Markedness, Faithfulness, and the Typology of Two-Height Tone Systems

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SUMMARY

In this paper, I explore the possibility of typologizing two-height tone systems based on markedness. Drawing from a current database of 650 tone systems (of which over 400 are two- height), I will first confirm that two-height systems may be "equipollent" /H, L/, "privative" /H/ or /L/ vs. Ø — or both, /H, L/ vs. Ø. I demonstrate that "markedness as faithfulness" (Pulleyblank 2004) and "faithfulness to the marked" (de Lacy 2002b, 2006) establish that H or L can be "marked" in both privative AND equipollent two-height tone systems. Tonal evidence presented from the Tibeto-Burman languages Kuki-Thaadow and Hakha Lai thus complements recent proposals of language-specific markedness in segmental phonology (Hume 2003, Rice 2007). However, I show that these criteria for markedness do not necessarily line up, with Haspelmath's (2006:64-5) 12 senses of the term "markedness", specifically "markedness as complexity". I conclude that typology should not be guided by markedness, rather by phonological representation and activation (Clements 2001, 2003): Which tone is activated (H, L, both), where in the phonology, and how?

RÉSUMÉ

Dans cet article j'explore la possibilité d'établir une typologie des systèmes tonals à deux niveaux de hauteur, fondée sur la notion de *markedness*. A partir d'une banque de données comprenant 650 systèmes tonals (dont plus de 400 sont à deux niveaux), je confirme premièrement que les systèmes à deux hauteurs tonales peuvent être soit "équipollents" /H, B/, soit "privatifs" /H/ ou /B/ vs. Ø — soit les deux, /H, B/ vs. Ø. Je démontre également, en m'appuyant sur les critères "Markedness as faithfulness" (Pulleyblank 2004) et "Faithfulness to the marked" (de Lacy 2002b, 2006) qu'un ton H ou un ton B peut être marqué dans les systèmes privatifs aussi bien qu'équipollents. Les arguments présentés, empruntés à deux langues tibéto-birmanes, le kuki-thaadow et le hakha lai, viennent ainsi compléter les récentes propositions selon lesquelles en phonologie segmentale les traits marqués sont spécifiques à chaque langue (Hume 2003, Rice 2007). Je montre cependant que ces critères de *markedness* ne correspondent pas nécessairement aux douze sens donnés par Haspelmath à la notion de *markedness*, en particulier ce qu'il nomme "markedness as complexity". Ma proposition est donc que la typologie ne devrait pas être guidée par la notion de *markedness*, mais plutôt par la représentation et l'activation phonologiques (Clements 2001, 2003) : quel ton est activé (H, B, les deux), où dans la phonologie de la langue, et comment ?

> *I favour the framework which assumes that Universal Grammar (UG) provides a set of general principles that are respected across all languages but underdetermine the phonological systems of particular languages. Specific grammars result from the incorporation of these principles and the selection of certain options (the parameters of variation) that are also made available by UG.* (Piggott 1999:179)

1. INTRODUCTION

Much of the previous work on the typology of tone systems has focused on defining what a tone system is (Pike 1948, Welmers 1959, 1973) and in contrasting tone vs. "pitch-accent" systems (McCawley 1970, 1978, Hyman 1977, 2006, 2009, Beckman 1986, van der Hulst & Smith 1988, Gussenhoven 2004, 2006, etc.). Attempts to typologize properties which distinguish "true" tone systems from each other have been based on several considerations:

(1) a. (relatively surface) contrasts, e.g. the number of tone heights, the presence vs. absence of contours, tonal downstep, phonations (Maddieson 1978, 2005)

b. distributional restrictions, leading to proposals to distinguish syllable tone, word tone, and "pitch-accent" (Donohue 1997, Matisoff 1999, Mazaudon 2005)
c. lexical vs. grammatical functions (Welmers 1973, Ratliff 1992ab, Hyman 2001)
d. presence vs. absence of phonological alterrnations (sandhi): assimilations, dissimilations, contour simplification, reductions (Chen 1992, 2000; Hyman & Schuh 1974, Hyman 2007, Schuh 1978)

Often cited is Pike's (1948) distinction between contour vs. register tones systems. Although corresponding roughly to Chinese and the "Sinosphere" (Matisoff 1999) vs. the world, the following table summarizes how the expected differences fare in two closely related Southeast Asian languages, Kuki-Thaadow (KT) and Hakha Lai (Lai):

Table 1. Expected Properties of "contour" vs. "register" tone systems

A. "Contour tone systems"	B. "Register tone systems"	KT	Lai
Fewer level tones than contours	More level tones than contours	B	A
Contour tones = units	Contour tones = sequences (clusters)	B	B
Contour tones have free distribution	Contour tones (clusters) often limited to the last syllable	B	A
Dissimilation of contour + contour	Dissimilation of contour tones = rare	B	A
Metathesis of features within a contour	Metathesis of contour tones = rare	B	A
No downstep	Downstep	B	A
Floating tones = rare	Floating tones = frequent	B	A
Tone spreading = rare	Tone spreading = frequent	B	A
Function of tone = lexical	Function = lexical AND/OR grammatical	A	A
Words are monosyllabic	Words come in various sizes	A	A
Tones are restricted by syllable type	Tones may occur on any syllable type	A	A

As we shall further examine below, these two members of the Kuki-Chin subgroup of Tibeto-Burman talley quite differently according to the contour (A) vs. register (B) tone properties: KT = 3A, 8B, Lai = 10A, 1B.

The goal of this paper is to explore the appropriateness of a phonologically-driven typology of two-height tone systems, based on markedness, drawing from a current database of over 650 tone systems of which over 400 are two-height. In order to do so, we must consider two preliminary issues. The first concerns the level or representation at which we should classify systems by tone height: Some languages have a binary contrast underlyingly, but derive up to five surface-contrastive tone heights by rule. Some of the ways to derive a third tone height are indicated in (2).

(2) a. lowering of H after L, e.g. Kom (Hyman 2005) L-H → L-M → M
b. raising of L before H, e.g. Ik (Heine 1993) L-H → M-H → M
c. raising of H before L, e.g. Engenni (Thomas 1978) H-L → ꜜH-L → ꜜH

When the underlying trigger of the tone change is dropped, perhaps by a rule that is still synchronically active, the result is a third surface-contrastive height. Thus Heine (1993:18) writes about Ik: "A low tone is realized as mid if followed by a high tone in the same word. The mid tone is retained even when the high tone is deleted due to word-final devoicing." The question is whether Ik has a two-height or three-height system? What would seem appropriate is a typological approach where both underlying and surface contrasts are considered: Ik would be a 2-input AND 3-output height system, abbreviated 2T3.

In addition to levels of representation, the second issue is to determine which of the following four analyses is the best, or most appropriate, for any given two-height system:

(3)			
	"equipolent"	/H/ vs. /L/	e.g. Baule, Bole, Mende, Nara, Falam, Kuki-Thaadow, Siane, Sko, Tanacross, Barasana
	"privative"	/H/ vs. Ø	e.g. Afar, Chichewa, Kirundi, Ekoti, Kiwai, Tinputz, Una, Blackfoot, Navajo, Seneca
		/L/ vs. Ø	e.g. Malinke (Kita), Ruund, E. Cham, Galo, Kham, Dogrib, Tahltan, Bora-Miraña
	both:	/H/ vs. /L/ vs. Ø	e.g. Ga, Kinande, Margi, Sukuma, Tiriki, Munduruku, Puinave, Yagua

The guiding principle followed here is to posit the one vs. two tones which are "phonologically active", i.e. invoked by the language's constraints or rules. Thus compare Clements' (2001, 2003) notion of "representational economy": "... features are specified in a given language only to the extent that they are needed in order to express generalizations about the phonological system" (Clements 2001:2). A feature (tone) may be underlyingly active, or may become active in the course of the derivation (either lexically or postlexically), possibly creating a "mixed type" system, as in Luganda (Hyman & Katamba 2010:70), which also has occasional downsteps on the surface:

(4)	Level	Domain	Tones	
a.	morphophonemic	morpheme	/H/ vs. Ø	= privative
b.	phonemic	word	H vs. L vs. Ø	= equipollent and privative
c.	phonetic	phrase	H vs. L	= equipollent

Compared to their equipollent counterparts, privative systems exhibit lower "tonal density" (Gussenhoven 2001:15296), as they allow tone-bearing units (TBUs) to occur without a tonal specification. Since [L] is underspecified (Ø) in a privative /H/ vs. Ø system, the H in principle: (i) cannot form HL and LH contours on a single TBU; (ii) can be a floating tone, whereas L cannot; (iii) can be subject to an OCP contraint (*H-H), whereas L cannot; (iv) can shift over long distances, since there are no specified L tones to block the shift; (v) can interact with ("see") another H tone at long distance, since there is no L between them; (vi) is a pitch target, whereas Ø is not. Although less common, privative /L/ vs. Ø systems have the same but inverted properties as /H/ vs. Ø; cf. floating L, OCP(L) in Bora-Miraña (Weber & Thiesen 2000; Seifart 2005). My working hypothesis is that there is nothing that a H tone can do that a L tone cannot in principle also do.

We turn now to the question of whether there is a general way to determine tonal markedness in two-height systems as a whole. An old (and intuitive) view is that H is universally marked and L unmarked (Pulleyblank 1986, 2006:415). We shall examine this hypothesis but note first that it appears to be contradicted in privative systems, where the one specific tone is presumably also the marked value. Thus, compare the distinction between "high-marked" (/H/ vs. Ø) and "low-marked" (/L/ vs. Ø) tone systems in Athabaskan (Hargus & Rice 2005:11-17). In equipollent systems, where both tones are "activated", hence necessarily specified, there are two possible approaches: (i) universal markedness, whereby H = marked and L unmarked (cf. de Lacy 2002a:28); (ii) language-specific markedness: H is marked in (most) languages, L in others. Recognizing both of these possibilities, Maddieson (1978:341) distinguishes *possible* (marked-H, marked-L) vs. *probable* (marked-H) systems: "It may be that high tones are more frequently marked because an upward deflection of pitch is naturally salient against an overall downward intonational contour than a downward deflection. Falling intonations seems the most frequent in speech" (Maddieson 1978:342n)."

The main question we need to address is thus the following: If both /H/ and /L/ are specified, how can one tell which is "marked"? Among the possibilities are the following two types of evidence:

(i) Quantitative arguments. Assuming that "a less frequent tone is marked" (Maddieson 1978:341), a tone which is more frequent in lexical entries or texts would then be less marked. This is certainly true in privative systems. However, it should be noted that a sparser, potentially "marked" tone may be more frequently activated by the phonological constraints/rules.

(ii) Qualitative arguments. One such argument is that, when in conflict, a marked tone is expected to override the unmarked tone and thus be preserved in output: ""marked elements are subject to greater preservation than less marked ones" (de Lacy 2002b:196).

There have been recent proposals within optimality theory that tonal markedness in particular (Pulleyblank 2004) and markedness in general (de Lacy 2002b, 2006) fall out from the ranking of Faithfulness constraints, e.g. MAX(Tone), which Akinlabi & Mutaka (2001:353) define as: "Input tones are realized in the output (i.e. no deletion)." According to this approach we can restate the two possibilities of marked H vs. marked L as follows:

(5)	a.	universal markedness:	(i)	MAX(H)	>> MAX(L)	(= marked H)
	b.	language-specific markedness:	(i)	MAX(H)	>> MAX(L)	(= marked H)
			(ii)	MAX(L)	>> MAX(H)	(= marked L)

In (5) I contrast the two possibilities mentioned earlier: If H is universally marked, then presumably Max(H) is always ranked higher than Max(L). If markedness is language specific, then both possibilities in (5b) should be found. In the rest of this paper I will argue that the latter is the case. Evidence from Kuki-Thaadow and Hakha Lai, two Kuki-Chin languages spoken in NE India and Myanmar, shows that both of the language-specific possibilities in (5b) exist.

2. KUKI-THAADOW (KT)

We begin with Kuki-Thaadow, which exhibits the following three-way contrast on words, which are mostly monosyllabic (Hyman 2010):

(6)	a.	/H/	:	/hláaŋ/	'mountain'	/zóoŋ/	'monkey'	/thúm/	'three'
	b.	/L/	:	/hùon/	'garden'	/làam/	'dance'	/gùup/	'six'
	c.	/HL/	:	/lôw/	'field'	/ûy/	'dog'	/gîet/	'eight'

A general property of KT is that a contour tone can only be realized on the last syllable of a phrase. The following examples show that /HL/ is simplified to H when followed by another syllable (the symbol ^{L} indicates a delinked floating L, while ˡ indicates a downstep on the following H):

(7)	a.	/lôw/	+	/làam/	→	lów	làam	'field dance'
		HL		L		H^{L}	L	
	b.	/lôw/	+	/ûy/	→	lów	ˡûy	'field dog'
		HL		HL		H^{L}	HL	
	c.	/lôw/	+ /ûy/	+ /gîet/	→	lów	ˡúy	ˡgîet 'eight field dogs' (with 2 downsteps)
		HL	HL	HL		H^{L}	H^{L}	HL

(7a) shows that the sequence /HL + L/ is realized H-L, while /HL + HL/ is realized H-ˡHL in (7b). (7c) shows that HL-simplification can lead to multiple downsteps. In addition to contour

simplification, KT has two tone-spreading rules. H tone spreading (HTS) applies whenever /H/ is followed by /L/, e.g. creating a HL falling tone on *gûup* 'six':

(8) /hláaŋ + zóoŋ + gùup/ → hláaŋ zóoŋ gûup 'six garden monkeys'
H H L H H HL

Correspondingly, L tone spreading (LTS) may apply to a /L + H/ sequence, e.g. creating the LH rising tone on *zǒoŋ* 'monkey' in the following examples:

(9) a. /hùon + zóoŋ/ → hùon zǒoŋ 'garden monkey' (L + H → L + LH)
L H

b. /lôw + zóoŋ/ → lów zǒoŋ 'field monkey' (HL + H → H + LH)
H L H

(9b) shows that the L of /HL/ spreads, but also delinks by pre-final contour simplification. The example in (10) shows the application of LTS, HTS, and contour simplification to a /L + H + L/ input:

(10) /hùon + zóoŋ + gùup/ → hùon zòoŋ gûup 'six garden monkeys'
L H L (L + H + L → L + L + HL)

Crucially, however: LTS does not apply when /L/ + /H/ is followed by /H/ or /HL/. The following examples are realized without change:

(11) a. /hùon + zóoŋ + thúm/ → hùon zo̲oŋ thúm 'three garden monkeys'
L H H

b. /hùon + zóoŋ + gîet/ → hùon zo̲oŋ gîet 'eight garden monkeys'
L H HL

From the above examples we see that LTS applies to L + H if the H is either (i) phrase-final or (ii) followed by L (to which the H spreads by HTS). LTS does not apply if the L is followed by H or HL. The question is why there should be such a restriction.

To answer this question, consider first what the output would have been in LTS could apply to such sequences:

(12)

		by LTS		by contour simplification
a.	/L + H + H/	→ L + LH + H	→	L + L̲ + H
b.	/L + H + HL/	→ L + LH + HL	→	L + L̲ + HL

In the above derivation, LTS first derives a LH rising tone on the penultimate syllable, which then must be simplified to L by contour-simplification. If now ask what's wrong with the above outputs, the answer becomes clear: the input Hs of the second syllable are not realized in output. The /H/ does have an output realization in (9), where LH can surface on the final syllable and in (10), where the H spreads onto the following L tone syllable. We thus can draw the following generalization about KT:

(13) Every input H is always realized on the surface. The same is not true of input Ls, which are often not realized, e.g. when /HL + L/ is realized H + L, as in (7a) above

The resulting ranking of the relevant constraints is thus as follows:

(14) MAX(H) >> SPREAD(Tone) >> MAX(L)

What this means is that tones will spread unless the result is the non-preservation of an input /H/. The above H >> L ranking is consistent with both the universal and language-specific markedness claims. To choose between them we will now consider the closely related language Hakha Lai.

2. HAKHA LAI

Like KT, Hakha Lai also has a three-way tonal contrast on words, again monosyllabic (Hyman & VanBik 2004). Whereas KT does not have underlying /LH/, Hakha Lai does not have /H/:

(15) a. /LH/ : /thlăaŋ/ 'grave' /tsăan/ 'time'
b. /L/ : /kòom/ 'corn' /sàa/ 'animal'
c. /HL/ : /tlâaŋ/ 'mountain' /zûu/ 'beer'

To illustrate the nature of tonal alternations in the language, consider how the nine possible combinations of the three input tones are realized in the output:

(16)

		HL		LH		L	
a.	LH	thlăan	zûu	thlăan	tsâan	thlàan	sàa
b.	L	kòom	zùu	kòom	tsăan	kòom	sàa
c.	HL	tlâaŋ	zùu	tlâaŋ	tsăan	tlâaŋ	sàa
ka + 'my'		'grave beer'		'grave time'		'grave animal'	
		'corn beer'		'corn time'		'corn animal'	
		'mountain beer'		'mountain time'		'mountain animal'	

As indicated, the output tones are as realized after underlyingly toneless *ka* 'my', which receives its pitch post-lexically. The words which have changed their tone are underlined. The results are summarized below:

(17)

a. Inputs which don't change			b. Inputs which do change				c. Outputs they change to		
LH	+	HL	L	+	HL	→	L	+	L
L	+	LH	HL	+	HL	→	HL	+	L
HL	+	LH	LH	+	LH	→	LH	+	HL
L	+	L	LH	+	L	→	L	+	L
HL	+	L							

The generalization concerning which inputs change can be extracted by comparing (17a) and (17b): In (17a) the second tone begins at the same pitch height at which the first tones ends. In contrast, the second tone in (17b) either jumps either up or down from the ending pitch height of the first tone. (Unlike KT, non-final contour tones are permitted in Hakha Lai.) The outputs in (17c) thus also show a continuation of the same pitch level from the first to the second tone. The constraint that is needed is informally schematized in (18).

(18) No Jumping Principle (NOJUMP) : * σ σ
| |
αH -αH

This constraint prohibits a change in pitch heights between syllables. Recalling the typological distinction in Table 1, it would seem that Hakha Lai, a contour tone language, prefers tone-height changes to take place WITHIN syllables.

Since there are several ways that the observed tone changes can be interpreted (see Hyman & VanBik 2004), the "repairs" of NOJUMP violations are stated informally in (19).

(19) a. HL → L / {HL, L} __ b. LH → HL / LH __
LH → L / __ L

In the changes in (19a), where HL and LH are simplified to L, MAX(H) is clearly violated. If (19b) is interpreted as metathesis, MAX(H) is not violated. In no case is a L deleted in order to satisfy the NOJUMP constraint. This leads to the following generalization in Hakha Lai:

(20) Every input L is always realized on the surface. The same is not true of input Hs, which are often not realized, as in (19a)

The resulting ranking of the relevant constraints is thus as follows:

(21) MAX(L) >> NOJUMP >> MAX(H)

This ranking of course has the MAX constraints reversed from KT in (13). We thus must conclude that if the highest ranked MAX(Tone) indicates the marked tone, then tonal markedness is LANGUAGE-SPECIFIC, i.e. (5b) is the correct hypothesis: In equipollent tone systems, H can be marked in one language (KT) vs. L in another (Hakha Lai). We further explore the significance of this finding in the following, last section.

4. CONCLUSION

To summarize our results thus, far, we arrive at the following points: (i) In a privative two-height system, the specified tone is the marked tone. (ii) In an equipollent two-height system, either tone can be the marked tone. (iii) In both systems, H is more commonly marked than Ø or L. To some extent the langauge-specificty of tonal markedness in equipollent systems should not be surprising. First, /H/ vs. Ø and /L/ vs. Ø privative systems already allow either tone to be the marked option. Second, recent studies have claimed language-specific markedness in segmental phonology as well (Hume 2003, Rice 2007). The question we must now ask is whether there is independent evidence for the MAX-based markedness values at which we have arrived?

Recall the earlier discussion in §1 that "unmarked" values are assumed to be more frequent. To this we can add that unmarked values are also expected to be found in positions of neutralization or reduction. Let us apply both of these criteria to KT and Hakha Lai. Table 2 provides the frequency counts of each tone in the two languages:

Table 2. Frequency Counts on the Tones in Kuki-Thaadow and Hakha Lai

KT	#	CVV	CV(V)R	CVT	CVVT
H	503	x	x		
L	513	x	x	x	
HL	473	x	x		x

Lai	#	CVV	CV(V)R	CVT	CVVT
LH	338	x	x	x	
L	206	x	x		x
HL	291	x	x		

The numbers indicate how many entries there are in the two lexicons created, respectively, by me (KT) and by Kenneth VanBik (Lai), both drawing in part from materials collected in field methods classes at Berkeley. The table also shows which tones occur in which syllable types (VV = long vowel or diphthong; R = sonorant, T = stop; CVT includes glottal stop in Lai, but is not ignored in KT, where -ʔ has multiple historical sources). It should also be noted that the CVT tone is also the tone that verbs get in a morphological tone reduction process ($Stem_1 \rightarrow Stem_2$).

From the table we can see that /L/ is slightly, but not impressively more frequent in KT. That it is the only tone in (original) CVT syllables as well as the reduced $Stem_2$ tone is consistent with identifying it as the unmarked tone. Hakha Lai, however, is less consistent. /L/ is the least frequent tone and cannot occur in CVT syllables, suggesting it is marked. However, since a [L] element is obligatory in all lexical items, it is more frequent than [H] (835 vs. 629). It also is odd that the /LH/ of CVT and reduced $Stem_2$ would be unmarked, given its phonetic complexity. (Maddieson 2004:744-5 curiously does find that /LH/ is shorter than the other tones on CV(V)R syllables.) Since [L] is a less complex tone and output of the neutralizing rules in (19a) we have good reason to think of the highly faithful L element/tone as unmarked. There thus is a contradiction: The ranking of Max(L) suggests it is marked, while the occurrence of L in positions of neutralization suggests it is unmarked.

The problem, I suggest, derives from different notions of what is meant by (un)marked. Up to now we have mostly been referencing "Markedness as faithfulness" (Pulleyblank 2004) and "Faithfulness to the marked" (de Lacy 2002b, 2006) vs. "Markedness as complexity" (cf. Haspelmath 2006:26). In fact, the "repairs" in Hakhai Lai in (19) are structure-preserving and "show strict adherence to the universal, phonetically grounded, markedness scale: *R >> *F >> *L" (Hyman & VanBik 2004:827), where R = LH rising and F = HL falling tone. Of the three tones of Hakha Lai, L is clearly the least complex. In addition, it can be pointed out that "markedness as faithfulness" needs to be rigorously tested against privative systems. The Haya /H/ vs. Ø system mostly has rules of H deletion (Hyman & Byarushengo 1984), while Bora-Miraña /L/ vs. Ø mostly has rules of L deletion (Weber & Thiesen 2000, Seifart 2005). In some privative systems, the output tone is culminative ("at most one per word"), suggesting that Ø is more faithful than the "marked" tone!

While there are various strategies one might follow to maintain markedness as faithfulness, it is not clear that the concept of markedness is fine-tuned enough to be unambigously applied to the kinds of facts considered in the previous sections. Haspelmath (2006:64-5) for example presents 12 different senses in the use of the term "markedness" in the literature. Particularly relevant here are the following:

(22) a. "markedness as specification for a phonological distinction"
b. "markedness as phonetic difficulty"
c. "markedness as rarity in texts [and lexicons]"
d. "markedness as rarity in the world"
e. "markedness as restricted distribution"
f. "markedness as deviation from default parameter setting"

According to Haspelmath, "markedness" is an incoherent notion which should be replaced with detailed study and comparison of the relevant properties (contrasts, difficulties, rarity etc.) and their distributions. As part of such an effort I have to point out as part of truth in advertising that data like those from Kuki-Thaadow and Hakha Lai are hard to come by. I do not know of any tone system which blocks LTS as KT does or which has a NOJUMP constraint like Hakha Lai. In fact, my impression is that L tone spreading is in general more likely to apply to /L-H-H/ than /L-H-L/, just

the reverse of Hakha Lai. What's impressive is that both of these Kuki-Chin languages care A LOT about specific-tone faithfulness, a lot more asymmetrically than other equipollent tone systems I know. Why this is so ought to be investigated on its own, perhaps with a eye open to the diachronic source of tone in these languages.

Because of the ambiguities and confusions surrounding the term, and despite the interesting divergent tonal preservation properties of the two languages discussed in this paper, I suggest that other systems will not be asymmetrically clear in ranking FAITH(H) and FAITH(L). As I have indicated, the first typological question concerns representation: Is the two-height tone system equipollent /H/ vs. /L/, privative /H/ vs. Ø or /L/ vs. Ø, or both /H/ vs. /L/ vs. Ø? In other words, the initial cut concerns phonological representation and activation (Clements): Which tone is activated (H, L, both), where in the phonology (lexical, postlexic), and how? As Glyne points out in the quote that I began with, all of the above derive from general principles of grammar, but follow specific options (or parameters) available to all languages (Piggott 1999:179).

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