# Markedness and the Phonological Typology of Two-Height Tone Systems

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ABSTRACT

Despite longstanding interest in defining what a tone system is and in contrasting tone, pitch- and stress-accent systems, there have been surprisingly few attempts to sort out the relevant phonological properties which distinguish "true" tone systems from each other. In this paper, I explore a property-driven typology of two-height tone systems, based on markedness. Drawing from a current database of ca. 600 tone systems (of which over 400 are two-height), I first confirm that two-height systems may be "equipollent" /H, L/, "privative" /H/ vs. Ø or /L/ vs. Ø. or both, /H, L/ vs. Ø. I then demonstrate a difference invoking tonal markedness: While the one tone of /H / or /L/ systems is unambiguously "marked", contrasting with the absence of tone (Ø), the claimed univerally marked H tone of /H, L/ systems does not show a consistent tendency to be preserved ("faithful") in outputs as proposed by Pulleyblank (2004) and de Lacy (2006). Two closely related Tibeto-Burman languages illustrate this point: In Kuki-Thaadow, the tone rules "conspire" to guarantee that every underlying /H/ will be realized on the surface. In closely related Hakha Lai, however, it is just the opposite: several rules apply in such a way as to guarantee that every input /L/ will be realized on the surface. One possible interpretation is that either /H/ or /L/ can be marked in /H, L/ systems, thus complementing recent proposals of language-specific markedness in segmental phonology (Hume 2003, Rice 2007). Given the polysemous and potentially contradictory notion of markedness (Haspelmath 2006), I suggest abandoning "markedness as faithfulness" in favor of the concept of "phonological activation" (Clements 2001, 2003; Hyman 2003): Which tone is activated (H? L? both?), where in the phonology (underlying? lexical output? surface?), and how?

## 1. Introduction

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

(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)

Drawing on properties such as those in (1), Pike's (1948) proposed typological distinction between "contour tone systems" and "register tone systems" can be elaborated as in (2).

| (2) | *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 | B | A |
| | Words are monosyllabic | Words come in various sizes | A | A |
| | Tones may be restricted by syllable type | Tones usually can occur on any syllable type | A | A |

Pike was particularly impressed with how different Chinese tone is from African and Mexican tone. In fact, one can more or less identify column A with Matisoff's (1991) "Sinosphere", which includes Chinese, Vietnamese, and a number of other languages in Southeast Asia. In all other parts of the world, tones tend to be more of the column B type: Thus, the tone systems of Africa, New Guinea, the Americas, and even Matisoff's Southeast Asian "Indosphere" tend to be of this second type. At least as far as tone is concerned, even closely related languages do not fall 100% in one vs. the other category. This is the case concerning Kuki-Thaadow (KT) and Hakha Lai (Lai), two Southeast Asian languages of the Kuki-Chin branch of Tibeto-Burman, which will be the subject of our attention in this study. As seen in the last two columns of (2), KT exhibits two A and nine B properties, while Hakha Lai shows ten A and one B. Where the designation is subject to interpretation, the A or B appears in parentheses.

The goal of this study is to attempt a property-driven typology of two-height tone systems, based on markedness, drawing from a current database of ca. 600 tone systems (over 400 are two-height). The limitation to two-height systems was deliberately chosen as these already show considerable variation, especially as concerns the interpretation of the underlying system. After presenting some of the range of variation in surface H, L systems (§2), we will consider the issue of tonal markedness (§3), eventually addressing recent proposals within optimality theory that marked values should show greater tendency to be preserved ("faithful") in outputs (de Lacy 2002a,b, 2006; Pulleyblank 2004). KT (§4) and Hakha Lai (§5) will serve as two test cases. This is followed by discussion (§6) and a brief conclusion (§7).

## 2. Types of two-height tone contrasts

The first question that must be addressed is what constitutes a two-height tone system? On the one hand this is the minimal tonal system, as there is no such thing as a one-height (monotone) system. While some languages have a binary contrast underlyingly, they may contrast more tone heights on the surface. Ngamambo, for instance, has been analyzed with underlying /H, L/, but

with the following surface-contrastive tones: H (5), M (4), ˈM (3), L˚ (2), L (21) (Hyman 1986). Some of the ways to derive a third tone height from underlying /H, L/ are shown in (3).

(3) 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 → ˈH-L → ˈH

Although the third height starts out as being allophonic, the last column shows it becoming contrastive when the trigger is lost. Thus, in 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." (Heine 1993:18)

The question is thus whether Ik has a two-height or three-height tone system? We must decide which level of representation we wish to typologize: underlying or surface? While one could arbitrarily choose, what would be most revealing would be a system of encoding both the number of input and output tone heights. Ik might be designated a 2T3 (read: "two-tone-three") height system: 2 input vs. 3 output tone heights. While this would cover discrepancies between the number of underlying vs. surface tone heights, there are in fact three relevant phonological levels and their corresponding domains:

(4)

| *Level* | *Domain* | *Luganda* |
|---|---|---|
| morphophonemic | morpheme | /H/ vs. Ø |
| phonemic | word | H, L vs. Ø |
| phonetic | phrase | H vs. L |

In (3) we were concerned only with the morphophonemic (=underlying) and phonetic (= surface) levels, whose domains are the input morpheme and phrase/utterance. However, the phonemic level and its word domain are often important in stating phonological generalizations. As seen in the last column of (4), the phonemic inventory can be distinct from either the morphophonemic or phonetic levels. Thus Luganda has (different) binary contrasts at these levels, but a ternary contrast at the output of the lexical phonology (Hyman & Katamba 2010:70).

The Luganda situation brings us to the major question concerning two-height systems: Are they best analyzed as underlyingly "equipollent" /H, L/, "privative" /H/ or /L/ vs. Ø, or both /H, L/ vs. Ø? Examples of each are indicated in (5).

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

To determine the underlying system The guiding principle is to posit the one vs. two tones which are "phonologically active", i.e. invoked by the language's constraints/rules. Cf. 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).

In a /H, L/ system, both tones are phonologically activated, whereas only one tone is activated in privative /H/ or /L/ vs. Ø systems. It should be noted, however, that a feature (tone) may be underlyingly active, or may become active in the course of the derivation (lexically, postlexically). Thus, as indicated in (4), only /H/ is underlyingly active in Luganda, with L becoming active in the lexical phonology.

The differences between an equipollent and privative systems are not trivial. First, privative systems typically have a lower "tonal density" (Gussenhoven 2001:15296) in the sense that the tone is activated on relatively fewer tone-bearing units (TBUs). Since phonetic L is underspecified (Ø) in a privative /H/ vs. Ø system, the H in principle: (i) cannot form a HL and LH contours on a single TBU; (ii) can be a floating tone, whereas L cannot; (iii) can be subject to an Obligatory Contour Principle (OCP) constraint (*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, which Ø is not expected to be. Ls may be introduced by specific rule or by default, at which point they are "phonologically active" by definition.

Although less common, privative /L/ vs. Ø systems have the same but inverted properties of /H/ vs. Ø. Thus both floating Ls and OCP(L) effects occur in Bora-Miraña (Weber & Thiesen 2000; Seifart 2005). Although systems with privative /H/ are much more numerous than those with privative /L/, we can assume as a working hypothesis that there is nothing that a H tone can do that a L tone cannot in principle also do.

## 3. Tonal markedness in two-height systems

With the above established we can now address the question of which tone is "marked" in a two-height tone system. An old (and intuitive) view is that H is universally marked and L unmarked (Pulleyblank 1986, 2006:415). This however does not take into consideration that some two-height privative systems contrast /L/ vs. Ø. In a privative system presumably the one specified tone is necessarily the marked tone. Thus, compare the distinction between "high-marked" and "low-marked" tone systems in Athabaskan (Rice & Hargus 2005:11-17). In equipollent /H, L/ systems, where both features are activated (hence specified), it seems necessary to distinguish between two potentially different notions: (i) universal markedness, where it has been claimed that H is marked and L is unmarked (e.g. de Lacy 2002a:28); (ii) language-specific markedness, where H is marked in some (most) languages, L in others. This distinction appears to be what is behind Maddieson's (1978:341) dichotomy between *possible* (marked-H, marked-L) vs. *probable* (marked-H) systems. That is, in a /H, L/ system, H is more often marked:

> "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).

In a privative system, the one specified tone is by definition marked. If both /H/ and /L/ are specified, the marked tone can be established only by examining how each functions within the system. Both quantitative and qualitative arguments have been offered. The tone which has greater frequency in lexical entries or in texts is likely to be less marked: As Maddieson (1978:341) puts it, "a less frequent tone is marked". This is certainly true in privative systems, where, recall, there is lower tonal density, i.e. the number of toneless TBUs exceeds the number of TBUs carrying the one tone. However, another quantitative argument may lead to the opposite conclusion: A tone which is more frequently referenced by the phonological constraints or rules may potentially be marked.

A qualitative argument that has been advanced is that the marked tone is expected to override the unmarked tone and hence be preserved in outputs: "marked elements are subject to greater preservation than less marked ones" (de Lacy 2002b:196). Within optimality theory, recent proposals of Pulleyblank (2004) and (de Lacy 2002b, 2006) suggest that markendess should fall out from the ranking of Faithfulness constraints. In this context let us refer to the relevant constraint as MAX(Tone): "Input tones are realized in the output (i.e. no deletion)" (Akinlabi & Mutaka 2001:353). Adopting this approach, we can restate the two markedness possibilities of /H, L/ as follows:

| | | | | | | |
|---|---|---|---|---|---|---|
| (6) | a. | universal markedness: | MAX(H) | >> | MAX(L) | (= marked H) |
| | b. | language-specific markedness: | MAX(H) | >> | MAX(L) | (= marked H) |
| | | | MAX(L) | >> | MAX(H) | (= marked L) |

So which is it? Is /H/ universally marked in /H, L/ systems, or does it depend on the language? Does the faithfulness approach provide the appropriate criterion and, if so, which version of markedness in (6) does it support? To address these questions, let us now consider the tonal properties of Kuki-Thaadow and Hakha Lai, two Kuki-Chin languages spoken in Northeast India and Myanmar.

## 4. Marked H in Kuki-Thaadow (KT)

As seen in (7), KT exhibits a three-way contrast on words, which are generally monosyllabic (Hyman 2010):

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| (7) | a. | /H/ | : | /hláaŋ/ | 'mountain' | /zóoŋ/ | 'monkey' | /thúm/ | 'three' |
| | b. | /L/ | : | /hùon/ | 'garden' | /làam/ | 'dance' | /gùup/ | 'six' |
| | c. | /HL/ | : | /lôw/ | 'field' | /ûy/ | 'dog' | /gîet/ | 'eight' |

In KT, a contour tone can only be realized on a final (pre-pausal) syllable. The /HL/ falling tone must therefore be simplified to H whenever followed by another syllable/word:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (8) | a. | /lôw/ | + | /làam/ | → | lów | làam | 'field dance' |
| | | HL | | L | | $H^{L}$ | L | |

b. /lôw/ + /ûy/ → lów ˈûy ‘field dog’
HL HL H L HL

c. /lôw/ + /ûy/ + /gîet/ → lów ˈúy ˈgîet ‘eight field dogs’
HL HL HL H L H L HL

In (8a), the L of the /HL/ tone is delinked, indicated by a raised L. Thus, /HL/ + /L/ is realized H-L. The same delinking applies in (8b). However in this case the resultant floating L conditions a downstep (ˈ) on the following HL contour. (8c) shows the same delinking and downstep applying iteratively.

A second process is H tone spreading (HTS), which applies whenever /H/ is followed by /L/, e.g. creating a HL falling tone on *gûup* ‘six’ in the following example:

(9) /hláaŋ + zóoŋ + gùup/ → hláaŋ zóoŋ gûup ‘six garden monkeys’
H H L H H HL

There also is a rule of L tone spreading (LTS), which applies to certain /L/ + /H/ sequences, thus creating the LH rising tone on *zǒoŋ* ‘monkey’ in (10a).

(10) 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

In (10b) both L tone spreading and pre-final HL contour simplification apply.

HTS and LTS seem quite symmetric, and in fact both apply to a /L/ + /H/ + /L/ sequence, which becomes L + L + HL:

(11) /hùon + zóoŋ + gùup/ → hùon zòoŋ gûup ‘six garden monkeys’
L H L

However, LTS does not apply when the /L/ + /H/ sequence is followed by /H/ or /HL/:

(12) 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

In other words, LTS will apply to a /L/ + /H/ sequence if the H is either pre-pausal (10a,b) or followed by L to which the H spreads by HTS (11). LTS will not apply if the H is followed by another H or HL. The natural question to ask is: Why this restriction?

To answer this, first consider what the outputs would have been if LTS could apply in such cases:

(13)

| | | *by LTS* | | *by contour simplification* |
|---|---|---|---|---|
| a. | /L + H + H/ | → L + LH + H | → | L + L + H |
| b. | /L + H + HL/ | → L + LH + HL | → | L + L + HL |

As indicated, LTS would first convert the /H/ of the second syllable to a LH rising contour. As was seen in (11), the resulting LH would however have to be simplified to L since contour tones are only allowed on pre-pausal syllables. We thus can assume that if LTS were to apply as in (13), the incorrect outputs would be as indicated. The question is: What's wrong with the above? The unacceptable output in (13b) is in fact identical to the attested output in (11).

The answer is that the second syllable /H/ inputs are not realized in the outputs in (13). (This of course assumes that when the H of the intermediate LH is delinked in (13), the floating H does not "fuse" with the following H or HL, rather it has no realization.) With this observation we can provide the following generalization:

(14) In KT, 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 (8a) above. The resulting ranking of constraints can be stated as in (15).

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

What this says 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 in (6). To choose between them we will now consider the tonal properties of closely related Hakha Lai.

## 5. Marked L in Hakha Lai

Like Kuki-Thaadow, Hakha Lai also has a three-way tonal contrast on its mostly monosyllabic words (Hyman & VanBik 2004):

(16)

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

In (17) the above words are combined to produce the nine tone patterns of $\text{NOUN}_1$ + $\text{NOUN}_2$ compounds, as they are realized after the proclitic *ka* 'my':

(17)

| | | *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 + | | 'grave beer' | | 'grave time' | | 'grave animal' | |
| 'my' | | 'corn beer' | | 'corn time' | | 'corn animal' | |

'mountain beer' 'mountain time' 'mountain animal'

As seen, both the /LH/ and /HL/ tone undergo modification in context. The input combinations which do not change are indicated in (18a), while those that do change are listed in (18b).

(18)

| a. Inputs which do not 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 | | | | | | | |

As seen, (18a) consists of sequences where the second tone starts at the end point of the first tone. (18b), on the other hand, consists of sequences where there is either a change up from L to H or a change down from H to L between $N_1$ and $N_2$. Note in (18c) that the outputs that (18b) change into again involve sequences where there is no change in tone height between the two words. The relevant constraint is schematized in (19), which says "Do not change pitch heights between syllables":

(19) No Jump Principle (NOJUMP) : * σ σ
| |
αH -αH

Hakha Lai, which was seen to be a case of Pike's "contour tone system" in (2), likes tone-height changes to take place *within* syllables, not across. The repairs that are needed are shown in (20).

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

In first two rules, MAX(H) is clearly violated: /HL/ becomes L in the (20a), while /LH/ becomes L in (20b). If interpreted as metathesis, MAX(H) is not violated in (20c) (see Hyman & VanBik 2004 for discussion of different implementations of (20c)). From the rules in (20), the following generalization emerges:

(21) In Hakha Lai, every input L is always realized on the surface.

Given (20a,b), the same is obviously not true of every input H. The resulting ranking of constraints is as shown in (22).

(22) MAX(L) >> NOJUMP >> MAX(H)

By this ranking input Hs will be preserved unless their non-realization is needed to satisfy NOJUMP. The relation of (22) to (15) is of course quite striking as the two languages treat the preservation of the H and L tone heights quite differently.

## 6. Discussion

Recall the suggestion of de Lacy and Pulleyblank that marked tones tends to be preserved in outputs over unmarked tones. If this correct, i.e. if the highest ranked MAX(Tone) = the marked tone, then Kuki-Thaadow and Hakha Lai provide evidence that tonal markedness is language-specific:

(23) a. Kuki-Thaadow marked H : Max(H) >> ... >> Max(L)
b. Hakha Lai marked L : Max(L) >> ... >> Max(H)

Accepting this result for the moment, we can summarize tonal markedness as follows: (i) In a privative two-height system, the specified tone = 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/L.

The language-specificity 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, a number of recent studies have claimed language-specific markedness in segmental phonology as well (Hume 2003, Rice 2007). However, what evidence other than the ranking of MAX(Tone) do we have for recognizing marked H vs. marked L in (23)? Recall the quantitative criterion: the unmarked tone should be frequent, the marked tone less frequent. In addition, we expect the unmarked tone in positions of reduction and neutralization. From the KT lexicon I produced and from a comparative Kuki-Chin lexicon produced by Kenneth VanBik I have calculated the following number of each of the three tone patterns in the two languages:

(24)

| *KT* | # | CV: | CV(:)R | CVT | CV:T |
|---|---|---|---|---|---|
| H | 503 | x | x | | |
| L | 513 | x | x | x | |
| HL | 473 | x | x | | x |

| *Lai* | # | CV: | CV(:)R | CVT | CV:T |
|---|---|---|---|---|---|
| LH | 338 | x | x | x | |
| L | 206 | x | x | | x |
| HL | 291 | x | x | | |

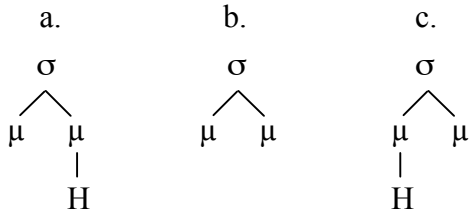
Also indicated are the tonal restrictions imposed by certain syllable types, where T = a voiceless stop and R = a sonorant consonant. As seen, CVT and CV:T allow only one lexical tone. Except for proclitics, the vowel of open syllable lexical entrires is always long (V:). Finally, it should also be noted that the CVT tone is also the tone that verbs get in a tone reduction process. Since both KT and Lai have underlying tonal contours, it is not clear whether we should quantify the number of H, L, HL and LH entries, or whether instead we should add up the H and L "features". Let us consider each count for both languages.

In KT, unmarked /L/ is slightly more frequent than /H/ and /HL/. Since there are ten more /H/ entries than /H/, the L feature is also slightly more frequent (986 vs. 976), which is certainly not impressive. However, ignoring CV?, which has multiple diachronic sources in KT, the only tone found in CVT syllables is /L/, which is also the reduced verb tone referred to in the previous paragraph. While these facts are consistent with positing unmarked L in KT, the evidence is not overwhelming.

The situation is quite different in Hakha Lai. Since L is marked in this language we expect either /L/ and/or the feature L to have relative low frequency, which is in fact borne out: /L/ is

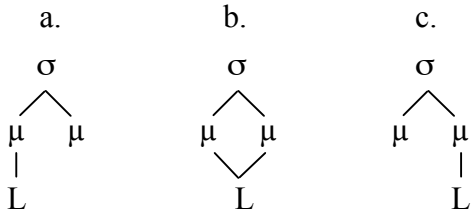
the least frequent tone in lexical entries. However, note that the feature L, being obligatory in all lexical items, is more frequent than H (835 vs. 629). This is a curious effect deriving not only from the tonal inventory but also from the fact that the language is monosyllabic and equipollent: If we had been tempted to analyze Hakha Lai as a privative system, the more parsimonious approach would be to zero out the L rather than the H to achieve the representations of /LH/, /L/, and /HL/ in (25).

(25)




But of course this would mean that H is marked. If we exploit the obligatoriness of L and zero out the H, the required representations would be as in (26).

(26)




Rather than the rules presented earlier in (20a,b), default H would presumably be inserted unless the result would be a NOJUMP violation. (20c), which changes LH to HL after another LH, could be represented as a shift of the L from the first mora in (26a) to the second mora, as in (26b).

Whatever position we might take on the representations, there are more serious issues: First, the one tone permitted in CVT syllables and in verb tone reduction is /LH/, which being articulatorily complex is hardly a good candidate to be the unmarked tone. (Maddieson 2004:744-5 does however report the surprising fact that /LH/ is shorter than the other tones on CV(:)R syllables.) Since the processes in (20a,b) neutralize HL and LH with L, the least complex tone, this suggests that the latter is unmarked. Up to now we have focused on "markedness as faithfulness" (Pulleyblank 2004) and "faithfulness to the marked" (de Lacy 2002b, 2005) vs. the quite different notion of "markedness as complexity" (Haspelmath 2006:26). The "repairs" in (20) are structure-preserving and "show strict adherence to the universal, phonetically grounded, markedness scale: *R >> *F >> *L" (Hyman & VanBik 2004:827), where R = rising and F = falling. Thus, while L is marked in the faithfulness sense in Hakha Lai, it is unmarked in the complexity sense. In fact, Haspelmath (2006:64-5) distinguishes 12 different senses of the term "markedness" of which the following six are the most relevant here:

(27) 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"

It thus appears that "markedness" is a contradictory, if not incoherent notion. Haspelmath thus suggests replacing the concept with detailed studies of the relevant, specific properties and their distributions.

## 7. Conclusion

The above discussion leaves us with some unanswered questions concerning tonal faithfulness. While Haspelmath's suggestion is to do what we might refer to as as "normal typology", how do the MAX(tone) differences between KT and Hakha Lai fit into this picture? We could of course just add tonal faithfulness as a typological parameter to be investigated in every tone system. However, I suspect that the picture that would emerge would not be as clean as the rankings in §4 and §5. While MAX(H) is never violated in KT, and MAX(L) is never violated in Hakha Lai, as they are the highest ranked among the tonal constraints, most languages will allow both MAX(H) and MAX(L) to be dominated by other constraints. In fact, there is reason to believe that both KT and Hakha Lai are outliers: I know of no other language that blocks LTS the way that KT does. Quite to the contrary, Hyman & Schuh (1974) claim that LTS is more likely to apply to a /L-H-H/ sequence than to /L-H-L/. Similarly, Hakha Lai is the only language reported to have the NOJUMP constraint in (19). Many more languages disallow contours, which in effect requires all changes in tone height to occur between syllables. Although still requiring a synchronic account, could these unusual properties be flukes, artifacts dating from the historical reduction of an original four-tone system to three, if not the original tonogenetic processes?

Even if MAX(tone) were to provide a useful way to characterize typological differences between equipollent two-height systems, there is some reason to doubt whether "markedness as faithfulness" has much usefulness in privative systems. Haya /H/ vs. Ø mostly has rules of H tone deletion (Hyman 1993), while Bora-Miraña /L/ vs. Ø mostly has rules of L deletion (Weber & Thiesen 2000; Seifart 2005). When there is only one tone value, MAX(tone) will interact with other constraints, but will be irrelevant for establishing markedness. My suggestion, therefore, is that typological variations in tonal faithfulness should be studied in their own terms—and not as a diagnostic for any version of markedness. Viewed this way, tonal typology will not be so much about markedness as it will be about phonological activation (§2). The questions we need to ask about each tone system are: Which tone is activated (H, L, both?), where is it activated in the phonology (underlying? lexical output? surface?), and how is it activated (distributional constraint, trigger/target of a rule, etc.)? The resulting sameness vs. diversity in phonological activations across languages can then be exploited to produce a property-driven typology.

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