Chapter 3.

TONE

3.1. Isolation tones

KT is a tone language in which every syllable carries one of three underlying tones. In isolation, the three tones are realized as high to low falling (F), low to high rising (R), and a low (L) tone which is fairly level but downglides before pause. Examples from different word classes are given in the following tables:

HL falling tone (F)

nouns		verbs		other	
vâa	'bird'	tsôo	'buy'	tûu	'now'
lâm	'path, road'	hlûng	'arrive'	kûo	'nine'
lôw	'field'	tâaw	'pray'	kêy	'I, me'
mâay	'face'	ngâq	'wait'	kît	'again'
khûup	'knee'	kâap	'shoot'	tsîeq	'each'
môot	'banana'	lûut	'enter'	gîet	'eight'

LH rising tone (R)

nouns		verbs		other	
thǒo	'fence'	věe	'watch'	ľii	'four'
khǔo	'village'	năm	'smell'	ngǎa	'five'
gǎm	'country'	kǎan	'bind, tie'	thǔm	'three'
hǔul	'hole'	vǔuy	'bury'	ǎa	(oblique)
khǔoy	'bee'	vǎq	'feed'	pěen	(superlative)
nǎq	'nose'	ngǐeq	'growl'	sěq	'only'

L level tone (L)

nouns		verbs		other	
hlàa	'wing'	mùu	'see'	nìi	'two'
màn	'price'	kòw	'call'	lòw	(negative)
zàan	'night'	dòon	'sprout'	kwòy	'who'
pùul	'plague'	gùoy	'hire'	sòom	'ten'
hùon	'garden'	kàp	'cry'	khàt	'one'
vòq	'pig'	pèt	'bite'	gùup	'six'

In terms of numbers, where a higher number represents a higher pitch, F = 41, R = 23, and L = 21. The following tonal transcriptions and abbreviations are adopted in this study:

[â]	HL, F	falling tone	[á]	H	high tone
[ǎ]	LH, R	rising tone	[�]		

[â] HL, F falling tone   [á] H   high tone
[ǎ] LH, R rising tone   [ꞌá] ꞌH   downstepped high tone
[à] L   low tone   [ꞌâ] ꞌHL downstepped falling tone

The H and downstepped tones are treated in §3.2.

N.B. In §3.2 it will be shown that the LH rising tone is best analyzed as /H/. Unless underlying representations are explicitly the issue, surface tones will be cited instead, e.g. *thǒo* for /thóo/ 'fence'.

As can be seen in the following minimal triplets, tone is important in KT, often being the only feature distinguishing between words:

sâa	'animal'	lôw	'field'	hâm	(question)
sǎa	'hot'	lǒw	'medecine'	hǎm	'snatch'
sàa	'build'	lòw	(negative)	hàm	'wheat'

mûu	'seed'	lêy	'earth, dirt'	în	'house'
mǔu	'hawk'	lěy	'tongue'	ìn	(ergative)
mùu	'see'	lèy	'bridge'	ǐn	(instrumental)

In the case of verbs, a tonal minimal pair may result from stem2 formation:

stem1	stem2		stem1	stem2	
thǐi	thìi	'die'	tâaw	tàaw	'pray'
kûm	kùm	'descend'	hûon	hùon	'cook'
sêy	sèy	'speak'	zǔoq	zùoq	'sell'
phǎl	phàl	'allow'	kâap	kàap	'shoot'

The above verbs have F or R tone in stem1, but L tone in stem2. Among other things, the stem1/stem2 distinction accounts for two different kinds of nominalization: *bùu hûon* 'rice cooker', *bùu hùon* 'rice cooking'; *théy zǔoq* 'fruit seller', *théy zùoq* 'fruit selling' (cf. §XX).

The following table shows the number of each tone as a function of syllable type:

	CVV	CVD	CVVD	CVq	CVT	CVVT	totals
F	46	107	69	30	(2)	35	289
R	26	108	143	37	Ø	3	317
L	70	91	74	42	36	4	317
totals	142	306	286	109	38	42	923

It can first be observed that there are approximately the same overall number of lexical entries carrying F, R and L tones. Assuming that the three tones should be spread roughly equally within each syllable type, there are some significant skewings. First, among the smooth syllable types,

there are more L and fewer R tone CVV syllables than expected. In addition, the number of R tone CVVD syllables is especially high. Turning to stopped syllables, CVq has a representative number of each tone. However, CVT (i.e. CVp and CVt) syllables are almost exclusively L tone, while CVVT (i.e. CVVp, CVVt, Cieq and Cuoq) syllables are overwhelmingly F tone. The four lexical L tone CVVT words are *gùup* 'six', *pèet* 'while', *tsàat* 'become', *kì-phèet* 'dodge'. Perhaps all but *gùup* 'six' are derived from stem2 verbs, which often change a F CVVT to L tone: *kâap/kàap* 'shoot', *lûut/lùut* 'enter', *khûot/khùot* 'scratch' (§XX). The three lexical R tone CVVT words are *zěep/zèep* 'whip', *gǒot/gòot* 'punish', and *zǔut/zùut* 'massage'.

CV or reduced syllables carry all of the underlying tones, but must be level tone on the surface, either high or low: *ká vòk* 'my pig', *hlà nìi* 'two wings'. This follows in part from the tonal alternations which broadly apply throughout KT utterances.

3.2. Tonal alternations

Although a word carries only F, R or L in isolation, tones are modified in context, where a fourth tone, high (H), is observed, as well as contrastive downstep (ꜜ). The major tone rules operating in KT are contour simplification and tone spreading.

3.2.1. Contour simplification

KT allows HL and LH contour tones only in utterance-final position. As we have seen, words in isolation may carry HL, LH or L tone. In the following phrases, the L tone noun *kèel* 'goat' is followed by adjectives and numerals representing the three contrastive tones:

L + F:	kèel	tsôm	'short goat'	kèel	gîet	'eight goats'
L + R:	kèel	gǒong	'thin goat'	kèel	thǔm	'three goats'
L + L:	kèel	lìen	'big goat'	kèel	gùup	'six goats'

As seen, when preceded by a L tone, the tones of all words are realized exactly as they would be in isolation.

The same three modifier tones are observed when the preceded by the F tone noun *ûy* 'dog':

F + F:	úy	ꜜtsôm	'short goat'	úy	ꜜgîet	'eight goats'
F + R:	úy	gǒong	'thin goat'	úy	thǔm	'three goats'
F + L:	úy	lìen	'big goat'	úy	gùup	'six goats'

However, in this case the F becomes a level H tone by a process of CONTOUR SIMPLIFICATION (CS). This can be represented by delinking the L from its syllable ( ) whenever it is followed by another syllable:

$$\nearrow \; \twohead="" \\ \text{H} \quad \text{L}$$

If the following syllable is /HL/, then this falling tone will begin at a lower level. This lowering, known as DOWNSTEP, is marked by ! . As further examples will also show, downstep occurs whenever a free or "floating" L tone is preceded by a H tone syllable and is followed by either a H or HL syllable:

$$\nearrow \quad \nearrow\!\!\searrow \\ \text{H} \quad \text{L} \quad \text{H} \quad \text{L} \;=\; [\text{H-}^!\text{HL}] \qquad\qquad \nearrow \quad \big| \\ \text{H} \quad \text{L} \quad \text{H} \;=\; [\text{H-}^!\text{H}]$$

As seen in preceding examples, the floating L tone can be followed by an utterance-final R tone: *úy gǒong* 'thin goat'. Now compare, however, what happens when a R tone noun such as *zǒong* 'monkey' occurs in pre-final position:

R + F:	zóong	tsôm	'short goat'	zóong	gîet	'eight goats'
R + R:	zóong	góong	'thin goat'	zóong	thúm	'three goats'
R + L:	zòong	lîen	'big goat'	zòong	gûup	'six goats'

When followed by a F or R tone, a R tone word will be realized H. The combination R + L, on the other hand, surfaces as L + F. This might suggest that there are three rules of LH simplification as below:

$$\nearrow\!\twohead="" \; \big| \qquad\qquad \neq\!\searrow \quad \triangle \qquad\qquad \nearrow\!\searrow \quad \neq\!\searrow \\ \text{L} \quad \text{H} \quad \text{L} \qquad\qquad \text{L} \quad \text{H} \;\{\text{HL, LH}\} \qquad \text{L} \quad \text{H} \quad \text{L} \quad \text{H}$$

The first CS rule delinks the H of the LH rising tone when followed by a L. (As discussed in the next section, the floating H will be realized on the next syllable.) The second CS rule delinks the L of LH when followed by either a HL falling or LH rising tone. As seen in the phrases *zóong góong* 'thin goat' and *zóong thúm* 'three goats', the third CS rule delinks the L of the second LH of a LH-LH sequence. The major problem is why the delinked L in the last rule does not trigger downstep: an input of LH + LH is realized H-H, not H-!H. The solution in the next section will not only account for this absence of downstep but also denecessitate all but the first of the LH contour simplification rules.

3.2.2. Underlying /H/

Up until now it has been assumed that there is an underlying R (LH) tone in KT. This assumption actually leads to complications. As seen in §3.2.1, a LH contour would have to simplify sometimes as L, sometimes as H, and in the latter case, the resulting floating L never triggers downstep. There is good reason, therefore, to propose that the R tone be analyzed as /H/.

Assuming the underlying system /HL, H, L/, the tonal alternations exemplified thus far are summarized in the following table:

	isolation	+ HL	+ H	+ L
HL	HL	H-ˈHL	H-LH	H-L
H	LH	H-HL	H-H	L-HL
L	L	L-HL	L-LH	L-L

As seen, whenever /H/ is realized LH or L, it is because it is utterance-initial or preceded by /HL/ or /L/ tone. Before introducing the two rules of tone spreading, the following table shows the realizations of the 27 combinations of tones found on sequences of three syllables:

ûy	+	tsôm	+	gîet	úy	ˈtsóm	ˈgîet	'eight short dogs'
ûy	+	tsôm	+	thúm	úy	ˈtsóm	thǔm	'three short dogs'
ûy	+	tsôm	+	gùup	úy	ˈtsóm	gùup	'six short dogs'
ûy	+	góong	+	gîet	úy	ˈgóong	gîet	'eight thin dogs'
ûy	+	góong	+	thúm	úy	ˈgóong	thúm	'three thin dogs'
ûy	+	góong	+	gùup	úy	gòong	gûup	'six thin dogs'
ûy	+	lìen	+	gîet	úy	lìen	gîet	'eight big dogs'
ûy	+	lìen	+	thúm	úy	lìen	thǔm	'three big dogs'
ûy	+	lìen	+	gùup	úy	lìen	gùup	'six big dogs'
zóong	+	tsôm	+	gîet	zóong	tsóm	!gîet	'eight short monkeys'
zóong	+	tsôm	+	thúm	zóong	tsóm	thǔm	'three short monkeys'
zóong	+	tsôm	+	gùup	zóong	tsóm	gùup	'six short monkeys'
zóong	+	góong	+	gîet	zóong	góong	gîet	'eight thin monkeys'
zóong	+	góong	+	thúm	zóong	góong	thúm	'three thin monkeys'
zóong	+	góong	+	gùup	zóong	góong	gûup	'six thin monkeys'
zóong	+	lìen	+	gîet	zòong	líen	ˈgîet	'eight big monkeys'
zóong	+	lìen	+	thúm	zòong	líen	thǔm	'three big monkeys'
zóong	+	lìen	+	gùup	zòong	líen	gùup	'six big monkeys'
kèel	+	tsôm	+	gîet	kèel	tsóm	!gîet	'eight short goats'
kèel	+	tsôm	+	thúm	kèel	tsóm	thǔm	'three short goats'
kèel	+	tsôm	+	gùup	kèel	tsóm	gùup	'six short goats'
kèel	+	góong	+	gîet	kèel	góong	gîet	'eight thin goats'
kèel	+	góong	+	thúm	kèel	góong	thúm	'three thin goats'
kèel	+	góong	+	gùup	kèel	gòong	gûup	'six thin goats'
kèel	+	lìen	+	gîet	kèel	lìen	gîet	'eight big goats'
kèel	+	lìen	+	thúm	kèel	lìen	thǔm	'three big goats'
kèel	+	lìen	+	gùup	kèel	lìen	gùup	'six big goats'

The input/output tones are summarized as follows:

HL-HL-HL	H-ꜜH-ꜜHL	H-HL-HL	H-H-ꜜHL	L-HL-HL	L-H-ꜜHL
HL-HL-H	H-ꜜH-LH	H-HL-H	H-H-LH	L-HL-H	L-H-LH
HL-HL-L	H-ꜜH-L	H-HL-L	H-H-L	L-HL-L	L-H-L
HL-H-HL	H-ꜜH-HL	H-H-HL	H-H-HL	L-H-HL	L-H-HL
HL-H-H	H-ꜜH-H	H-H-H	H-H-H	L-H-H	L-H-H
HL-H-L	H-L-HL	H-H-L	H-H-HL	L-H-L	L-L-HL
HL-L-HL	H-L-HL	H+L+HL	H-H-ꜜHL	L-L-HL	L-L-HL
HL-L-H	H-L-LH	H+L+H	L-H-LH	L-L-H	L-L-LH
HL-L-L	H-L-L	H+L+L	H-H-L	L-L-L	L-L-L

The above noun + adjective + numeral combinations and the summary table are representative of all three-syllable sequences in KT. Regardless of the syntactic relation, unless interrupted by pause, whenever the indicated tones are inputted, they are realized as indicated. The following subsections further comment on the alternations seen in these tables.

3.2.3. Downstep

The phrase *úy ꜜtsóm ꜜgîet* 'eight short dogs', from /ûy + tsôm + gîet/, shows that it is possible to obtain multiple downsteps in KT. If we were to prepose *kéy ꜜpâa* 'my father', from /kêy + pâa/, to this phrase we would obtain two more downsteps: *kéy ꜜpáa ꜜúy ꜜtsom ꜜgîet* 'my father's eight short dogs'. Similarly, if we were to follow this by *kéeng ꜜtôo*, from /kêeng/ 'leg' + /tôo/ 'bottom, end', this would produce a total of six downsteps: *kéy ꜜpáa ꜜúy ꜜtsóm ꜜgíet ꜜkéeng ꜜtôo* 'my father's eight short dogs' feet'. Each of these downsteps is contrastive with the absence of a downstep, and, as can be inferred from this rather extreme example, there is no principled upper end to the number of downsteps one can find in succession in a single utterance.

While the downsteps in the preceding paragraph derive from successive HL tones, it is also possible to get a downstep from an input of HL + H + H(L): *úy ꜜtsóm gîet* 'eight short dogs', *úy ꜜtsóm thúm* 'three short dogs'.

It should be noted that although the downstep mark ꜜ suggests that the process is one of lowering the following H tone, it is more appropriate to say that the H of the preceding syllable(s) is raised to anticipate the downstep. This is seen in the following phrases:

/bóong vóm thúm hí/	bóong vóm thúm hí	[‾ - - -]	'these three black cows'
/mêeng vóm thúm hí/	méeng ꜜvóm thúm hí	[‾ - - -]	'these three black cats'
/bóong tsôm thúm hí/	bóong tsóm ꜜthúm hí	[‾ ‾ - -]	'these three short cows'
/mêeng tsôm thúm hí/	méeng ꜜtsóm ꜜthúm hí	[‾ ‾ - -]	'these three short cats'

The schemas to the right of the first output shows that an entirely H phrase will be realized somewhat middish in pitch, say 3-3-3-3. The H of the one syllable preceding the downstep in the second phrase (4-3-3-3), while both H tone syllables are raised in the third phrase (4-4-3-3). The last phrase shows that there will be separate, successive anticipatory raising for each downstep (5-4-3-3).

There is a potential phonetic opposition between the following:

/kèel lìen gîet hí/	kèel lìen gíet Ɪhí	[- - ‾ -]	'these eight big goats'
/kèel vóm gùup hí/	kèel vom gúup Ɪhí	[- - ‾ -]	'these six black goats'

The first phrase has two underlying /L/ tone syllables preceding the H that anticipates the downstep. Its phonetic realization can be numerified as 2-2-4-3. The second phrase has an underlying /L-H-L-H/ sequence whose second and third syllables undergo respective lowering and raising by the tone spreading rules to be discussed in the following sections. The result can be pronounced in one of two ways: either L-L-H-ꞮH (2-2-4-3), identically to the preceding phrase, or as L-M-H-ꞮH, where M = a middish tone with an approximate value of 3, hence 2-3-4-3. Examples of this variation are shown below:

/ì núuy ùu êe/	ì nùuy úꞮvêe	[- - ‾ ﹅]	2-2-4-31	'we (incl pl.) laughed'
	ì nūuy úꞮvêe	[- - ‾ ﹅]	2-3-4-31	
/à háa àq/	à hàa âq	[- - ﹅]	2-2-41	'in his teeth'
	à hāa âq	[- - ﹅]	2-3-41	
/khúo kà vée êe/	khùo ká ꞯvée êe	[- ‾ - ﹅]	2-4-3-31	'I watched the village'
	khūo ká ꞯvée êe	[‾ ‾ - ﹅]	3-4-3-31	

While this phonetic variation has been often observed in spontaneous speech, for simplicity, such syllables will be marked with L rather than M tone.

Finally, note that successive changes of H's and L's condition an automatic downstep or DOWNDRIFT. Thus, each successive H of *nà húng dìng ká dèy êe* 'I want you to come', from /nà hûng dìng kâ dèy êe/, is realized on a successively lower pitch.

3.2.4. H tone spreading (HTS)

Several of the phrases cited in earlier sections reveal the need for the following rule of H tone spreading (HTS):

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   |   ⸌‾|
   H    L
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A H tone will spread onto a following L tone syllable: /zóong góong gùup/   *zóong góong gûup* 'six thin monkeys'. As schematized, HTS converts an underlying /H-L/ sequence into H-HL. However, just as was seen with respect to underlying /HL/, the HL derived by HTS will be simplified to H if followed by another tone. The following phrases show HTS applying to a /H-L/ noun + numeral sequence, followed by each of the three underlying tones:

/H/ +/L/ +/HL/	hítsyé kéel ˈgîet	'these eight goats'
/H/ + /L/ + /H/	hítsyé kéel thǔm	'these three goats'
/H/ + /L/ + /L/	hítsyé kéel gùup	'these six goats'

The sequences in question are preceded and followed by the preposed near speaker demonstrative *hítsyé* whose /H/ spreads onto the L of /kèel/ 'goat'. Although the result would have been a HL falling tone in final position (*hítsyé kêel* 'this goat'), a H surfaces on [kéel] in non-final position by CS. In *hítsyé kéel thǔm* 'these three goats', the L of /kèel/ spreads onto the H tone numeral /thúm/ 'three'.

3.2.5. L tone spreading (LTS)

The above three phrases demonstrate that HTS applies to a /H-L/ sequence independent of the tone that follows. The following phrases show that the analogous process of L tone spreading (LTS) is more restricted:

/L/ + /H/ + /HL/	kà zóong gîet	'my eight monkeys'
/L/ + /H/ + /H/	kà zóong thúm	'my three monkeys'
/L/ + /H/ + /L/	kà zòong gûup	'my six monkeys'

By itself the possessive + noun sequence /kà zóong/ 'my monkey' is realized *kà zǒong* by LTS: the L of /kà/ 'my' spreads onto the H tone syllable /zóong/ 'monkey'. However, the first two phrases above show that a /L-H/ sequence will be realized unchanged if followed by either a /HL/ or /H/ tone. On the other hand, when it is followed by a /L/ tone, both LTS and HTS will apply:

kà   zòong   gûup   'my six monkeys'

As seen, the LH which results from LTS is simplified by CS, while the HL which results from HTS is realized in final position. As indicated in §3.2.3, the second L of a L-L-HL or L-L-Hˈ sequence which result from a combination of LTS and HTS is variably pronounced L or mid. Thus, /kà zóong gùup/ is pronounced kà zòong gûup (2-2-41) or *kà zoong gûup* (2-3-41).

The following phrases show similar facts when the input sequence is /HL-H/:

HL+H+HL	kéy ˈzóong gîet	'my eight monkeys'
HL+H+H	kéy ˈzóong thúm	'my three monkeys'
HL+H+L	kéy zòong gûup	'my six monkeys'

The pronoun *kêy* 'I, me, my' has been substituted for the proclitic *kà* 'I, my' in the previous set (cf. *kéy zǒong* 'my monkey'). As expected, its underlying /HL/ simplifies to H by CS. The delinked L produces a downstep in the first two phrases, where LTS fails to apply before a /HL/ or /H/ tone. In the third phrase, however, both LTS and HTS apply:

kéy   zòong   gûup   'my six monkeys'

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 ⁄  ╪  ╱╱  ‡  ╱ ╱ ╱  ⎮
 H   L    H       L
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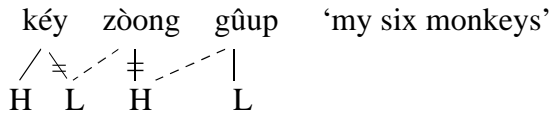
From this example it can be seen that LTS is triggered by both /L/ and /HL/ tones: LTS converts underlying /L-H/ and /HL-H/ to L-LH and H-LH before pause. In addition, the sequences /L-H-L/ and /HL-H-L/ are realized L-L-HL and H-L-HL by an interplay of LTS, HTS and CS, as demonstrated above. Neither /L-H/ nor /HL-H/ will undergo LTS when they are followed by a /HL/ or /H/ tone.

The application vs. non-application of LTS is summarized below:

Applies:	(i) before pause		(ii) before /L/	
	/L-H/	L-LH	/L-H-L/	L-L-HL
	/HL-H/	H-LH	/HL-H-L/	H-L-HL
Does not apply:	(i) before /HL/		(ii) before /H/	
	/L-H-HL/	L-H-HL	/L-H-H/	L-H-H
	/HL-H-HL/	H-ꜝH-HL	/HL-H-H/	H-ꜝH-H

A comparison of these outputs suggests an generalization: In the two environments where LTS applies, the underlying /H/ is realized on the surface. Before pause, the result of spreading will be a LH rising tone; before /L/, the /H/ will spread onto the following syllable to produce an output HL—which will simplify to H(ꜝ) if not in final position. Compare this to the environments where LTS does not apply: If /L-H-HL/ were to become L-L-HL there would be no trace of the underlying /H/ of the second syllable. Note that this output would also merge with /L-L-HL/. If LTS were to apply more generally, a surface L-HL sequence could either have come directly from /L-HL/ or from /H-HL/ when preceded by either /L/ or /HL/. However, avoidance of merger can't be the entire story. If LTS were to apply to all /L-H/ input sequences, then a surface L-H would unambiguously derive from an underlying /H-H/ sequence preceded by /L/ or /HL/. This is because /L-H/ is realized L-LH before pause and would be realized L-L by CS in non-final position.

The more inclusive statement is that KT does not allow LTS to apply if the result will be the non-realization of an underlying H tone feature. In fact, the H feature of both underlying /H/ and /HL/ tones is never lost on the surface in KT. On the other hand, when HL becomes H by CS, an input L feature may fail to be realized. Interestingly, this never results in merger, since the delinked L always has a recoverable effect: it either triggers LTS, conditions downstep, or blocks HTS.

While either /L/ or /HL/ can trigger LTS, we have also seen that /H/ words have LH tone in isolation: /zóong/   zǒong 'monkey', /khúo/   khǔo 'village'. LTS will in fact apply to an utterance-initial /H/ that is either final (as in citation) or followed by a /L/ tone: /zóong gùup/ zòong gûup 'six monkeys'. To account for this, a boundary L tone is set up utterance-initially and after pause. This tone, symbolized %L, can then appropriately trigger LTS:

zòong   gûup   'my six monkeys'

%L   H   L
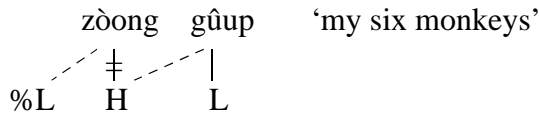
Finally, note that LTS never applies to a syllable with /HL/ tone: /kà ûy/   *kà ûy* 'my dog' rather than *kà ǔỳ*, *kà ǔy* or *kà ùy*.

3.2.6. Summary

To summarize, there are three underlying tones in KT: /HL/, /H/ and /L/. These tones are subject to the following rules:

rule	effects		restrictions
High tone spreading (HTS)	/H-L/	H-HL	none
Low tone spreading (LTS)	/L-H/	L-LH	applies before pause
	/HL-H/	H-LH	and before /L/
Contour simplification (CS)	HL	H	applies in non-final
	LH	L	position

As a result of these rules the three underlying tones have the following range of surface realizations:

underlying:	HL	H	L
surface:	HL, H, ˈHL, ˈH	H, ˈH, LH, L	L, HL, H

The first row shows the three tones which a syllable may have underlying, while the second row shows the corresponding tones they may bear on the surface. As seen, /HL/ and /H/ syllables each have four different realizations, while /L/ syllables have three.

It should be noted that HTS, LTS and CS produce the above outputs independently of the syntactic relation between the words in sequence. If the appropriate tones are separated by pause, HTS or LTS may fail to apply. At the same time, an expected final LH that should have been derived by LTS may be pronounced H if the speaker wishes to show that he or she is not finished (as if anticipating a following H or HL tone that would block LTS). This was observed, for example, in counting 1, 2, 3 etc., where 'three' could be pronounced *thǔm* or *thúm*. HL tones, on the other hand, are always realized prepausally.

Unless otherewise noted, all tonal transcriptions in this study are given in terms of actual surface realization. The corresponding underlying tones can be ascertained from the lexicon XX.

3.3. Grammatically conditioned tone

The tone rules discussed in §3.2 are completely general and operate on underlying representations. In general, the underlying tone of a word or grammatical marker is the same as its lexical representation. In a few cases, however, the tones which input HTS, LTS and CS are determined by grammatical factors. Three such cases need to be distinguished: pronominal proclitic tone, grammatical H tone, and stem2 tone.

3.3.1. Pronominal proclitic tone

There are four pronominal proclitics in KT whose underlying tone varies between /L/ and /HL/ according to the tone of the following word:

before /HL, H/	before /L/	
/kà/	/kâ/	first person (excl)
/nà/	/nâ/	second person
/à/	/â/	third person
/ǐ/	/î/	first person (incl)

These proclitics, which are used with both nouns and verbs, have an underlying /L/ tone when followed by a /HL/ or /H/ tone, but /HL/ tone when followed by a /L/ tone:

	'my'	'your'	'his/her'	'our (dual incl)'	
/L/ :	kà ûy	nà ûy	à ûy	ì ûy	'dog'
/L/ :	kà zǒong	nà zǒong	à zǒong	ì zǒong	'monkey'
/HL/ :	ká kèel	ná kèel	á kèel	í kèel	'goat'

In the above phrases, the /L/ of /kà, nà, à, ì/ found before /HL/ and /H/ tones is realized L. In the phrases involving /zóong/ 'monkey', this /L/ triggers LTS, thereby creating the rising tone on *zǒong*. The /HL/ of the representations /kâ, nâ, â, î/ required before a /L/ tone, is realized H by CS. If /H/ had been set up instead, HTS spreading would have incorrectly applied to yield *ká kêel* instead of the correct form *ká kèel* 'my goat'. In addition, if *zòol ká kèel á mùu êe* 'a friend saw my goat' had been set up with /zòol ká kèel.../, we would have expected LTS also to apply, to yield the incorrect **zòol kà kéel ˡá mùu ê*. Historically, it can be hypothesized that these proclitics originally carried *HL tone which simplified to L in Pre-KT *HL-HL and *HL-H sequences. If this reconstruction is correct, it would mean that all pronouns were *HL in Pre-KT (cf. *kêy* 'me', *nêy* 'you').

   Although the forms given in the preceding table are unmarked for number, the same tonal allomorphy is observed when the dual /hlòn/ or plural /ùu/ postposition follows the noun: *kà úy hlòn* 'our (dual excl) dog', *nà zòong hlôn* 'your (dual) monkey', *á kèel ùu* 'their (pl.) goat', *ì úy ùu* 'our (pl. incl) dog', etc.

   The same four proclitics appear with identical tonal variation in verb constructions:

	'I'	'you'	'he, she'	'we (dual incl)'	
/L/ :	kà née ꜝêe	nà née ꜝêe	à née ꜝêe	ì née ꜝêe	'eat'
/L/ :	kà núuy êe	nà núuy êe	à núuy êe	ì núuy êe	'laugh'
/HL/ :	ká kàp êe	ná kàp êe	á kàp êe	í kàp êe	'cry'

The verbs are /nêe/ 'eat', /núuy/ 'laugh', and /kàp/ 'cry'. In this case /kà núuy êe/ 'I am laughing' and other forms in the second row do not undergo LTS because of the following /HL/ tone of the declarative marker /êe/. Again, dual and plural forms show the same alternations: *kà née hlòn êe* 'we (dual excl) are eating', *nà nùuy hlón ꜝêe* 'you (dual) are laughing', *á kàp ùvêe* 'they (pl.) are crying', *ì née ùvêe* 'we (pl. incl) are eating'.

    Given the above allomorphy, the following interesting surface contrast arises:

/kà/ + /H/ + /L/	kà L HL	e.g. kà zòong gûup	'my six monkeys'
/kâ/ + /L/ + /HL/	ká L HL	e.g. ká kèel gîet	'my eight goats'

In the first phrase, the /L/ of the proclitic *kà* triggers LTS, since a /H/ + /L/ sequence follows. The output is L-L-HL. On the other hand, an underlying /HL/ proclitic followed by a /L/ + /HL/ sequence is realized H-L-HL. A L-HL sequence can thus be derived from two distinct underlying representations. As a result, there are potential minimal pairs such as the following:

/à búq kùo/	à bùq kûo	'his frost pit'
/â bùq kûo/	á bùq kûo	'his nine colds'

The first phrase has a /L/ proclitic /à/ because of the /H/ of /búq/ 'pit, hole', while the second has a /HL/ proclitic /â/ because of the /L/ of /bùq/ 'cold (n.)'. It should be recalled from §3.2.3 that the first phrase can also be pronounced *à buq kûo* with a M tone on the second syllable.

    We see in these contrasts that the choice of a /L/ vs. /HL/ proclitic is determined on the basis of the UNDERLYING tone of the following word. As a result, its L vs. H surface realization of the proclitic will often be useful in analyzing the tone of compounds and word combinations which would otherwise be ambiguous. Consider for example the stem1/stem2 forms of the following two verbs:

stem1			stem2		
/bán/	'cut'	à bán êe	'he cut'	/bàn/	á bàn nǔng	'after he cuts'
/tân/	'cut apart'| à tán ꜝêe	'he cut'	/tàn/	á tàn nǔng	'after he cuts'

Although the two verbs have /H/ vs. /HL/ tone in stem1, their stem2 forms are both /L/ (§XX).

    Now consider the following realizations when the two cutting verbs are combined to form a complex verb 'to cut off, sever':

à bán tán ꜝêe	'he is cutting it off'
á bàn tán nǔng	'after he cuts it off'

In the first sentence both verbs are unambiguously in stem1. In the second sentence, *bàn* is realized L and *tán* is realized H—but conditions the LH rise on /núng/ 'after'. It clearly has HL tone at some level of representation. Ignoring the tone of the subject proclitic, there would be two sources of the L + HL tones on the two verbs:

stem1 + stem2: /à/ + /bán/ + /tàn/ + /núng/   *à bàn tán nǔng
stem2 + stem1: /â/ + /bàn/ + /tân/ + /núng/   á bàn tán nǔng

In the first analysis, the second verb changes to stem2 /tàn/, while in the first analysis the first verb changes to stem2 /bàn/. The tone of the proclitic in *á bàn tán nǔng* shows that the second analysis has to be right. (In §XX it is seen that a change from stem1+stem1 to stem2+stem1 is unattested in KT.)

The above examples show that *ka*, *na*, *a* and *i* exhibit the same tonal allomorphy independently of whether they are used as subject or possessive pronouns. There is exactly one exception to this statement: When occurring as subject markers before the past tense proclitic /ná/, the four pronominal proclitics have /H/ tone:

ká ná múu ˈêe 'I saw it'   mùu 'see'
ná ná záam ˈêe 'you ran away'   zâam 'run away'
á ná lúut ˈêe   's/he entered'   lûut 'enter'
í ná núuy êe   'you and I laughed'   núuy 'laugh'

Of the remaining pronominal elements which accompany the verb, *êy* 'first person object' and *nêy* 'second person subject + first person object' are full syllables which carry HL tone: *éy mùu êe* 'he sees me', *néy mùu êe* 'you see me'. This leaves the reflexive marker *kì*. Rather than varying between /L/ and /HL/, /kì/ has underlying /L/ tone in all contexts:

á kì khúot ˈêe 'he scratched himself, he was scratched'   /khûot/ 'scratch'
á kì hléng êe   'he chose himself, he was chosen'   /hléng/ 'choose'
á kì pèt êe   'he bit himself, he was bitten'   /pèt/   'bite'

As seen, *kì* is pronounced L independently of the tone of the following verb. As a result, the subject proclitic /â/ is pronounced H by CS.

Finally, note that when a CVV is reduced to CV by vowel shortening (§XX), its tone is realized exactly the same as full syllables:

/vâa/   'bird'   vá lìen   'big bird'   kà vá lìen   'my big bird'
/lúu/   'head'   lù lîen   'big head'   kà lù lîen   'my big head'
/khùo/ 'foot'   khwò lìen   'big foot'   ká khwò lìen   'my big foot'

When vowel shortening applies before the adjective /lìen/ 'big', the above phrases maintain distinct tonal properties. The correct proclitic allomorph, /kà/ or /kâ/, is again chosen on the basis of the underlying tone.

3.3.2. Grammatical H tone

While the surface tones of utterances can usually be calculated on the basis of the input tones found on each concatenated word or grammatical marker, there are constructions where a grammatical H tone unexpectedly occurs. A H TONAL MORPHEME is found within complex noun phrases as well as within the verb complex.

3.3.2.1. Genitive H tone. The tonal morpheme found within complex noun phrases will be referred to as GENITIVE H TONE. In the following noun phrases, a sequence of a L tone noun followed by one or more L tone modifiers is realized all L:

vòq lìen	'big pig'	vòq lìen nìi	'two big pigs'
vòq nìi	'two pigs'	vòq lìen hòo	'two pigs'
vòq hòo	'pigs'	vòq lìen nìi hòo	'two big pigs'

The same is true of noun + noun compounds or possessives whose second element is modified:

vòq mìt	'pig eye, pig's eye'	vòq mìt lìen	'big pig eye'
vòq mìt nìi	'two pig eyes'	vòq mìt lìen nìi	'two big pig eyes'
vòq mìt hòo	'pig eyes'	vòq mìt lìen nìi hòo	'two big pig eyes'

Finally, there will be no tonal changes if a multiple noun compound is strictly right-branching:XX

vòq mìt ùul	'pig's eye perspiration'	vòq mìt ùul thàq	'pig's eye perspiration itch'
vòq mìt thàq	'pig's eye itch'	vòq mìt ùul nàm	'pig's eye perspiration odor'

Now compare the following phrases, where all of the words have underlying /L/ tone:

zòol bùu	'friend's food'	zòol lìen bûu	'big friend's food'
zòol hòo bûu	'friends' food'	zòol lìen hòo bûu	'big friends' food'
zòol nìi bûu	'two friends' food'	zòol lìen nìi bûu	'two big friends' food'
zòol nìi hòo bûu	'two friends' food'	zòol lìen nìi hòo bûu	'two big friends' food'

While there is no difference between a compound vs. possessive noun + noun in KT, *zòol bùu* 'a/the friend's food, friend food' was chosen to allow semantic separability. In each of the above phrases, when the first element *zòol* 'friend' is modified, the head noun /bùu/ 'food' is unexpectedly realized HL. The same is involved in the following phrases which involve a compound + noun structure:

hàaw sàa	'chief' (lit. wealth builder)	hàaw sàa bûu	'chief's food'
hùuy kòt	'window' (lit. wind + door)	hùuy kòt mûn	'window's place'

Here the /L/ tone nouns /bùu/ 'food' and /mùn/ 'place' are also realized HL.

The difference between the two tonal contexts can be schematized as follows:

No genitive H   **Genitive H**

N   N   {N, A, Nu}   N   {N, A, Nu}   N

                                                                H
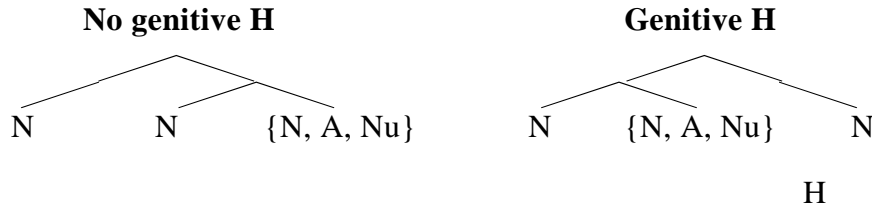
No tone change will take place if the branching constituent is on the right. If it is on the left, the genitive H tone will be inserted. As shown, the H will follow a branching noun-noun, noun-adjective, noun-numeral, or noun-plural constituent.

Concerning the historical source of the inserted H, two hypotheses are worthy of consideration. First, genitive H tone may be the relic of an old genitive marker, perhaps related to the headless possessive marker /áa/ found in KT today: *kà púu áa* 'my grandfather's', *kéy ǎa* 'mine'. Alternatively, it may derive from the third person proclitic /a/ which would have underlying /HL/ and surface H tone before a following L (§3.3.1). In this case, /zòol + lìen + ´ + bùu/ 'big friend's food' may have had the literal meaning 'big friend his food'. This second hypothesis has the advantage of explaining why the H is present only if the following noun is L tone (see below).

The following three facts should be noted concerning the genitive H:

First, the above left-branching configuration is required in order for there to be a genitive H. An input such as /zòol khùt nìi/ 'friend's two hands' can only be pronounced *zòol khùt nìi*, not **zòol khút nìi* or **zòol khùt nîi*.

Second, there appears to be some variation. To some extent these variations can be predicted. In principle, a noun+noun+noun compound could be either left- or right-branching. Thus, we expect *kèel khwò gìu* 'goat's leg-bone' vs. *kèel khwò gûu* 'goat-leg bone'. When *hùuy kòt mùn* 'window's place' is pronounced without a genitive H, it could be that speakers are treating the compound *hùuy kòt* 'window' ('wind' + 'door') as a single unit. These and other subtleties most likely account for some of the variation. This variation may at times be useful in disambiguating phrases such as the following:

kèel gùup bùu né hòo	'six food-eating goats, eaters of six goat's food'
kèel gùup búu � né hòo	'eaters of six goat's food'

The first phrase, which lacks the genitive H on *bùu* 'food', has two meanings, while the second phrase, where the genitive H is observed on *búu*, has only one. In this latter case, a genitive relation must exist between the goats and the food.

Third, the genitive H occurs only if the preceding tone is L. This is seen in the following combinations of noun-numeral + noun:

1	mîi	+	gîet	+	în	míi	ˈgíet	ˈîn	'eight people's house'
2	mîi	+	gîet	+	gám	míi	ˈgíet	gǎm	'eight people's land'
3	mîi	+	gîet	+	bùu	míi	ˈgíet	bùu	'eight people's food'
4	mîi	+	thúm	+	în	míi	ˈthúm	în	'three people's house'
5	mîi	+	thúm	+	gám	míi	ˈthúm	gám	'three people's land'
6	mîi	+	thúm	+	bùu	míi	ˈthúm	bûu	'three people's food'
7	mîi	+	gùup	+	în	míi	ˈgúup	în	'six people's house'
8	mîi	+	gùup	+	gám	míi	ˈgúup	gám	'six people's land'
9	mîi	+	gùup	+	bùu	míi	gùup	bûu	'six people's food'
10	gúol	+	gîet	+	în	gúol	gíet	ˈîn	'eight friends' house'
11	gúol	+	gîet	+	gám	gúol	gíet	gǎm	'eight friends' land'
12	gúol	+	gîet	+	bùu	gúol	gíet	bùu	'eight friends' food'
13	gúol	+	thúm	+	în	gúol	thúm	în	'three friends' house'
14	gúol	+	thúm	+	gám	gúol	thúm	gám	'three friends' land'
15	gúol	+	thúm	+	bùu	gúol	thúm	bûu	'three friends' food'
16	gúol	+	gùup	+	în	gùol	gúup	ˈîn	'six friends' house'
17	gúol	+	gùup	+	gám	gùol	gúup	gǎm	'six friends' land'
18	gúol	+	gùup	+	bùu	gùol	gúup	bùu	'six friends' food'
19	zòol	+	gîet	+	în	zòol	gíet	ˈîn	'eight friends' house'
20	zòol	+	gîet	+	gám	zòol	gíet	gǎm	'eight friends' land'
21	zòol	+	gîet	+	bùu	zòol	gíet	bùu	'eight friends' food'
22	zòol	+	thúm	+	în	zòol	thúm	în	'three friends' house'
23	zòol	+	thúm	+	gám	zòol	thúm	gám	'three friends' land'
24	zòol	+	thúm	+	bùu	zòol	thùm	bûu	'three friends' food'
25	zòol	+	gùup	+	în	zòol	gúup	în	'six friends' house'
26	zòol	+	gùup	+	gám	zòol	gúup	gǎm	'six friends' land'
27	zòol	+	gùup	+	bùu	zòol	gùup	bûu	'six friends' food'

In 9 and 27, where the genitive H is both preceded and followed by a L tone word, it is realized on the latter (´ *bùu*   *bûu*). In 7-8 and 25-26, where the preceding word is L and the following either HL or H, the genitive H links onto the former (*gùup ´*   *gúup*). As seen in 1-3, 10-12 and 19-21, there is no genitive H after HL tone *gîet* 'eight'. If, for example, there were an underlying genitive H in /zòol gîet ´ bùu/ 'eight friends' food' in 21, the expected output would be **zòol gíet ˈbûu*, rather than the correct *zòol gíet bùu*. In addition, there is no genitive H after a DERIVED HL: In 16-18, the boundary %L spreads onto /gúol/ 'friend', whose H spreads in turn onto the L of /gùup/ 'six'. The resulting HL tone subsequently becomes H by CS. If there had been a following genitive H in 27, / ` gúol gùup ´ bùu/ 'six friends' food' would have been realized **gùol gúup ˈbûu*, rather than the correct *gùol gúup bùu*. Note also in 24 that if the underlying representation had been /zòol thúm ´ bùu/ 'three friends' food', the expected output would be **zòol thúm bûu*

instead of *zòol thùm bûu*. Since LTS is not blocked, it can be assumed that there is no genitive H in the underlying representation.

The same alternations occur when the second word is an adjective instead of a numeral, e.g. *lìen* 'big' in the place of *gùup* 'six': *mí ˈlíen gám* 'a big person's land', *mí lìen bûu* 'a big person's food', etc.

Because of HTS, a demonstrative + noun input such as /hí zòol/ 'this friend' appears without a genitive H in *hí zóol bùu* 'this friend's food'. The three preposed demonstratives are all /H/: *hí* 'near speaker', *tsú* 'near hearer', *khú* 'far from speaker and hearer'. Since there is no /L/ demonstrative, there is no way to test whether demonstrative + noun would otherwise have counted as branching for the purpose of genitive H tone. Pronominal proclitics, which are /HL/ before a /L/ noun, show that there is a genitive H:

ká zòol bûu	'my friend's food'	á zòol bûu	'his/her friend's food'
ná zòol bûu	'your friend's food'	í zòol bûu	'our (incl dual) friend's food'

A proclitic + noun combination thus provides the required branching for the genitive H to be inserted.

The genitive H tone is also present when full complex pronouns are used in the place of possessive proclitics. The base pronouns have underlying /HL/ tone. The emphatic and plural postpositions *màa* and *hòo* have /L/ tone:

	singular	**singular + màa**	**plural**	**plural + màa**
1st person (excl):	kêy	kéy màa	kéy hòo	kéy màa hòo
1st person (incl)	êy	éy màa	éy hòo	éy màa hòo
2nd person:	nâng	náng màa	náng hòo	náng màa hòo
3rd person:		á màa		á màa hòo

When used possessively before a noun, *màa* and *hòo* acquire H tone:

singular	**singular + màa**	**plural**	**plural + màa**	
kéy ˈlôw	kéy ˈmáa lôw	kéy ˈhóo lôw	kéy ˈmáa hóo lôw	'my, our field'
éy ˈlôw	éy ˈmáa lôw	éy ˈhóo lôw	éy ˈmáa hóo lôw	'my, our field'
náng ˈlôw	náng ˈmáa lôw	náng ˈhóo lôw	náng ˈmáa hóo lôw	'your field'
	á ˈmáa lôw		á ˈmáa hóo lôw	'his/her, their field'
kéy găm	kéy ˈmáa gám	kéy ˈhóo gám	kéy ˈmáa hóo gám	'my, our land'
éy găm	éy ˈmáa gám	éy ˈhóo gám	éy ˈmáa hóo gám	'my, our land'
náng găm	náng ˈmáa gám	náng ˈhóo gám	náng ˈmáa hóo gám	'your land'
	á ˈmáa gám		á ˈmáa hóo gám	'his/her, their land'
kéy bùu	kéy màa bûu	kéy ˈhóo bûu	kéy ˈmáa hóo bûu	'my, our food'
éy bùu	éy màa bûu	éy ˈhóo bûu	éy ˈmáa hóo bûu	'my, our food'
náng bùu	náng màa bûu	náng ˈhóo bûu	náng ˈmáa hóo bûu	'your food'
	á màa bûu		á ˈmáa hóo bûu	'his/her, their food'

The same tone changes are seen before the oblique marker /áa/ used in a headless noun phrase:

singular	singular + màa	plural	plural + màa	
kéy ǎa	kéy ˈmáa áa	kéy ˈhóo áa	kéy ˈmáa hóo áa	'mine, ours'
éy ǎa	éy ˈmáa áa	éy ˈhóo áa	éy ˈmáa hóo áa	'mine, ours'
náng ǎa	náng ˈmáa áa	náng ˈhóo áa	náng ˈmáa hóo áa	'yours'
	á ˈmáa áa		á ˈmáa hóo áa	'his/hers, theirs'

The observed tonal changes appear related to the genitive H tone, since one finds the H tone effect only when the pronoun is both branching and used possessively before another noun or /áa/. Since *hòo* and *màa* are both L tone (and preceded by a HL pronoun), the genitive H is expected. When followed by /L/, the genitive H goes onto the noun: /â màa ´ bùu/   *á màa bûu* 'his food'. When followed by /HL/ or /H/, it goes onto the pronoun: *kéy ˈhóo gám* 'our land'. Surprisingly, there are two tone changes when *màa* and *hòo* occur in sequence, e.g. *ná ˈmáa hóo lôw* 'your (pl.) field'. In this case one cannot simply put in genitive H tones after each branch, since /ná màa ´ hòo ´ lôw/ would wrongly be pronounced *á ˈmáa ˈhóo lôw. If a single genitive H is posited, /á màa hòo ´ lôw/, it would have to affect both *màa* and *hòo*. The alternative is to say that these morphemes are /H/ whenever the branching pronoun is used as a possessive (e.g. *á ˈmáa hóo* 'their' vs. *á màa hòo* 'they, them'). This would make the alternations a matter of allomorphy, as was seen with /HL/ vs. /L/ proclitics. See also §3.3.2.2.

3.3.2.2. Subject H tone. Another grammatical H tone effect is undoubtedly related to the preceding, but since it involves the marking of the subject relation, it is treated separately.

The two types of verb nominalization in KT are illustrated below:

stem1:	pèt	kèel pèt	'goat biter'
stem2:	pèe	kèel pèe	'goat biting' (of/by the goat)
stem2:	pèe	kèel pêe	'goat biting' (by the goat)

A noun+stem2 verb nominalization creates a subject-oriented noun, often but not necessarily agentive (cf. *bùu kì gùu* 'stolen food', constructed with reflexive *kì* and stem1 *gùu* 'steal'). Either or both the internal noun or the whole compound can be pluralized: *kèel hòo* pèt 'biter of goats', *kèel pèt hòo* 'goat-biters', *kèel hòo pèt hòo* 'biters of goats'.

A noun+stem2 verb nominalization creates an action or event nominalization comparable to deverbal forms ending in *-ing* in English. A form such as *kèel pèe* can be translated as 'goat biting', 'goat's biting', or 'biting of goat'. When pronounced *kèel pèe* the goat can either be the one doing the biting or the one being bitten. As seen in the second stem2 nominalization, *kèel pêe* has only the one meaning 'biting by goat'. That is, 'goat' must be the subject of the verb 'bite'. Unlike stem1 nominalizations, only the internal noun of stem2 nominalizations can be pluralized: *kèel hòo pèe* 'biting of goats' (ambiguous), *kèel hòo pêe* 'biting of goats' (the goats are doing the biting).

This subject H tone is no doubt related to the genitive H seen in §3.3.2.1, possibly deriving from historical *kèel á pèe* 'goat its biting'. It differs, however, in not requiring a branching noun phrase to the left of the stem2 verb. Unlike the variation seen with *màa* and *hàa*, the subject H tone requires a /L/ + /L/ input:

/HL + L/	méeng pèe	'cat biting' (of/by the cat)
/H + L/	zòong pêe	'monkey biting' (of/by the monkey'
/L + L/	kèel pèe	'goat biting' (of/by the goat)
/L + L/	kèel pêe	'goat biting' (by the goat)

When the noun has either /HL/ or /H/ tone, there is no subject H tone. Thus, 'the biting of the cat' and 'the biting of the monkey' are both ambiguous.

Subject H tone is limited to stem2 verb nominalizations, which can only bear /L/ or /HL/ tone. If the stem2 verb form is /HL/, there is no subject H. The resulting nominalizations are therefore ambigous:

/HL + HL/	méeng ˈpûoq	'cat carrying' (of/by cat)
/H + HL/	zóong pûoq	'monkey carrying' (of/by cat)
/L + HL/	kèel pûoq	'goat carrying' (of/by goat)

The verb *pûo* 'carry' has a stem2 form *pûoq*. Because of its HL tone, *méeng ˈpûoq* 'carrying of the cat' (etc.) can mean either that the cat is being carried or is doing the carrying.

The subject H tone is an important marker found on stem2 verbs that are not preceded by a pronominal proclitic. This happens in *á hìi êe* verb tenses: XX Fix

/HL + L/	méeng lùm á hìi êe	'the cat is lying down'
/H + L/	zòong lúm ˈá hìi êe	'the monkey is lying down'
/L + L/	kèel lùm ˈá hìi êe	'the goat is lying down'

 The verb *lùm* 'lie down' remains L in the first sentence, since it is preceded by the HL noun *mêeng* 'cat'. LTS and HTS apply to /zóong + lùm/ in the second sentence. The third sentence shows that there has to be a subject H tone between /kèel/ and /lùm/.

That this H grammatical tone is to be specifically identified with the subject relation is seen in the following sentences:

á màa ìn á mùu á hìi ê	'he found it'	á pèe ìn á mùu á hìi ê	'he bit him'
á màa múu ˈá hìi ê	'he found it'	á màa pée ˈá hìi ê	'he bit it'
á màa mùu á hìi ê	'he was found'	á màa pèe á hìi ê	'he was bitten'

In the first line, the ergative marker *ìn* shows that *á màa* must be the subject of the transitive verbs *mùu/mùu* 'find, see' and *pèt/pèe* 'bite'. As seen, *á màa ìn* is obligatorily followed by the third person proclitic *á*. In the second line, there is no ergative marker and no proclitic subject pronoun. The H tone on *múu* and *pée* still makes clear that *á màa* is the subject. Compare the

third line, where *mùu* and *pèe* have their underlying L tones. In this case, since the subject H tone is missing, *á màa* is unambiguously the object of these sentences, which could also be translated 'someone found him' and 'someone bit him'.

The relation to the nominalizations cited at the beginning of this section should be clear. /á màa ´ mùu/ and /á màa ´ pèe/ mean 'his finding it' and 'his biting it', and the meanings of the sentences can be literally interpreted as 'it is/was his finding it' and 'it is/was his biting it' (where the third person object 'it' is expressed by Ø). The sentences in the last line have the literal interpretations 'it is/was the finding of him' and 'it is/was the biting of him'. For more on the copular origin of *hìi* tenses, see §XX.

Confirmation of this analysis is seen in further contrasts such as the following:

*bùu múu ꜜá hìi ê	'the food found it'	*bùu tsóo ꜜá hìi ê	'the food stirred it'
bùu mùu á hìi ê	'the food was found'	bùu tsòo á hìi ê	'the food was stirred'

Since 'food' cannot find or stir, the subject H is inappropriate in the first line.

Compare also the following sentences:

náng hòo múu ꜜá hìi êe	'you (pl.) found it'	*náng hòo mùu á hìi êe
náng hòo mùu ná hìi êe	'you (pl.) were found'	*náng hòo múu ꜜná hìi êe

In the first sentence with subject H tone, *náng hòo* 'you pl.' is unambiguously subject, while it is object in the second sentence without subject H tone. [XX check lower right *]

The following sentences show the full set of independent pronouns as subject of *mùu* 'find, see':

kéy mùu á hìi êe	'*I* found it'
náng mùu á hìi êe	'YOU found it'
á màa múu ꜜá hìi êe	'S/HE found it'
kéy hòo múu ꜜá hìi êe	'WE found it'
náng hòo múu ꜜá hìi êe	'YOU PL. found it'
á ꜜmáa hóo múu ꜜá hìi êe	'THEY found it'

These sentences have focus on the subject, 'I was the one who found it', 'you were the one who found it', etc. The first two sentences do not have subject H, since *kêy* 'I, me' and *nâng* 'you' have underlying /HL/ tone. The pronoun in the next three sentences ends in L, and subject H is assigned to the verb. The last sentence shows that both *màa* and *hòo* undergo raising, exactly as was seen at the end of §3.3.2.1. The following contrast shows that this special behavior is triggered by the morpheme *màa*:

náng nìi múu ꜜá hìi êe	'you two found it'
á ꜜmáa níi múu ꜜá hìi êe	'they two found it'

Here the numeral *nìi* 'two' appears at the end of the subject noun phrase. In the first sentence, the subject H tone is assigned to the verb. In the second sentence, both *ámàa* and *nìi* undergo raising. [XX finish paradigm]

Since a subject proclitic is frequently missing in WH questions (§XX), subject H tone will often be observed:

bóong hí kòy ìn à tsóq ꜝhâm   'who bought this cow?'
bóong hí kóy tsóq ꜝhâm   idem.

In the first sentence kòy ìn 'who' is marked by ergative case and there is a following proclitic à. In the second, nominalized sentence, there is no ergative ìn or proclitic à. The two sentences are synonymous, although the second might have the more literal interpretation 'whose buying of this cow is it?' As seen, the subject H goes on the WH word kóy. The same is seen in the following pair of sentences: [XX check VL on ipi]

ìpìi gíng hâm   'what's that noise?'
ípí gín ꜝhâm   idem.

The verb in question is *gíng/gìn* 'make a ringing sound'. In the first sentence, where the stem1 form gíng 'noise' (lit. sound-maker) is used, and ìpìi maintains its underling L-L tones. The literal meaning is 'what is the sound-maker? In the second sentence, the stem2 form *gìn* is used, and the literal meaning is 'what ringing is it'?, i.e. 'ringing by what'? As seen, *ípí* now occurs with H-H tone (which also spreads onto the stem2 verb *gìn*). Vowel shortening also applies, since /ìipìi + ´ + gìn/ is a constituent, while /ìipìi + gíng/ is not. Subject H will in fact never be present if the verb is in stem1: *kòy kàp hâm* 'who is crying'. [XX check; also kèel pèt 'biter goat'; check also hàaw sàa lìen, lìm làng lìen 'big mirror'] see p.79; maybe *kòy káp ꜝhâm* is ok too? *kòy tsìe hâm* 'who is going?'. *ìpìi khíe dìng hâm* 'what will fall?' (p.79)

3.3.2.3. *hlòn* and *dìng* allomorphy. The following two grammatical morphemes share a number of properties:

after /HL/	after /H/ or /L/	within the verb complex	within a noun phrase
/hlòn/	/hlôn/	'dual subject/object'	'dual possessor'
/dìng/	/dîng/	'future, irrealis'	'for benefit of'

The two morphemes are postpositional, appear within both the verb complex and the noun phrase, and exhibit the indicated tonal allmorphy: /L/ after /HL/ and /H/ vs. /H/ and /L/. Interestingly, this tonal allomorphy is the mirror-image of that found on pronominal proclitics (§3.3.2.1).

The following sentences show *hlon* following all three tones, first on verbs, then on nouns:

kà táaw hlòn êe   'we (dual) are praying'   /tâaw/   'pray'
nà núuy hlón ꜝêe   'you (dual) are laughing'   /núuy/   'laugh'

á kàp hlón ꜜêe	'they (dual) are crying'	/kàp/	'cry'

kà lów hlòn	'our (dual) field'	/lôw/	'field'
nà khúo hlôn	'your (dual) village'	/khúo/	'village'
á hùon hlôn	'their (dual) garden'	/hùon/	'garden'

In the first example of each set, /hlòn/ clearly has an underlying /L/ after the preceding /HL/ tone. In the last example of each set, /hlôn/ is realized with HL after an underlying /L/. This alternation between L and HL might suggest that there is a floating grammatical tone comparable to the genitive and subject H tones, i.e. /kà lôw ´ hlòn/ 'our (dual) field', etc. In this case pre-hlòn H would occur only after a /L/ tone. However, the preservation of the /H/ of *núuy* 'laugh' and *khúo* 'village' shows that this analysis is incorrect. If the underlying representation of 'you (dual) are laughing' and 'your (dual) village' were /nà núuy hlòn êe/ and /nà khúo hlòn/, respectively, we would expect LTS to apply to yield *nà nùuy hlón ꜜêe and *nà khùo hlôn. It is therefore assumed that /hlôn/ is used after both /L/ and /H/ words, while /hlòn/ occurs only after /L/.

The following sentences show the same tonal variants with respect to *ding*:

nà néq dìng á hìi êe	'we will eat'	/nêe/, /nêq/	'eat'
à núuy díng ꜜá hìi êe	'he will laugh'	/núuy/, /nùy/	'laugh'
ná kàa díng ꜜá hìi êe	'you will cry'	/kàp/, /kàa/	'cry'

The verbs /nêq/ 'eat' and /kàa/ 'cry' appear in stem2, while /núuy/ 'laugh' appears in stem1 (see §XX for further discussion). As seen, /dìng/ has L tone after /kàa/, but /HL/ tone after both /nêq/ and /núuy/. LTS fails to apply in the second sentence since the underlying representation is /à núuy dîng.../ rather than /à núuy dìng/.

The same facts are observed in the nominal use of *ding* which marks benefactives:

súoq dìng ǐn	'for the slave'	/sûoq/	'slave'
zúol díng ǐn	'for the friend'	/zúol/	'friend'
kèel díng ǐn	'for the goat'	/kèel/	'goat'

That the same tonal allomorphy is involved supports the contention that the same morpheme *ding* is involved in marking future and irrealis verb forms and benefactive noun phrases. *ding* is also used as a complementizer:

nà húng dìng ká dèy êe	'I want you to come'	/hûng/	'come'
ná nùuy díng ꜜká dèy êe	'I want you to laugh'	/núuy/	'laugh'
ná tàaw díng ꜜká dèy êe	'I want you to pray'	/tàaw/	'pray'

The French translation 'à l'intention de' seems particularly apt to capture the relation between these uses of *ding*: an action is done with a future or irrealis intention or for the intention of someone or some other action.

The following sentences show that it is possible to combine *hlon* and *ding* in this order:

kà néq hlòn díng ꜜá hìi êe 'we dual will eat'
à núuy hlón dìng á hìi êe 'they dual will laugh'
ná kàa hlón dìng á hìi êe 'you dual will cry'

In this case the tone of *hlon* depends on the preceding word, while the tone of *ding* depends on *hlon*. As seen, /dîng/ has /HL/ tone after the /L/ of /hlòn/ in the first sentence, but /L/ tone after the /HL/ of /hlôn/ in the other two sentences. What this means is that the allomorphy is determined on a left-too-right basis.

This last point is dramatically underscored in cases where *hlon* or *ding* follow a HL tone derived from an underlying sequence of /H/ + /L/ via HTS: XX check list of R + L compounds.

/à bóong gùup hlòn/ à bòong gúup hlòn 'their (dual) six cows'
/kà gúol hùon hlòn/ kà gùol húon hlòn 'our (dual) friend's garden'
/gúol hùon dìng ín/ gùol húon dìng ǐn 'for a friend's garden'

In the above phrases, HTS converts /gúol hùon/ and /gúol kèel/ to intermediate *gùol hûon* and *gùol kêel*, which then become *gùol húon* and *gùol kéel* by CS. As seen, the L tone allomorphs /hlòn/ and /dìng/ are chosen on the basis of intermediate *hûon* and *kêel*. Whereas the choice between /HL/ and /L/ pronominal proclitics was based on the underlying tone of what follows, the choice of /HL/ and /L/ allomorphs of the postpositions *hlon* and *ding* is based on the derived tone of the preceding word. While the choice of allomorph must follow HTS, it must precede LTS. If /kà gúol/ first becomes intermediate *kà gǔol*, and /hlôn/ is then chosen, the output would be **kà gùol hlôn* rather than *kà gúol hlôn* 'our (dual) friend'. Another interpretation might be to posit the underlying forms /hlòn/ and /dìng/, whose tone is raised to *hlôn* and *dîng* after a H or L by a rule specific to these morphemes. This rule could then be ordered after HTS, but before LTS.

3.3.2.4. Stem2 tone. As discussed in detail in chapter 5, verbs have two forms: stem1 and stem2. Historically, stem2 was derived from stem1 by adding a suffix which had tonal consequences. Stem2-formation may have segmental effects which are only partially predictable in present-day KT. This is seen in the verbs in the left columns below:

		stem1	stem2		stem1	stem2	
HL	L	hlûng	hlùn	'arrive'	hûon	hùon	'cook'
		tsôw	tsòo	'dig'	sêy	sèy	'speak'
		nûom	nùop	'agree'	tâaw	tàaw	'pray'
		vâq	vàa	'wander'	ngâq	ngàq	'wait'
		lîeq	lìe	'lick'	lûut	lùut	'enter'
H	L	vĕe	vèt	'watch'	thǐi	thìi	'die'
		hlěng	hlèn	'choose'	kǎl	kàl	'climb'
		vǔuy	vùy	'bury'	lǎam	làam	'dance'

kěq	kèe	'burst'	văq	vàq	'feed'
hlǒq	hlòo	'soft'	zěep	zèep	'whip'

In addition, stem2-formation can simply involve a tone change, as in the verbs in the right columns.

The above examples show that verbs whose stem1 is either /HL/ or /H/ typically change their tone to L in stem2. Verbs which are already /L/ remain L in stem2:

		stem1	**stem2**		**stem1**	**stem2**	
L	L	sùu	sùq	'pound'	mùu	mùu	'see'
		tòng	tòq	'work'	kòl	kòl	'hug'
		sòon	sòt	'push'	hàaw	hàaw	'yawn'
		kàp	kàa	'cry'	zèp	zèp	'swim'
		pèt	pèe	'bite'	thòt	thòt	'send'

 If there is no segmental change, /L/ verbs will have identical stem1 and stem2, as in the examples on the right. Of 534 lexical verbs, all but 33 have L tone in stem2. The remain 33 have F tone. Of these, 28 have the stem1 shape CVV and take -q or -t in stem2. Since these generalizations are treated in §5.XX, it should only be noted here that tone is implicated in stem2 formation.

Finally, there are some tonal variations... nee, hluu etc.

insert numey somewhere.