

ON META-RULES IN PHONOLOGY

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The paper considers data from Luganda, a Bantu language of East Africa, and presents arguments for the operation of meta-rules which govern the application of both diachronic and synchronic processes. It also argues that, in accordance with such principles, a language can create segments which are counter-predicted by the markedness theory of natural generative phonology. The paper further considers that some phonological processes can be more naturally stated in terms of the phonological word than in terms of either segments or syllables and, consequently, natural generative phonology requires word structure constraints.

1. Introduction

The main purpose of this paper is to show that certain synchronic and diachronic processes in phonology are most insightfully considered in terms of *meta-rules*, i.e. general principles which govern the application of the various rules responsible for the "phonetic mode" of a language [Lass 1969; Foley 1972; Kim 1972]. It will be further argued that sometimes, in following the dictates of its meta-rules, a language may develop segments and processes which are counter-predicted by the markedness theory incorporated in natural generative phonology: language specific meta-rules can override universal marking conventions. This claim will be supported with data involving vowel lowering and consonant strengthening in Luganda.

The secondary aim is to suggest that there are some phonological processes which can be more *naturally* stated in terms of the phonological word than in terms of simply either segments or syllables. Of course, recognition of the word as a phonological unit is not new [Palmer 1970; Chomsky and Halle 1968]. However, in discussions of natural generative phonology attention has normally been focused on the syllable [Schane 1972; Vennemann 1972]; and with a few exceptions [Vennemann 1974; Hooper 1975], the word has not been given a favoured position in natural generative phonology.

It will be argued here that, in addition to syllable structure constraints, natural generative phonology needs word structure constraints of the kind

proposed by Kisseberth [1972]. The word structure constraints which I envisage are output conditions on the systematic phonetic sequences within a single phonological word. They apply only within this domain and have no effect beyond it. The article falls into two parts. In section 2 I discuss vowel lowering, and in section 3 consonant strengthening.

2. Vowel Lowering

Proto-Bantu had seven vowels: */i/ | e a o u u/. Only five of them, however, have reflexes in the systematic phonetic representation of modern Luganda because of the mergers of */i/ and */u/ with */i/ and */u/ respectively.

(1)	Proto-Bantu	i	i	e	a	o	u	u
	Luganda	i		e	a	o	u	

The number of vowels in modern Luganda is controversial. In all traditional descriptions only five vowels are recognized, namely /i e a o u/. In a more abstract analysis where absolute neutralization is allowed, however, a system of seven underlying vowels, two of which are absolutely neutralized could be justified on the basis of morphophonemic alternation [Katamba 1974].

Whichever of these two points of view is adopted in a synchronic grammar, vowel lowering would have to be recognized historically since the vowels /i/ and /u/ do not occur in the surface representation because of the mergers.

(2)	Proto-Bantu		Luganda
	*/-y _i ye/	'locust'	/-zi _{ge} /
	*/-ki _i ye/	'eyebrow'	/-si _{ge} /
	*/-tu _{ya} /	'to tame'	/-fu _{ga} /
	*/-yu _{βu} /	'hippo'	/-vu _{βu} /

I would like to suggest that the historical process which was involved in the merger of */i/ and */u/ with */i/ and */u/ respectively stems from the existence of a meta-rule which dictates the phonetic mode of non-high vowel articulation for Luganda. That same meta-rule, I would like to further claim, is responsible for what might, at first sight, appear to be an

unrelated word structure constraint which excludes the high vowels /i/ and /u/ from word initial position in modern Luganda.

The effect of this output condition can be seen in the realization of the prefix. The preprefix is a constituent of the noun and the adjective in Luganda. The noun and the adjective typically consist of the following:

(3) (Preprefix) + Class prefix + Stem

The class prefix and the stem are obligatory, while the occurrence of the preprefix is determined by the syntactic context in which a noun or adjective occurs [Ashton *et al.* 1954].

(4) Preprefix + Class prefix + Stem

e	ki	ntu	'thing' (class 7)
o	mu	ntu	'person' (class 1)
a	βa	ntu	'people' (class 2)
e	βi	to	'young' (class 8)
o	lu	to	'young' (class 11)
a	ka	to	'young' (class 12)

If a Bantu class prefix has a vowel, that vowel is normally one of /i a u/. This can be ascertained in the examples above. Two of the vowel oppositions are suspended in that position in Luganda. This neutralization is predicted by the principle of maximum differentiation [Schane 1972]. Schane has proposed that in natural generative phonology, instances of neutralization which are not due to assimilation can be explained in terms of maximum differentiation.

It is generally accepted that a three vowel system with the vowels /i a u/ is more natural than one with the vowels /e a o/ because the perceptual distance between the vowels of the former is greater than that between those of the latter. Likewise, it is suggested that, if two of the oppositions are suspended in a five vowel system, /i a u/ rather than /e o a/ are the vowels most likely to occur in the place of neutralization.

It is against this background that I would like to show that in obeying the meta-rules that permeate its grammar a language sometimes goes against what would otherwise be the natural process. Consider the diachronic derivation of the preprefix vowel: i) A preprefix formation rule, copying the

secondary prefix before the class prefix, was added to the grammar¹:

- (5) /βa+ntu/ → /βa+βa+ntu/ 'people'
 /mu+ntu/ → /γu+mu+ntu/ 'person'
 /βi+ntu/ → /βi+βi+ntu/ 'things'

ii) A rule deleting the consonant of the copied prefix was introduced:

- (6) /βa+βa+ntu/ → /a+βa+ntu/
 /γu+mu+ntu/ → /u+mu+ntu/
 /βi+βi+ntu/ → /i+βi+ntu/

and finally, iii) vowel lowering² applies:

- (7) /u+mu+ntu/ → /o+mu+ntu/
 /i+βi+ntu/ → /e+βi+ntu/

Luganda phonology is governed by a vowel lowering principle. Diachronically it was responsible for the merger of */i/ with */i/ and */u/ with */u/. Synchronically it is implemented by a word structure constraint prohibiting the occurrence of high vowels in word initial position. All high vowels in word initial position are lowered as can be seen in (7)³.

The lowering of preprefix high vowels leads to a situation which is counter-predicted by the maximum differentiation principle of natural generative phonology. When the opposition between /i/ and /e/ on the one hand,

¹Forms like /ku+mu+ti/ 'tree' (class 3) and /ki+mi+ti/ 'trees' are attested in Lumasaaba which is closely related to Luganda. This suggests that the preprefix arose from a copying of the secondary prefix before the class prefix. The secondary prefix occurs before demonstratives, e.g. omuti guno 'this tree' and as pronominal prefix before a verb stem, e.g. omuti guteme 'cut the tree'. The similarity between the Luganda secondary prefix and the Lumasaaba preprefix is not accidental.

²/a+βa+Ntu/ 'people' which already has a low initial vowel is not affected by the vowel lowering rule.

³Though the occurrence of high vowels at the end of a word is permissible in fact word final /i/ and /u/ also tend to be lowered, e.g. tano < *tanu 'five'; muppo < *munyu 'salt'. For the most part word final /i/ and /u/ are reflexes of Proto-Bantu */i/ and */u/.

and between /u/ and /o/ on the other, is suspended, instead of having the maximally differentiated vowels /i a u/ occurring in the position of neutralization, Luganda has /e a o/. The explanation, I would like to suggest, is that the meta-rule of vowel lowering takes precedence over the universal principle of maximum differentiation.

So far it has been tacitly assumed that the rule which implements the vowel lowering meta-rule in the synchronic grammar by lowering any high vowel in word initial position is a word structure rule and not a morpheme or syllable structure rule. It would be incorrect to regard vowel lowering as a morpheme structure rule excluding high vowels from morpheme initial position since morphemes can begin with high vowels. Thus, the lexical roots -iso 'eye' and -ungu 'vegetable marrow', for example, both begin with high vowels (though it should be noted that roots beginning with high vowels are very rare). Likewise, grammatical formatives like -is- and -ul- which are, respectively, causative and conversive verbal extensions also begin with high vowels. However, as the last three examples in (8) show, the first vowel of a morpheme beginning with a vowel is never syllable initial once the morpheme is put in a word.

It would be equally incorrect to regard this constraint as an ordinary syllable structure rule because, outside the word initial position there are no syllables which begin with vowels. Medial syllables always begin with consonants⁴:

(8a)	CV	/mu+kazi/	[mu\$ka\$zi]	'woman'
	NCV	/βa+Ntu/	[βa:\$ntu]	'people'
	C:V	/mi+ggo/	[mi\$g:o]	'sticks'
	CV	/lɪm+is+a/	[lɪ\$mi\$sa]	'cause to cultivate'
	CV:	/mu+uŋgu/	[mu:\$ŋgu]	'vegetable marrow'
	CV:	/lɪ+iso/	[lɪ:\$so]	'eye'

Only word initially can syllables begin with--or more accurately, be composed of--vowels:

(8b)	V\$CV	[o\$mu\$ka\$zi]	'woman'
	V\$NCV	[e\$nte]	'cow'
	V\$C:V	[e\$t:a\$βi]	'branch'

⁴\$ is used as a sign for a syllable boundary.

The constraint on the occurrence of high vowels can, therefore, only be stated naturally in terms of the word: it is only word initial position that high vowels are excluded from.

It could be argued that the same meta-rule that was implemented by the rule which lowered the high vowels */i/ and */u/ is still operating in Luganda, although its scope has been restricted. The earlier rule which implemented the lowering meta-rule applied blindly, lowering */i/ and */u/ wherever they occurred; today that meta-rule is implemented by a word structure rule and it affects only high vowels in word initial position. But, in one respect the meta-rule has been consistent: both diachronically and synchronically it has had the effect of restricting the distribution of the highest vowels of the system.

3. Consonant Strengthening

Another pervasive tendency in Luganda phonology is *consonant strengthening*. The strengthening principle is implemented by several P-rules. The output of each one of these P-rules governed by the strengthening principle is more fortis than its input. We shall consider in turn the processes involved in the strengthening conspiracy.

3.1. Consonant hardening. In the surface representation the only permissible consonant sequences are those where a homorganic nasal is followed by a non-nasal consonant--long consonants which are discussed later in this section are not regarded as consonant sequences in the surface representation. Consider the examples in (9) and (10):

(9)	/N+fudu/	[mfudu]	'tortise'	(class 9)
	/N+si/	[nsi]	'country'	(class 9)
	/N+te/	[nte]	'cow'	(class 9)
	/N+kima/	[pcima]	'monkey'	(class 9)
	/N+go/	[ngo]	'leopard'	(class 9)
(10)	/N+βuzi/	[mbuzi]	'goat'	(class 9)
	/ka+βuzi/	[kaβuzi]	'small goat'	(class 12)
	/N+liga/	[ndiga]	'sheep'	(class 9)
	/ka+liga/	[kaɫiga]	'small sheep'	(class 12)
	/N+yu/	[ɲju]	'house'	(class 9)
	/ka+yu/	[kayu]	'small house'	(class 12)

In all the examples in (9) and (10) the nasal prefix is homorganic with the following consonant:

$$(11) \quad \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \rightarrow [\text{aF}] \text{ --- } \begin{bmatrix} +\text{cons} \\ \text{aF} \end{bmatrix}$$

(F stands for place of articulation features.)

In addition to (11) which makes a nasal homorganic with a following consonant, a hardening rule applies to the forms in (10). The hardening rule is stated in (12) below:

$$(12) \quad \begin{bmatrix} +\text{cons} \\ +\text{continuant} \\ -\text{sibilant} \\ +\text{voice} \end{bmatrix} \rightarrow [-\text{continuant}] / \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \text{ ---}$$

Note that where the underlying consonant preceded by the nasal is not one of $[\beta \mid \gamma]$ the hardening rule does not apply.

We shall assume that (11) and (12) apply to the forms in (10) simultaneously as both rules are obligatory and as the structural description for both is satisfied by these forms [Koutsoudas *et al.* 1974]. We shall come back to this later.

3.2. The Ganda law. There is another strengthening process which has a similar structural description to the hardening rule. It is the Ganda law (also referred to as Meinhof's rule). The Ganda law is at the root of some of the major complications of Luganda phonology. Meinhof formulated it in these words: "When two successive syllables both begin with a nasal plus a following voiced plosive, the plosive of the first syllable is lost" [Meinhof 1932:183]. On the next page Meinhof qualifies his statement and points out that sometimes this rule may apply even when the second syllable has a nasal without a following plosive. Meinhof's formulation of the Ganda law correctly accounts for its application in (13):

(13)	/N+βuna/	[m:una]	'I get covered with'
	/N+βanβa/	[m:a:mba]	'lung fish' (classes 9/10)
	/N+limi/	[n:imɪ]	'tongues' (class 10)
	/N+laŋga/	[n:a:ŋga]	'harp' (classes 9/10)
	/N+yima/	[p:ɪma]	'I take a stand'
	/N+yinβa/	[p:ɪ:mba]	'I sing'

- (13) cont.
- | | | | |
|-----------|----------|----------|----------------|
| /N+goma/ | [ŋ:oma] | 'drum' | (classes 9/10) |
| /N+gaNβa/ | [ŋ:amba] | 'I tell' | |

Meinhof's statement of the Ganda law would also predict its application to the data in (14), which is incorrect.

- (14)
- | | | |
|------------|------------|----------------------|
| /N+doŋgo/ | [ndo:ŋgo] | 'harp' |
| /N+doŋgwa/ | [ndo:ŋgwa] | 'I talk rubbish' |
| /N+bama/ | [mbama] | 'I rush about madly' |

The forms in (14) are not affected by the Ganda law. There are two possible explanations. Either Meinhof's statement of the Ganda law is incorrect, or the forms in (14) are exceptions. I think the latter is the case. Only in a phonemicization of Luganda where the principle contrast used in isolating phonemes is carried to absurd limits and where all statistical considerations are ignored could /b/ and /d/ be regarded as separate phonemes from /β/ and /l/ as the number of morphemes which are distinguished by the opposition between /d/ and /l/ on the one hand and between /β/ and /b/ on the other can be counted on the fingers of one hand. It would, therefore, be inadvisable to claim that the Ganda law does not apply to the forms in (14) because they differ from those in (13) in having underlying stops instead of continuants following the first nasal; the non-application of the Ganda law should rather be accounted for using a minus rule feature.

Returning to the forms in (13), I would like to suggest that diachronically their surface representations were the result of the successive application of several assimilation rules. First, there was homorganic nasal assimilation (rule 11) and then hardening (rule 12). Later a rule was added to the grammar which completely assimilated the plosive to the nasal preceding it (that plosive was either created by rule (12), in the case of /β l y/ or it was present in the underlying representation of the morpheme in the case of /g/) where the following syllable also began with a nasal. This assimilation is shown in (15).

- (15)
$$\begin{bmatrix} +\text{cons} \\ +\text{voice} \\ -\text{cont} \end{bmatrix} \rightarrow [+nasal] / \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \text{ --- } V_1 \begin{bmatrix} +\text{cons} \\ +\text{nasal} \end{bmatrix} \quad (C)$$

A low level rule then turns sequences of two identical nasal consonants into one long nasal.

One important point which should be noted here is that the Ganda law is a word structure rule. It only applies within the boundaries of a phonological word. It could be regarded as a consonant harmony rule as its effect is to make two successive syllable onsets agree in specification for the feature [nasal]. Being a word structure rule it applies to the examples in (16):

(16)	/#N+βaNβa#/	[m:a:mba]	'lung fish' (classes 9/10)
	/#N+lum+a#/	[n:uma]	'I bite'
	/#N+lunβa#/	[n:u:mba]	'hornet' (classes 9/10)
	/#N+yiNβ+a#/	[ɲ:i:mba]	'I sing'
	/#N+gum+u#/	[ŋ:umu]	'strong' (adjective, classes 9/10)
	/#N+gaNb+a#/	[ŋ:a:mba]	'I say'

But it is blocked in (17) by the presence of word boundaries:

(17)	/#N+βa+a#mu+kazi#/	[mbamukazi]	'if I were a woman'
	/#N+yu#N+laala#/	[ɲju:ndala]	'another house'
	/#βa+tuNi+a#N+βwa#/	[βatu:nda:mbwa]	'they sell dogs'

Clearly, the Ganda law is an output condition on the phonological word, stipulating that in the surface representation, no word may have a sequence of NCV₁N where C is derived from any one of /β l γ g/ in the underlying representation. Beyond the limits of the word, however, such sequences are permissible.

Of course, an alternative analysis in which the Ganda law is regarded as a morphophonologically triggered rule is possible. All the examples of the Ganda law cited in (13) and (16) above involve some nasal prefix which represents either the first person singular personal pronoun, or the classes 9/10 prefix. On these grounds it could be argued that the Ganda law has been morphologised. Such an argument is not overwhelming since the Ganda law can be insightfully discussed without any reference to morphology; for a true morpho-phonological rule that is not possible. Moreover, the Ganda law is still a productive process. This can be seen in the treatment of Swahili loan words; e.g. Swahili *bunduki* 'gun' is borrowed into class 9 as *mmundu* [m:u:ndu] (<N+buNdu(ki)) and the first singular of the verb *kulanda* in the present tense is *nnanda* [n:a:nda] and this is derived from the Swahili noun *randa* 'carpenter's plane'.

The Ganda law and the hardening rule which we discussed earlier are related in an interesting way. Not only do they both derive from the same strengthening principle which was described at the beginning of this section, but they also have partially similar structural descriptions. In a model where extrinsic ordering of rules in a synchronic grammar is allowed, these rules would be ordered in exactly the same way as we suggested above in our historical sketch of the development of the Ganda law, with continuant hardening (12) preceding the assimilation of nasality (15).

In our view, it is not necessary to assume that these rules are applied in a synchronic grammar in the same sequence as they were historically. To assume that would entail extrinsically ordering (12) before (15). But it is unnecessary to resort to extrinsic ordering to ensure the correct application of these rules. The principle proposed by Koutsoudas *et al.* [1974] which states that every obligatory rule must be applied to every derivation that satisfies its structural description is sufficient to ensure the correct application of (12) and (15). A representation like NCV₁N where C is one of /β | γ/ simultaneously satisfies the structural description of (12) and (15) and therefore the two rules apply simultaneously; a derivation where the consonant following the first nasal is /g/ only satisfies the structural description of (15) and therefore it is only affected by (15).

So far the relationship between the Ganda law and the hardening rule has been considered mainly in formal terms. In the next sub-section it will be discussed from the point of view of the articulatory mode of the language.

3.3. Strengthening. Strong consonants are the most interesting peculiarity of Luganda phonology. Consonant lengthening which is a by-product of the Ganda law, and hardening are two of the strategies by which strong consonants are achieved.

According to markedness theory, long segments are marked. Statistically they are rare in the languages of the world; and even in those languages where they occur they are in a minority [Postal 1968]. Markedness theory also claims that it is the marked sounds that are unstable during language change: given two segments, one marked and the other unmarked, the marked is likely to be merged with the unmarked. On the basis of that hypothesis, one would expect Luganda to lose long consonants. An inspection of the facts indicates otherwise: in spite of their being marked, long consonants are not only holding their own, but they are also spreading.

Meeussen [1955] showed that diachronically long consonants arose when a Proto-Bantu syllable containing the vowel */i/ was lost and a following consonant was lengthened in compensation.

(18)	Proto-Bantu		Luganda	
	/-j β-/	'steal'	/-bb-/	[-b:]
	/-j t-/	'kill'	/-tt-/	[-t:]
	/ i+taβi/	'branch'	/ø+ttabi/	[t:aβi]

This strengthening of consonants by compensatory lengthening was due to the strengthening meta-rule which controls Luganda phonology. The effect of this meta-rule is to produce optimum consonants which are as different as possible from vowels. The continuant hardening rule and the process shown in (18) are two of the strategies by which the articulatory mode of strong consonants is achieved. As the continuant hardening rule seems to have operated in Proto-Bantu [Meinhof 1932], (and is still operating in many Bantu languages) Luganda may be said to have inherited an embryonic strengthening principle from Proto-Bantu and generalized it to new environments where it did not apply before.

Thus, the Ganda law, which is found in several other Bantu languages, produces long consonants in Luganda but not elsewhere⁵. For example, in Swahili which does not have the articulatory mode of consonant strengthening, /N+goma/ 'drum' is realised as [ŋgoma] and not as [ŋ:oma] as in Luganda. If the Ganda law produces strong consonants in Luganda but not elsewhere, it is probably because Luganda phonology is controlled by the principle of consonant strengthening while the phonology of sister languages is not. That principle operated diachronically to produce the type of long consonants shown in (18) and it is at the root of the synchronic operation of the Ganda law. Because of the strengthening meta-rule, when (by the operation of the Ganda law) a non-nasal consonant assimilates to the nasal, one long nasal is produced. However, in other languages which do not have the strengthening principle markedness theory holds sway: after the assimilation of the non-nasal to the nasal, the second nasal (or the length feature) is deleted so that instead of marked NN or N: one has unmarked N occurring in the surface representation.

The strengthening meta-rule also projects itself into the area of

⁵This statement must be qualified. The Ganda law causes strengthening in a few other Bantu languages (cf. Meinhof 1932:184).

innovation. In the contemporary language a new consonant strengthening rule, which seems to be the most important and obvious linguistic manifestation of the generation gap, has been added to the grammars of younger speakers. They generally strengthen the initial consonant of a verb stem when it is preceded by an infinitive prefix, if the initial stem consonant is a non-nasal velar.

(19) Older speakers

/ku+kola/	[kukola]	'to work'
/ku+kuβa/	[kukuβa]	'to hit'
/ku+gaβa/	[kugaβa]	'to give'
/ku+gula/	[kugula]	'to buy'

(20) Younger speakers

/ku+kola/	[k:ola]	'to work'
/ku+kuβa/	[k:uβa]	'to hit'
/ku+gaβa/	[g:aβa]	'to give'
/ku+gula/	[g:ula]	'to buy'

In (20) the infinitive prefix has its vowel deleted and /k/ assimilates the voicing of the consonant which it now abuts with. Note that the hardening rule turns the continuants /β | γ/ into the stops [b d j] respectively after nasals and these same continuants are obligatorily realised as the strong stops [b: d: j:] when they are lengthened in a strengthening environment. The structural similarity between the two rules suggests that the hardening rule and the strengthening rule are part of the same process [Katamba 1974].

The pervasiveness of the strengthening process can further be seen in the manner in which it has affected some loan words. In recent decades many of the nouns borrowed from other languages have been incorporated in Luganda with strong initial consonants which they do not possess in the source language.

(21) /φ+ddokita/	[d:ocita]	'doctor'	(class 1)
/φ+bbaasi/	[b:a:sɪ]	'bus'	(class 9)
/φ+ssaati/	[s:a:tɪ]	'shirt'	(class 9)

Normally the indigenous nouns with a zero class prefix and a strong initial consonant belong to class 5. The historical explanation for the strong

consonant in that case is the loss of class 5 prefix */lǐ/ before noun stems which begin with a consonant. This led to the compensatory lengthening of the stem initial consonant. Thus Proto-Bantu */lǐ+tʌβi/ 'branch' became /φ+ttaβi/[t:tʌβi].

There is no obvious reason why many loan words which do not belong to class 5 are borrowed with a strong stem initial consonant--if they all belonged to class 5 paradigm pressure might have been a plausible explanation. But the examples in (21) rule that out. The strengthening meta-rule again holds the key to the explanation. I would like to suggest that because of the pervasiveness of the strengthening principle, strong consonants are not unnatural in Luganda. On the contrary, the phonetic mode of strong articulation characterizes the language. Strengthening is dynamic. Strong consonants which originally characterised class 5 nouns only in the noun class system have now been generalized to a new paradigm of forms marked [+foreign], often regardless of the noun class the loan words belong to.

4. Conclusion

The upshot of this argument is that the meta-rules of a particular language may take precedence over universal marking conventions. Thus, long consonants may be marked according to universal marking conventions, but they are normal in Luganda because the consonant strengthening principle dominates a big portion of Luganda phonology. Several structurally diverse rules, as we have shown above, only exist in order to bring about the articulatory mode imposed by the strengthening principle. Likewise, the occurrence of the vowels /e a o/ in a position of neutralization in a language which has the vowels /i e a o u/ may be unnatural according to markedness theory, but it is normal in Luganda because the vowel lowering principle dominates the vowel processes in the language.

In view of the pervasiveness of the vowel lowering and the consonant strengthening meta-rules (which both involve violations of marking conventions) in the synchronic as well as the diachronic phonology of Luganda, one is tempted to agree with Lass [1972,1973] that the strong universalist bias of generative phonology may sometimes obscure significant, idiosyncratic characteristics of an individual language or language family. Phonological theory has to take into account the fact that a segment may be marked, a process may be extremely rare and still be natural in some language where it occurs.

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