native speaker of Chitonga and he is thus the source of all the data from the language. Unless indicated otherwise, all the verb forms from Chitonga in this paper are of low tone type.

(3) *to*: 'take'
pe: 'get subdued'
ko: 'catch'
kha: 'stay'
po: 'get cold'
me: 'grow'

The monosyllabic morphemes above are intances of phonological words in Chitonga. As the symbol (:) indicates, however, these verbs have a long vowel, hence bimoraic. They, therefore, need not undergo epenthesis because they satisfy the requirements in Chitonga where the level of analysis is the mora and not the syllable. As Prince and Smolensky (2004: 56) observe, "the PrWd [prosodic word] must contain at least one foot; a foot will contain at least two moras; hence, lexical words are minimally bimoraic".

The Chitonga verbs with the epenthetic /i/ in (2), therefore, are acceptable not because they have two syllables, but rather because they satisfy a general property of structure defined by Foot Binarity (McCarthy & Prince 1986). This constraint obviates the need for such a thing as a "minimal word constraint". Since syllables contain moras, Foot Binarity indeed entails that the smallest foot is bimoraic. Bimoraic word minimality condition has also been reported in other languages of the world (Cole 1990, Mester 1994, Downing 2006).

3. Optimality Theory – General Principles

The central idea of Optimality Theory (OT) is that, unlike in derivational theories of the type assumed and argued for in Generative Phonology, phonological outputs are not derived from underlying representations through the interaction of ordered rules. Instead, outputs are freely generated and the actual output for any input within a particular language is the one which is the most optimal given the ranking of relevant constraints in that language. In other words, surface forms of language reflect resolutions of conflicts between competing demands (constraints). A surface form is "optimal" in the sense that it incurs the least serious violations of a set of violable constraints, ranked in a language-specific hierarchy. Constraints are universal and languages differ in their ranking of constraints, giving priorities to some constraints over others. Such rankings are based on "strict" domination: if one constraint outranks another, the higher-ranked constraint has priority, regardless of violations of the lower-ranked one. However, such violation must be minimal, which predicts the economy of grammatical processes.

As the foregoing shows, Optimality Theory is a development of Generative Grammar, a theory sharing its focus on formal description and quest for universal principles, on the basis of empirical research of linguistic typology (and first language acquisition). However, OT radically differs from earlier generative models in various ways.

OT is surface-based in the sense that well-formedness constraints evaluate surface forms only. Structural description and changes must always be evaluated among other possible resolutions of constraint violations. Therefore OT predicts that a markedness constraint (which seeks to change the input to conform to unmarked output forms) may trigger various types of structural changes, depending on its interaction with faithfulness constraints (which seek to maintain the input at all cost). Different languages should therefore pursue different 'repair strategies' in attaining identical output goals. In contrast, a rule-based theory fails to make this prediction of the functional unity of processes. Consider the set of rules in (4). All function to avoid the configuration *XAY, yet these rules cannot be formally related:

(4) A set of functionally coherent rules

a. A ⟶ B/X ___Y	d. Y ⟶ Z / XA ___
b. A ⟶ C/X ___Y	e. ∅ ⟶ B/XA ___Y
c. A ⟶ ∅/ ___Y	f. X ⟶ ∅ / ___AY

(Kager 1999: 56)

This reoccurrence of a common output factor which guides different rules, without being explicitly stated in the rules, is called a conspiracy.

Before OT, phonologists had already realized that output constraints are necessary ingredients of grammatical theory. As a response to rule conspiracies and the Duplication Problem (overlapping functions of rules and constraints), they introduced output constraints to block or trigger the application of rules. Among the first output constraints were the OCP in autosegmental theory ("no identical adjacent autosegments", Goldsmith 1976), and the No-Clash constraint in metrical theory (Liberman 1975). Such additions resulted in mixed models, containing both rules and output constraints. Various proposals were made for interactions of rules and output constraints, such as the Theory of Constraints and Repair Strategies (Paradis 1988), and Persistent Rule Theory (Myers 1991).

Problems of mixed models involve an extremely complicated interaction of rules and constraints. A rule may apply in violation of a constraint, of which violation is later repaired by some subsequent rule. Therefore a mixed model must not only stipulate structural descriptions of the rules and the linear ordering of the rules, but also interactions of rules and output constraints, defining the conditions under which output constraints can be temporarily violated. OT avoids such interactional complexity by limiting grammatical interactions to constraints. This unification of interaction makes OT, both conceptually and computationally, a much simpler theory than any mixed model.

The major strength of OT is captured when we consider the following problem in syntax where the constraints are assumed to be inviolable:

> The inviolable principles of syntax have proved themselves to be problematic in that inviolability has been purchased at the cost of a variety of types of hedges. (…) some principles are parameterized, holding in one way in one language and in another way inanother language. (…) the prevailing belief about constraints - that they are inviolable -resulted in a continuing frustration with their role in grammar, for it is exceedingly difficult to find a constraint that is never violated. (Archangeli 1997: 26–27).

4. OT Analysis

In the light of the foregoing, an adequate characterization of Chitonga grammar should include the following facts:

> Monomoraic verbs such as those in (1) will always attach an epenthetic /i/ in the imperative mood.
>
> A syllable with a two-mora nucleus forms a phonological word (see [3]).

To begin with, epenthesis involves a violation of faithfulness: the output diverges from the input by the presence of an epenthetic segment, one that is not "sponsored" by lexical representation. The faithfulness constraint militating against epenthesis is DEPENDENCY-IO (or DEP-IO), after McCarthy and Prince (1995).

(5) DEP-IO: Output segments must have input correspondents. (No epenthesis)

This constraint accounts for the cases where epenthesis does not occur, such as *galu* 'dog', which is never **igalu*. As observed by Harford (1999) and several others, forms like those in (2) "avoid being rendered non-optimal by DEP-IO by virtue of satisfying a more highly ranked constraint requiring words to have more than one syllable". Myers (1995) formulates the following constraint for Shona:

(6) MINPW: A prosodic word must consist of at least two syllables.

MINPW outranks DEP-IO, meaning that DEP-IO is obeyed except when the result would be a violation of MINPW. These results are displayed in the table (1). Following OT conventions, higher ranking constraints appear to the left of lower ranking constraints, separated by solid lines. (Dotted lines indicate that constraints are not ranked with respect to each other.) An asterisk indicates violation of a constraint by the form whose row it appears on; an asterisk followed by an exclamation mark indicates that the violation renders the form non-optimal. Optimal forms are indicated with a pointy finger or an arrow.

Table 1. MINPW outranks DEP-IO.

-lya, -swa, -phwa, -fwa	MINPW	DEP-IO
a. lya, swa, phwa, fwa	*!	
b. ⇒ i.lya, i.swa, i.phwa, ifwa		*

In table 1, both candidates (a) and (b) violate a constraint, but *ilya, iswa, iphwa* and *ifwa* are more favoured, are more optimal, because the constraint they violate is less highly valued.

Completing this analysis requires an account of prosodic words in (3) which are one syllable, but bimoraic. This will be possible if we postulate that the level of analysis for Chitonga should be the mora rather than the syllable. The constraint MINPW lacks a generalization such as the one suggested by Prince and Smolensky (2004), which accounts for both epenthesis and monosyllabic words in this language. Following the formulation of McCarthy & Prince (1986), Prince & Smolensky (2004) make a deduction that rests on the principle of Foot Binarity stated in (7):

(7) Foot Binarity (FTBIN)

Feet are binary at some level of analysis (mora, syllable)

Since the level of binarity in Chitonga is the mora, the forms in (2) are optimal because they satisfy FTBIN. The table 2 shows the ranking of the two relevant constraints.

Table 2. FTBIN outranks DEP-IO.

-lya, -fwa, -swa	FTBIN	DEP-IO
a. lya, fwa, swa	*!	
b. ⇒ i.lya, i.fwa, i.swa		*

Candidates (a) are disqualified since they violate the highest ranked FTBIN which does not allow monomoraic morphemes to form a foot. The second set of candidates, therefore, are optimal as they satisfy the high ranked constraint and violate the tolerable low ranked DEP-IO which prohibits epenthesis. The forms *to:, ko:, po:, kha:* and *me:*, therefore, are acceptable because they satisfy the demands of foot binarity at the mora level of analysis.

The Foot Binarity principle based on the level of the mora also accounts for acceptability of words of classes beside the verb, which are also bimoraic. They include nouns (*m-wâ*: [3-stone] 'stone', *mbâ*: [9/19] 'fire marks', *gâ*: [5 charcoal] 'charcoal', *bê*: [5 breast] 'breast', *bô*: [5 faeces] 'faeces'). The negation for 'not' (*chá:*) also falls under this category.

5. Conclusion

The main claim we made in this paper is that the level of analysis for a minimal word in Chitonga, and perhaps in most Bantu languages, must be the mora and not the syllable as mostly believed in Bantu linguistics. The data have clearly shown that the word minimality condition for this language is for it to be bimoraic. This, we have seen, satisfies the requirement of Foot Binarity principle that feet must be binary at some level of analysis (mora or syllable). Such an observation, we believe, may be extended to account for the presence of bimoraic words in Bantu languages claimed to have the inviolable bisyllabic minimality condition.

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