

VOWEL HARMONY AND THE CONSONANT | IN CHUMBURUNG

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This paper presents a synchronic description of the realization of /|/ in Chumburung, a Kwa language of Ghana. In this description I attempt to demonstrate that the influence of the feature *advanced tongue root* is not restricted to the vowel harmony system, but also spreads to influence the realization of the consonant |. Following from this synchronic description is evidence suggesting that native speakers of Chumburung require more than phonetic information in order to choose the appropriate allophone of /|/.

1. Introduction

The phonetic realization of /|/ in Chumburung¹ has been the subject of some discussion. The purpose of this paper² is basically two-fold. A synchronic analysis of /|/ is presented in which I attempt to demonstrate that the influence of the feature *advanced tongue root* (ATR) is not restricted to the vowel harmony system, but also spreads to influence the realization of the consonant |. Then following from this, some implications which these data involve for phonological theory are discussed.

¹Chumburung is a language of the North Guang subgroup of Volta-Comoe languages, part of the Kwa branch of Niger-Congo. Although previous references to the name of this language have included Nchimburu and Chumburu, I am referring to it as Chumburung as this is closer to the speakers' own name for their language, i.e. ɔ̃mborɔŋ.

²I wish to acknowledge the contributions of the following people. Tony Naden has most kindly discussed various drafts of this paper with me. An anonymous reviewer for this journal has given pertinent bibliographic suggestions and comments as to the precise phonetic mechanisms involved, and my colleague, Keir Hansford, has provided language specific criticism. Hansford has also expressed gratitude for the opportunity of reading an earlier version of this paper and acknowledges his agreement with its conclusions. I am most grateful for this help but must claim responsibility for any shortcomings.

2. Background

In an early and tentative phonological analysis of Chumburung, Price [1975:22] establishes one phoneme /l/ with allophones, according to the principle of complementary distribution, [l] occurring word and noun-stem-initial, and [r] (a lightly-retroflexed alveolar flap) occurring elsewhere. In a later unpublished paper, Hansford [1977] argues for the existence of a separate phoneme /r/ based on examples in which [l] occurs word-medial, contrasting in analogous environments with [r]. This may be seen in the following data:³

l ^á aalê	'cattle egret'	l ^à arí	'waist'
l ^ó olí	'deep'	k ^ò orí	'to collect'

The Price analysis, while noting generally that [l] does not occur word-medial, fails to account for the instances, albeit relatively few, where [l] does in fact occur in this position. Hansford is quite correct in pointing out this medial contrast, but due to the tentative nature of his paper also, he overlooks two important facts.

The first is that all occurrences of medial [l] follow syllables which similarly begin with [l].⁴ This argues strongly in favor of the probability that occurrences of medial [l] are conditioned by the preceding [l]. The second fact overlooked is that not all speakers pronounce these words in the same way:

- (a) some speakers follow Prices's generalization precisely, having [r] in all non-initial environments;
- (b) some speakers have [l] in all non-initial environments when the preceding syllable begins with [l];

³The phonetic symbols for vowels adopted here are those used by Stewart and van Leynseele [1979]. The underlined vowels represent those which are in the unadvanced vowel harmony set (the vowel harmony is discussed in section 3.1.1). These correspond roughly to IPA symbols as follows: $\underset{\sim}{i} \sim \underset{\sim}{\iota}$, $\underset{\sim}{e} \sim \underset{\sim}{\epsilon}$, $\underset{\sim}{u} \sim \underset{\sim}{\omega}$, $\underset{\sim}{o} \sim \underset{\sim}{\omicron}$. The symbols used for tones are: high $\acute{}$, low $\grave{}$, lowered high (downstepped) $\bar{}$, falling $\hat{}$, and rising $\check{}$.

⁴Hansford [1977] provides one example [b^àaal^á] 'bushcat' in which medial [l] occurs in an environment other than that stated here. I have never, however, heard anyone (including the speaker consulted by Hansford) say anything other than [b^àar^á].

(c) still other speakers have both [ɿ] and [r] in medial syllables when the preceding syllable begins with [ɿ].

So, it may be seen that medial [ɿ] and [r] are in some state of dialectal or idiolectal variation.⁵

3. Conditioning of Allophones

3.1. Stem-medial environment. Although occurrences of medial [ɿ] appear to be in variation with [r], there is some regularity worthy of attention which involves the Chumburung vowel harmony system.

3.1.1. Cross-height vowel harmony. According to recent thinking summarized in Stewart and van Leynseele [1979:32-33], cross-height vowel harmony (CHVH) is a phenomenon based on a feature referred to as *advanced tongue root* in which the classic system has ten vowels: a [+ATR] set /i, e, ə, o, u/ and a [-ATR] set /ị, ẹ, ạ, ọ, ụ/. More recent study suggests that 'retracted tongue root' or 'expanded pharynx' may be more precise phonetic terms (see discussion of section 3.1.2. below). Essentially CHVH involves the harmonization of vowels within a phonological word to one set or the other, regardless of the height of the respective vowels.

Chumburung follows the classic definition of a CHVH system with the exception that the contrast between the two vowel harmony sets is neutralized with respect to low (central) a as in Akan (cf. Stewart and van Leynseele, loc. cit.). Consequently, there is now a nine-vowel system with a realized in either set, all nine being also subject to a contrast in length.

Consider the following data which was elicited from speakers who manifest a medial contrast between [ɿ] and [r].

+ATR		-ATR	
l̩àl̩àkw̩?	'type of tuber'	k̩l̩ árám̩b̩ô	'thing which frightens'
l̩áal̩é	'cattle egret'	l̩àar̩í	'waist'
l̩óol̩í	'deep'	l̩òor̩í	'to remove seeds'
àl̩úul̩á?	'red dye'	l̩àar̩ó	'to lie across'

It is apparent that [ɿ] is realized medially where the preceding syllable be-

⁵Although a thorough sociolinguistic analysis has not been carried out, patterns of variation generally seem to follow clan lines.

gins with [l] and the word belongs to the [+ATR] set while [r] correlates with the [-ATR] set.

Statistics reveal that approximately 80% of the words in the language belong to the [-ATR] set. This results in a shortage of examples which fit the [lVl-] pattern in the [+ATR] set. Further support for the analysis may, however, be drawn from the following informal test.

After some basic orientation as to what was expected of her, a native speaker was asked to repeat spoken nonsense syllables the way she thought they would be said in Chumburung if the language had such words. These were purposely devoid of meaning so as to minimize any interpretation which might otherwise occur. A representation of the results appears below.

[+ATR]		[-ATR]	
Stilumus	Response	Stimulus	Response
tili	tiri	t <u>l</u> l <u>i</u>	t <u>r</u> r <u>i</u>
bili	biri	b <u>l</u> l <u>i</u>	b <u>r</u> r <u>i</u>
lolo	lolo	l <u>l</u> l <u>l</u>	l <u>r</u> r <u>l</u> l <u>r</u>
lili	liri	l <u>l</u> l <u>i</u>	l <u>r</u> r <u>i</u>

As was expected, l was realized as r word-medial except when the onset of the preceding syllable was l and the vowels were in the [+ATR] set.

3.1.2. Relationship of ATR to vowel harmony and l/r. The possibility that a language could reveal a correlation between a consonant and CHVH is not without previous recognition. In an article showing the explanatory potential of voice-register phonology, Pittman [1978:201] points out that many languages use two and sometimes three "resonance placements as fundamental parts of their lexical and grammatical contrast apparatus". In his discussion, he assigns the phonetic feature *retracted tongue root* to his first register and *advanced tongue root* to his second register citing Akan vowel harmony as an example and making reference to Stewart [1967]. He notes that "a very common effect of retracting the tongue root is to decrease the tongue bulk in the mouth, giving a generally lowered vowel height" [ibid., 203]. He also equates the two registers with the emphatic and plain articulations of Classical Arabic which affect "all the consonants and vowels of spoken Cairo Arabic" and cites

Lehn's description [1963] of *emphasis* in Arabic which states that one of the characteristic articulatory features of emphasis is "lateral spreading" [ibid., 204]. In the light of these parallels the Chumburung correlation between /l/ and the vowel harmony feature ATR is seen as not unprecedented.

Insofar as relates to Chumburung, the most pertinent discussions of the phonetics of CHVH and of [l] and [r] are Ladefoged [1964], Pike [1967], and Stewart [1967, 1970]. Stewart [1970:350] describes the tongue for unadvanced vowels as "pushed backwards" with the dorsum low. Conversely, for advanced vowels, the tongue is "pulled forwards" with the dorsum high. In an auditory-instrumental phonetic study of West African languages, Ladefoged [1964:29] describes [l] as articulated with a "raising of the back of the tongue". He then contrasts this with a "one tap alveolar r" which is without the "hollowing or raising of the back of the tongue". His conclusions are supported by palatographic evidence. From these phonetic studies there appears to be a correlation between [l] and the vowel harmony feature [+ATR] in that the back of the tongue is raised for both as opposed to its being lowered for both [r] and the [-ATR] set.

A further correlation is noted between the feature [-ATR] and r. Painter refines Stewart's [1967] thesis of tongue root fronting, i.e. ATR, to "one of two types of oppositions: root fronted ≠ normal or normal ≠ root backed" [Painter 1971:239]. There is substantial radiographic evidence for recognizing the [-ATR] vowel harmony set of Niger Congo languages as characterized by a retracted tongue root and contracted pharyngeal cavity, as opposed to its being characterized by a non-advanced tongue root (cf. Ladefoged [1964], Painter [1973], and Lindau [1979]). Painter [1971] also describes the 'close' set, i.e. [+ATR], of Anum, a Guang language related to Chumburung, as having a "normal" pharyngeal cross-sectional area, and the "open" set, i.e. [-ATR], as having a "thrusting back of the tongue root" [p. 243]. Phonetic research on articulatory details of, especially, English r, suggests that r's in general are characterized by a retraction of the tongue root towards the back pharyngeal wall (cf. Delattre and Freeman [1968] and Lindau [1978]). Although radiographic research on the nature of the retroflexed alveolar flap r of Chumburung has not been carried out, the data would be consistent with the statement that

the [-ATR] vowel harmony set and *r* have a feature of retracted tongue root as a common denominator.

3.2. Stem-initial environment. [l] occurs to the exclusion of [r] initially, but the initial environment is defined by the stem, not by the phonological word. This statement is necessary, particularly in view of the existence of prefixation in the noun-class system.

3.2.1. Chumburung noun-class system. The noun-class system of Chumburung, although more elaborate than the eroded southern Guang systems, e.g. Awutu and Cherepong, is still fairly simple compared with some Niger-Congo languages. In Chumburung, the noun-stems are prefixed by singular and plural noun-class markers. Concord with these classes exists between a noun and an adjective, although this is restricted mostly to quantifying numerals.

Chumburung has seven noun-class prefixes:⁶

Singular Classes	Plural Classes
1 ɔ-	2 a-
3 ka-	4 N-
5 Ø-	6 i-
7 kɪ-	

These form the singular/plural for five groups of noun-stems as follows:

Group A (people)	1/2
Group B	3/4
Group C	5/6
Group D	7/2
Group E (liquids)	4
Group F (mass nouns)	6

3.2.2. Stem-initial /l/. Apart from the medial [lVl-] occurrences discussed above, [l] only occurs stem-initial. This may be seen in the word-

⁶N is a syllabic nasal which is homorganic with a following consonant in point of articulation. All prefix vowels assimilate the [+ATR] feature of a [+ATR] noun-stem and in addition front vowels assimilate the back and round features from a back, round vowel of a following syllable. This latter assimilation, however, is blocked by an intervening labial consonant.

initial occurrences of (a) and the noun-stem-initial occurrences of (b).

(a)	lòʔ	'to remove from a pot	lósé	'difficult'
	lěeʔ	'to remove'	lûŋ	'to curse'
(b)	Singular		Plural	
	kì + lîmpó		à + lîmpó	'shea nut'
	ká + ló		ń + ló	'cooking pot'
	∅ + lówí		ì + lówí	'death'
	∅ + lòojí		ì + lòojí	'scythe'

On the other hand, [r] does not appear either word-initial or noun-stem-initial.

3.2.3. Compound words. [l] may also occur in the initial position of non-initial component parts of a grammatical word.

là|à|úwî 'the last thing' (cf. lúwî 'to finish')

In addition to obvious compound words, the language has a number of reduplicative words which may also be considered a type of compound.

í|é|éʔ 'lightning' lín|lín|nsê 'hard' lípò|lípò 'lipstick'

To conclude this section on the conditioning of allophones of /l/, /r/ is realized as [l] stem-initial for all speakers. Elsewhere /l/ is realized as [r]

- (a) (for some speakers) in all cases;
- (b) (for other speakers) in all cases except where the preceding syllable begins with [l];
- (c) (for still other speakers) in all cases except as in (b), but only if the vowels are in the [+ATR] vowel harmony set.⁷

⁷I have noted one unexplained exception. /lòolí/ 'deep' is realized as [lòorí] in the speech of some speakers who manifest a contrast between [l] and [r] in medial environments. This may indicate the breaking down of the system and thus a contribution to the more general tendency for | to change to r in Volta-Comoe languages.

4. The Suffix /-l̩/

Further indications which support the analysis proposed come from the behaviour of the suffix /-l̩/. Grammatically, /-l̩/ is a locative marker which most usually translates as 'in'. Phonologically, it is a clitic which assimilates the ATR feature of the word it attaches, and thus may be considered part of the greater phonological word. As such, the realization of /l̩/ in this morpheme is therefore subject to the constraints discussed in section 3. Thus, for speakers who manifest a medial contrast between [l̩] and [r], where /-l̩/ is preceded by a syllable which begins with [l̩] and where the word is of the [+ATR] vowel harmony set, /l̩/ is realized as [l̩].

/laale-l̩/ → [laalel̩] 'in (the) cattle egret'
cattle egret-in

Where /-l̩/ is not preceded by a syllable which begins with [l̩] or is preceded by a syllable which begins with [l̩] but the word is of the [-ATR] vowel harmony set, the first segment is realized as [r].

/jon̩-l̩/ → [jonoro] 'in (the) dog'
dog-in
/kan̩-l̩/ → [kanoro] 'in (the) mouth'
mouth-in
/l̩-l̩/ → [loro] 'in (the) sore'
sore-in

Where /-l̩/ is preceded by a nasal consonant, its first segment is realized as [n] and the preceding nasal consonant is also realized as [n] since it assimilates the alveolar articulation point.⁸

/lon̩-l̩/ → [lonno] 'in (the) house'
house-in
/t̩nt̩n̩-l̩/ → [t̩nt̩nno] 'in (the) earthworm'
earthworm-in

5. Implications For Phonological Theory

Recognizing a need to constrain the power of phonological theory, linguists

⁸/l̩/ does not otherwise undergo nasal assimilation across morpheme boundaries.

have proposed a number of rules to limit abstractness. Notable among these are the strong claims of the Natural Generative Phonology (NGP) theory. In an effort to give a "realistic representation of linguistic competence" [Hooper 1976:5], the theory of NGP places strong constraints on abstractness in underlying forms. One way in which this is accomplished is through the True Generalization Condition which states that all rules must make true generalizations about *surface* representations. One result of this is that a phonological rule (P-rule) must be sensitive to only a *phonetic* environment.

The data discussed above provide evidence that Chumburung speakers not only rely on the phonetic environment to determine their realization of /l/, but also on the grammatical information of a morpheme boundary. In order to adequately represent the linguistic competence of a native Chumburung speaker, the rules written to account for /l/ would need to consider a native speaker's consistent pronunciation of a medial [r] in a loan word like *kárāndà* 'calendar'⁹ while yet pronouncing a medial [l] in *kàlādá* (*kà* + *lādá*) 'libation'. They would also have to account for the native speakers' ability to distinguish words like *kìrìsì* 'to tie around' from words like *kìlìbò?* (*kì* + *lìbò?*) 'bunch of bananas' to determine the appropriate choice of allophone. Speakers who always pronounce medial /l/ as [r] in [lVl-] occurrences also rely on non-phonetic information for the correct pronunciation of words like *ì|è|è?* 'lightning'.

Since the rules which determine the proper choice of allophone for /l/ in the speech of speakers who manifest a medial contrast between [l] and [r] are obviously allophonic and relate surface forms to surface forms, it seems inappropriate to classify these as "morphophonemic" just because they contain grammatical information.

6. Summary

In the second section, previous analyses of /l/ in Chumburung are pre-

⁹Since the immediate source of loan words is not always clear, examples such as this provide only weak evidence because, while the original source may be obvious, i.e. English, the immediate source may be Twi, which lacks a phoneme /l/.

sented and their inadequacies discussed. In the third section, I attempt to demonstrate that the feature ATR is not restricted to the vowel harmony system, but also influences the realization of the consonant /l/. I conclude that /l/ is realized as [l] stem-initial and is elsewhere realized as [r]

- (a) (for some speakers) in all cases;
- (b) (for other speakers) in all cases except where the preceding syllable begins with [l];
- (c) (for still other speakers) in all cases except as in (b), but only if the vowels are in the [+ATR] vowel harmony set.

Support for this conclusion comes from radiographic evidence that the tongue root is clearly retracted in the articulation of the [-ATR] vowel harmony set and r. Consequently, the realization of /l/ as [r] in [-ATR] environments is seen as a natural assimilatory process.

Since the environment for the realization of /l/ includes grammatical information, I have suggested that the Chumburung data support the conclusion that a theory which does not allow for the sensitivity of a P-rule to non-phonetic information is overly restrictive.

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