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Proceedings of the Twenty-Eighth Annual Meeting of the Berkeley Linguistics Society: Special Session on Tibeto-Burman and Southeast Asian Linguistics (2002), pp. 15-28

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The purpose of this paper is to present an analysis of the tone system of Hakha-Lai, a Tibeto-Burman language of the Kuki-Chin subgroup, spoken in Chin State, Burma, and parts of Mizoram State, India. After establishing the underlying tonal representations, we turn to examine the various tone sandhi which account for their realization in different contexts. In so doing, we shall be particularly interested in the relation between tone and syllable type, specifically which syllable structures allow contour tones.[1]

The different syllable structures of (largely monosyllabic) Hakha-Lai words are schematized in (1).

(1) a. "Smooth" syllables

CVV	V = /i, e, u, o, a/
CVD	D = sonorant, i.e. /m, n, ŋ, l, r, y, w/
CVVD	D = sonorant, i.e. /m, n, ŋ, l, r, y, w/

b. "Checked" syllables

CVT	T = obstruent, i.e. voiceless stop /p, t, k/ or glottalized sonorant /m', n', ŋ', l', r', y', w'/
CVVT	T = voiceless stop /p, t, k/ (but not glottalized sonorants)

c. "Reduced" syllable (grammatical proclitics or derived via compounding)

CV	e.g. sg. pronominal proclitics (*ka* 'my' in (3), N1 in (5))

[1]This is a shortened version of the paper presented at BLS and in the Séminaire Tibéto-Burmane, at Université de Paris III, February 5, 2002. We are grateful for helpful comments received from interested persons at both events, especially John Ohala and David Peterson. Previous work on Hakha-Lai includes Kathol & VanBik (2001), Melnit (1997a,b), Olawsky & VanBik (2000), Patent (1997), Peterson (1998), VanBik (2001) and VanBik & Roengpitya (2001).

As seen, Hakha-Lai syllables require an onset and can be open or closed. Coda consonants can be obstruents (T), either voiceless stops or glottalized sonorants, or plain sonorants (D). Underlying length is contrastive only in syllables closed by a sonorant or a voiceless stop, and vowels are short before a glottalized sonorant coda.

As seen in (2), smooth-syllable words carry one of two tones in isolation: a falling (F) tone from a high to a low pitch [31] or a level (L) tone on a relatively low pitch [22]:

(2) Tones of smooth syllables in isolation

		CVV		**CVD**		**CVVD**	
a.	F	*hmaà*	'wound'	*lùŋ*	'heart'	*tlaàŋ*	'mountain'
		zuù	'beer'	*lòw*	'field'	*raàl*	'enemy'
b.	F	*oò*	'voice'	*hròm*	'throat'	*koòy*	'friend'
		keè	'leg'	*tsàl*	'forehead'	*tsaàn*	'time'
c.	L	*saa*	'animal'	*raŋ*	'horse'	*koom*	'corn'
		hnii	'skirt'	*kal*	'kidney'	*boor*	'bunch'

However, when preceded by a singular pronominal proclitic, e.g. *ka* 'my', the falling tone nouns in (2b) are instead realized with a mid-to-high [23] rising tone, as seen in (3).

(3) Tones of smooth syllables preceded by proclitic *ka*= 'my'

		CVV		**CVD**		**CVVD**	
a.	F	*ka hmaà*	'my wound'	*ka lùŋ*	'my heart'	*ka tlaàŋ*	'my mtn.'
		ka zuù	'my beer'	*ka lòw*	'my field'	*ka raàl*	'my enemy'
b.	R	*ka oó*	'my voice'	*ka hróm*	'my throat'	*ka kooý*	'my friend'
		ka keé	'my leg'	*ka tsál*	'my forehead'	*ka tsaán*	'my time'
c.	L	*ka saa*	'my anim.'	*ka raŋ*	'my horse'	*ka koom*	'my corn'
		ka hnii	'my skirt'	*ka kal*	'my kidney'	*ka boor*	'my bunch'

Our proposal is that there are three underlying tones in Hakha-Lai, falling (ˋ), rising (ˊ), and level low (unmarked), which we shall refer to as F, R, and L. In addition, as formalized in (4), there is a postlexical rule which changes a R tone to F in phrase-initial position:

(4) Initial Falling Rule (IFR)

$$\phi[\ \sigma \quad \Big| \quad R \rightarrow F$$

Because of the preceding *ka*, the /R/ of nouns in (3b) does not undergo rule (4).

Now consider the N1-N2 noun compounds in (5).

(5) 3 x 3 tone patterns plotted in N1- N2 compounds (N1 = reduced)

		F		**R**		**L**	
a.	**F**	*hna*	*hmaà*	*hna*	*oó*	*hna*	*hnii*
b.	**R**	*ke*	*hmaà*	*ke*	*oó*	*ke*	*hnii*
c.	**L**	*sa*	*hmaà*	*sa*	*oó*	*sa*	*hnii*

(*hnaà + hmaà* 'ear wound', *keé + hmaà* 'leg wound', *saa + hmaà* 'animal's wound', etc.)

In these forms we observe that when CVV → CV as the N1 of a N1-N2 possessive/compound, its tone is deleted and therefore has no effect on N2. (Its vowel is pronounced on a mid-to-high pitch.) We interpret this as indicating that a syllable must have two moras to be a tone-bearing unit, i.e. to carry F, R or L tone.

Compounds whose N1 ends in a coda consonant do not undergo such reduction. When both N1 and N2 are full syllables, tone changes affect those nouns which are boxed in (6).

(6) 3 x 3 tone patterns plotted in N1-N2 compounds (N1 ≠ reduced)

		F		**R**		**L**	
a.	**F**	*tlaàŋ*	*zuu*	*tlaàŋ*	*tsaán*	*tlaàŋ*	*saa*
b.	**R**	*thlaán*	*zuù*	*thlaán*	*tsaàn*	*thlaan*	*saa*
c.	**Ø**	*koom*	*zuu*	*koom*	*tsaán*	*koom*	*saa*
'my' +		'mountain beer'		'mountain time'		'mountain animal'	
		'grave beer'		'grave time'		'grave animal'	
		'corn beer'		'corn time'		'corn animal'	

The above forms indicate the tones with which they are realized after a singular proclitic such as *ka* 'my' so that IFR will not apply to the initial R tone in (6b).

As seen, F alternates with L tone. Phrase-internally, an underlying /F/ will be realized F in the three contexts in (7).

(7) a. after a /R/ which is realized R

ka + thlaán + zuù → *ka thlaán zuù* 'my grave beer'

ka + kooý + lùŋ → *ka kooý lùŋ* 'my friend's heart'

b. after a /R/ which is realized F by IFR (4)

thlaán + zuù	→	*thlaàn zuù*	'grave beer'	(i.e. R-F → F-F,
koóy + lùŋ	→	*koòy lùŋ*	'friend's heart'	ϕ-initially)

c. after a reduced syllable (toneless CV)

ka + zuù	→	*ka zuù*	'my beer'
hnaà + hmaà	→	*hna hmaà*	'ear wound'
saa + hmaà	→	*sa hmaà*	'animal wound'

On the other hand, a F tone is simplified to L in the two environments in (8).

(8) a. after a full syllable with F or L tone

tlaàŋ + zuù	→	*tlaàŋ zuu*	'mountain beer'
koom + zuù	→	*koom zuu*	'corn beer'

b. after two (or more) reduced CV syllables

ka + hnaà + hmaà	→	*ka hna hmaa*	'my ear wound'
ka + saa + hmaà	→	*ka sa hmaa*	'my animal wound'

As (9a) shows, the F simplification rule (FSR) may affect more than one input F:

(9) a.

kàn + tlaàŋ + zuù	→	*kàn tlaaŋ zuu*	'our mountain beer'
raàl + lòw + hmaà	→	*raàl low hmaa*	'enemy field time'

b. *ka + raŋ + hnaà + hmaà* → *ka raŋ hna hmaà* 'my horse's ear wound'

The example in (9b) shows, however, that even phrase-internally, a F will not be simplified if it is preceded by exactly one reduced CV syllable.

Our analysis is to group syllables into (largely iambic) tonal feet (f) within the phonological phrase (ϕ), according to the algorithm in (10).

(10) a. each full syllable must be in a separate foot, e.g.

tlaàŋ + zuù	→	[[*tlaàŋ*]$_f$ [*zuu*]$_f$]$_\phi$	'mountain beer'
F F		F L	
koom + zuù	→	[[*koom*]$_f$ [*zuu*]$_f$]$_\phi$	'corn beer'
L F		L L	

b. a sequence of two or more CV syllables will group together as a foot

ka + saa + hmaà	→	[[*ka sa*]$_f$ [*hmaa*]$_f$]$_\phi$	'my animal wound'
L F		L	

c. otherwise, a single reduced CV syllable foots with a following full syllable, ϕ-initially...

ka + zuù → [[*ka zuù*]$_F$]$_\phi$ 'my beer' (poss + N)
F F

saa + hmaà → [[*sa hmaà*]$_F$]$_\phi$ 'animal wound' (N1-N2)
F F

d. as well as ϕ-internally

ka + raŋ + hnaà + hmaà → [[*ka raŋ*]$_F$ [*hna hmaà*]$_F$]$_\phi$
F F F
'my horse's ear wound'

Assuming the footing structure in (10), the following generalization emerges: If not preceded by a R, a F will be deleted in a non-ϕ–initial monosyllabic foot, as indicated in the formulation of the FSR in (11).

(11) F-Simplication Rule: [... [...]$_F$ [σ]$_F$ ...]$_\phi$
(FSR) |
F → L

The FSR also predicts that the F of the isolation form [[*hmaà*]$_F$]$_\phi$ 'wound' will surface because the indicated monosyllabic foot is ϕ-initial. Since the rule in (11) depends on footing, and since footing is based on the distinction between full vs. reduced syllables, FSR will be sensitive to how the vowel shortening rule applies. As seen in (16), strings of multiple CVV syllables show some variation:

(12) a. *ka + saa + keé + hmaà* → [[*ka saa*]$_F$ [*ke hmaà*]$_F$]$_\phi$
L R F L F

b. *ka + saa + keé + hmaà* → [[*ka sa ke*]$_F$ [*hmaa*]$_F$]$_\phi$
L R F L

Both output forms mean 'my animal's leg wound'. In (12a), vowel-shortening applies only to *keé*. Two bisyllabic feet are thus constructed. Since the F of *hmaà* is protected by the reduced syllable *ke* in the second foot, FSR does not apply. In (12b), however, vowel-shortening applies to both *saa* and *keé*. As seen, this produces an initial foot consisting of three CV syllables. FSR therefore applies.

Whereas /F/ is affected by one rule (FSR), /R/ is affected by three rules. The first is IFR, already seen in (4): ϕ[R → ϕ[F. A second rule is illustrated in (13).

(13) a. *ka + thlaán + tsaán* → *ka thlaán tsaàn* 'my grave time'
R R R F

b. *ka + kooý + hróm* → *ka kooý hròm* 'my friend's throat'
R R R F

As seen, an input sequence /R-R/ is realized as R-F, a case of a contour tone appearing to obey the OCP. This dissimilatory rule is formulated in (14).

(14) R-R Rule (RRR): σ σ
| |
R R → F

The derivations in (15) show that, if ordered, RRR would have to precede IFR, which counterbleeds it:

(15) **R-R Rule** **Initial RF Rule**

a. *thlaán + tsaán* → *thlaán tsaàn* → *thlaàn tsaàn* 'grave time'
R R R F F F

b. *kooý + hróm* → *kooý hròm* → *kooỳ hròm* 'friend's throat'
R R R F F F

In addition, as seen in (16), RRR applies iteratively (from right to left), each F beginning at a lower level, hence an automatic downstepping effect:

(16) a. *ka + tlaán + zaán + tsaán* → *ka tlaán zaàn tsaàn* 'my grave night time'
R R R R F F

b. *tlaán + zaán + tsaán* → *tlaàn zaàn tsaàn* 'grave night time'
R R R F F F

(16a) shows *zaán* and *tsaán* both acquiring F tone in post-R position. The same happens in (16b), although *tlaán* then undergoes IFR to become itself a F tone.

Note in this context that IFR renders both FSR and RRR opaque. Recall that FSR changes an input F-F to F-L, as in (17a).

(17) a. ϕ[F-F → F-L e.g. *tlaàŋ + zuù* → *tlaàŋ zuu* 'mountain beer'
F F F L

b. ϕ[R-F → F-F e.g. *thlaán + zuù* → *thlaàn zuù* 'grave beer'
R F F F

c. ϕ[R-R → F-F e.g. *thlaán + tsaán* → *thlaàn tsaà* 'grave time'
R R F F

(17b) shows that IFS counterfeeds FSR, since the derived F does not condition the simplification of the following F. (17c) shows that IFS counterbleeds RRR, since the derived initial F does not prevent the following R from becoming F. There are at least two ways of capturing the non-interaction between the three rules. First, in a derivational approach, we could order the rules: FSR ⊃ RRR ⊃ IFR. On the other hand, in a two-level unificational approach, we could adopt a simultaneous input-output implementation of the three "rules".

A fourth and last rule that affects tone in Hakha-Lai is the R-Simplification Rule (RSR), which, as seen in (18), converts input /R-L/ to L-L:

(18)	a.	*ka + koóy + koom* R L	→	*ka kooy koom* L L	'my friend's corn'
	b.	*kàn + koóy + koom* F R L	→	*kàn kooy koom* F L L	'our friend's corn'

This is shown after toneless *ka* 'my' in (18a) and F tone *kàn* 'our' in (18b), both of which otherwise permit a following R.

The phrases in (19) now show that when a R meets both a left condition that would convert it to F, and the right condition that would convert it to L, it is always realized as F:

(19)	a.	*koóy + thlaán + saa* R R L	→	*koòy thlaàn saa* F F L	'friend's grave animal' (not *F--L--L)
	b.	*koóy + saa* R L	→	*koòy saa* F L	'friend's animal' (not *L-L)

(19a) shows that RRR takes precedence over RSR, while (19b) shows that IFR takes precedence over RSR. These can easily be incorporated into a rule ordering account by ordering RSR last: FSR ⊃ RRR ⊃ IFR ⊃ RSR. A non-derivational input-output account requires something further to guarantee that we do not generate **koòy thlaan saa* and **kooy saa*. One idea might be to scan the above forms in a left-to-right fashion. However, we saw earlier in (16) that strings must be scanned right-to-left for the purpose of RRR. A more promising approach would be to invoke constraint ranking: Given the choice of a change R → F vs. R → L, the former has the advantage of preserving both components of the R contour tone. That is, it is preferable to re-sequence ("metathesize") the tonal

gestures, {lh} → {hl}, rather than to lose one, {lh} → {l}[2] However, why doesn't FSR change F to R, rather than L?[3]

At this point, let us consider the following generalizations concerning tone sandhi in Hakha-Lai:

(20) a. F can be deleted
b. R can be changed to F or L
c. L never changes (never becomes a contour tone)

These generalizations directly reflect what has generally been accepted in work on tone, namely that rising tones are more complex than falling tones, which are more complex than level tones (Ohala 1978:30-1). Or, in terms of constraints: *R » *F » *L. The modifications in (20) thus convert more complex tones into less complex tones. The reverse is not found: F does not ever become R, and L does not ever become F or R.[4] This is a reassuring result, given the next issue.

Two other universal expectations concern the remaining "checked" or "stopped" syllables, CVT and CVVT, not yet treated. First, CVT should license fewer tonal oppositions than smooth syllables (CVV, CVD, CVVD) or long stopped syllables (CVVT). Second, CVT should disprefer (or disallow) contour tones (F, R) (see Zhang 2001 and references cited therein). As shown in (21), neither CVVT or CVT allow an underlying tonal opposition:

(21) In Hakha-Lai, neither CVVT nor CVT allows an underlying tonal opposition

a. CVVT, where T = voiceless stop (i.e. /p, t, k/)

tseep	'bug'	*liit*	'leech'	*hnaak*	'rib'

b. CVT, where T = voiceless stop, glottal stop or glottalized sonorant

kep	'button'	*mit*	'eye'	*vok*	'pig'
tsop	'chisel'	*kut*	'hand'	*ruʔ*	'bone'

Except for some derived verb forms (see Hyman & VanBik 2002), all CVVT words carry L tone, i.e. they are realized on a long, relatively low level pitch.

[2]In the oral presentation, we treated the level (L) tone as unmarked (Ø), in which case, the choice would be between R → F vs. R → Ø. MAX(T) might then be evoked on the contour as a unit. This is still a possible analysis, which we are examining in another paper in preparation.

[3]Similarly, unless the change of R-L to L-L is an assimilation (rather than a contour simplification), we have no explanation as to why R-L doesn't become F-L, where F would preserve both pitch levels of the input R.

[4]This pertains to phonological rules only. Hyman & Bik (2002) show that stem2 formation frequently consists of a morphological replacement of stem1 F or L by R.

Although they do not themselves alternate (since /L/ never becomes F or R), CVVT does condition RSR, as seen in (22).

(22) *ka + kóóy + tseep* → *ka kooy tseep* 'my friend's bug'
R L L L

Since CVVT has a long vocalic nucleus, it is surprising both that there are no underlying tonal oppositions, and that the one tone that underlying CVVT morphemes carry is L.

The situation concerning CVT is even more intriguing. In isolation, CVT words are pronounced on a very short high falling tone. Given the tonal properties we have established above, it is clear that all CVT syllables are underlyingly /R/. As /R/ fails to do in general, (23a) shows that CVT does not condition FSR on the following syllable:

(23) a. *mit + hmaà* → *mìt hmaà* 'eye wound'
R F F F

b. *vok + kóóy* → *vok kòòy* 'pig's friend'
R R F

c. *ka + kóóy + mit* → *ka kóóy mìt* 'my friend's eye'
R R R F

On the other hand, (23b) shows that CVT conditions RRR, as /R/ generally does. Finally, as seen in (23c), CVT undergoes RRR itself.

Although there is no underlying tonal opposition on /CVT/, (24) shows that there is a contrast on the surface:

(24) a. *raàl + níʔ* → *raàl níʔ* 'enemy + erg.'
F R F R

b. *kóóy + níʔ* → *kòòy nìʔ* 'friend + erg.'
R R F F

In (24a), the ergative marker /níʔ/ is realized on a high (non-falling) pitch. This is as we would expect if the output tone were R, with the beginning part of the contour clipped because of the shortness of the vowel. This realization contrasts with (24b), where /níʔ/ is realized with a falling pitch—which has been downstepped from the level of the preceding F. Whereas the F tones of the first word in the two examples are identical, the two realizations of /níʔ/ are strikingly different, much higher in (24a) than in (24b). The lower pitch of what we have marked as a falling CVT syllable is even more noticeable in cases where more

than on such CVT syllable occurs in sequence, e.g. *koòy vòk nìʔ* 'friend's pig + erg.'.

As seen, CVT syllables have the same behavior as smooth syllables with /R/ tone. There is one rule, however, which applies specifically to the /R/ of CVT syllables. (25a) shows that phrase-initial /vók/ conditions RRR on /tsaán/, while (25b) shows the same conditioning when /vók/ is immediately preceded by a full syllable (foot).

(25)	a.	*vók + tsaán* R R	→	*vòk tsaàn* F F	'pig time'
	b.	*koóy + vók + tsaán* R R R	→	*koòy vòk tsaàn* F F F	'friend's pig time'
	c.	*ka + vók* R	→	*ka vòk* F	'my pig'
	d.	*ka + vók + tsaán* R R	→	*ka vok tsaán* F R	'my pig time'

However, when preceded by a reduced CV syllable, the /R/ of a CVT syllable is changed to F. We not only hear this change in (25c), but also observed in (25d) that *vòk* now does not condition RRR on *tsaán*. Since CV syllables do not generally convert /R/ to F, e.g. *ka koóy* 'my friend' (not **ka koòy*), the proposed rule in (26) must make specific reference to CVT syllables:

(26) CVT-R Rule: [CV - CVT]
|
R → F

Since *tsaán* is realized with R tone in (25d), (26) must be ordered before RRR.

The above completes our outline study of the Hakha-Lai tone system. Although we have illustrated the various rules citing noun compounds and possessives, the same tone rules apply more generally within the noun phrase, as in (27), and in the verb phrase, as in (28).

(27)	a.	*ka + koóy + heé* R R	→	*ka koóy heè* R F	'with my friend' (cf. *ka tseep heé* 'with my bug')
	b.	*hii + raàl + hií* L F R	→	*hii raal hií* L L R	'this enemy' (cf. *raàl* 'enemy')

(28) a. *kàn + raà* → *kàn raa* 'we come'
F F F L
(cf. *ka raà* 'I come')

b. *a + baá + lów* → *a baá lòw* 'he didn't tire'
R R R F
(cf. *a raà lów* 'he didn't come')

c. *a + ka + hnám + mii* → *a ka hnam mii* 'the one who kissed me'
R L L L
(cf. *a ka hnám* 'he kissed me')

As Hyman & VanBik (2002) show, tone is also implicated in the morphological process of stem2 formation in verbs: First, all stem2 verbs carry R tone except for the L of CVVT forms whose stem1 is CVV. In addition, tonal differences of stem1 largely predict segmental differences in stem2 formation.

The last issue on which we are currently working, but should like to briefly consider here concerns the featural interpretation of what we have identified as F, R and L tones. We have considered the possibility that L is actually the unmarked (Ø) tone in the language, and will simply set aside this issue to consider the following three interpretations of F and R.

The first interpretation is that F and R are unitary contour tones. The main argument for this is that they seem to be treated as units by some of the rules, e.g. IFR and RR, both of which convert /R/ to [F]. The major problem with this analysis is that it does reveal anything about the tone rules or distributions: Why should the changes indicated in (29) take place? (Cells left blank do not undergo modification.)

(29)

	F	R	L
F	F-L		
R		R-F	L-L
L	L-L		

In addition, why should all CVT syllables carry underlying /R/, i.e. the most marked and unexpected tone on such a short vowel nucleus (Zhang 2001)?

To remedy these problems in part, we might consider reinterpreting F as /L/ and R as /H/, where H = high tone, and L = low tone. (Our L tone would then have to be analyzed as Ø, receiving a L pitch by default.) In this case we could say that CVT syllables carry /H/, which has been identified as intrinsically shorter than /L/ in other tone languages. Whereas it is puzzling why IFR should forbid a phrase from beginning with a R tone, it is natural to prohibit initial H tone. As far as the other tone sandhi are concerned, summarized in the table in (30), RRR

would be reinterpreted as H-H → H-L, i.e. equivalent to Meussen's Rule in Bantu and more transparently related to the OCP:

(30)

	L	H	Ø
L	L-Ø		
H		H-L	Ø-Ø
Ø	Ø-Ø		

The other rules would not necessarily fare any better than in the F/R account: If F = /L/, why should FSR change L-L and Ø-L to L-Ø and Ø-Ø, respectively? Similarly, if R = /H/, why should RSR change H-Ø to Ø-Ø?

We don't have answers to all of these questions, but now turn to a third interpretation, where F = HL and R = LH.[5] While not explaining why LH is prohibited initially in a phrase, but it does permit a major generalization with respect to the tone sandhi.[6] With contours represented as sequences of high and low levels, the tone changes would now be expressed as in (31).

(31)

	HL	LH	L
HL	HL-L		
LH		LH-HL	L-L
L	L-L		

Compare the two sets of input sequences in (32a,b).

(32)

a.	b.	c.	
LH-HL	HL-HL	→	HL-L
HL-LH	LH-LH	→	LH-HL
L-LH	LH-L	→	L-L
HL-L	L-HL	→	L-L
L-L			

The sequences in (32a) do not change, whereas those in (32b) do. What is the difference? A close examination reveals that in (32a) the second syllable begins on the same pitch level with which the first syllable ends. In (32b), the initial pitch of the second syllable is opposite to the end pitch of the first syllable. When the sequences in (32b) are modified to those in (32c), the result is like (32a): the second syllable begins at the same pitch level as the first syllable ends. The generalization is clear: In Hakha-Lai, pitch changes may not be effected between

[5]By this we do not mean that Hakha-Lai's contours are like the tautosyllabic tone "clusters" in African languages. Rather, we follow Yip's (1989) suggestion that South and Southeast Asian contours are still units, with the sequenced tonal features dominated by a single tonal node.

[6]For the prohibition against initial LH, we have thought of a phrase-initial %H boundary tone.

syllables but only tautosyllabically. That is, the only way to get a pitch change is via a contour![7]

There is much more to say about the interpretation and significance of the Hakha-Lai tone system. For the present purpose we restrict ourselves to the following observations concerning the phonetic grounding of tone with respect to syllable structure. As we have said, the number of tonal contrasts and tonal contours should be greater on longer than on shorter sonorous rimes (Zhang 2001). Initial evidence for this position may be derived from the fact that only "full" (bimoraic, heavy) syllables carry tone in Hakha-Lai. CV syllables are toneless. However, counterevidence is found in two cases, both involving stopped syllables. CVVT syllables have a long nucleus, but no underlying tonal contrast. In addition, they are realized with a low level tone, i.e. not a contour. In the case of CVT, the lack of an underlying contrast is as expected, given the short nucleus and non-sonorant coda. However, we have seen two complications. First, their one underlying tone is a LH rising tone—the one that in principle requires the greatest duration! Second, due to the tone sandhi rules, there actually is a surface contrast between LH and HL on CVT syllables, as seen in (24). The one tone that is not allowed on CVT syllables is the one that is most expected—level L! We suspect that the rising tone of CVT syllables may derive historically from previous final glottalization, which is attested in other languages in Southeast Asia. If correct, the present study supports the notion that history may provide a more direct contribution to the understanding of the synchronic phonological distributions and rules found in Hakha-Lai than direct reference to phonetics.

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[7]This generalization applies only to input forms, since, as we have seen in forms such as in (15)-(17), the rules produce output F-F sequences. Note also in this regard that RSR does not apply when followed by a mid-to-high pitched toneless CV in the next foot, which does not constitute a heterosyllabic pitch change. (It is evidence that unmarked tone is not equivalent to the L we have established for level tone full syllables, however.) We have yet to explain why HL is simplified after toneless a CV-CV foot, as in (10b).

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