CONSONANTAL MUTATION AND TONAL SPLIT
IN THE TAMANG SUB-FAMILY OF TIBETO-BURMAN

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Tone is often believed by non-specialists to be a
fundamental feature of a language, almost a peculiar turn of
mind of its speakers. It is assumed that a language either
is tonal or is not, nothing in between, and that tonal
languages have always been and will always be tonal. These
are all fallacies. The Tibeto-Burman languages of Nepal
which we will describe here are what we could call semi-
tonal or marginally tonal. They also exemplify how languages
can become tonal from being non-tonal, or more precisely in
this case, more tonal from being slightly tonal.[1]

1.   THE TAMANG SUB-FAMILY

1.1   The eight languages or dialects under study all belong
to the Gurung Branch of the Bodish Section of the Bodic Divi-
sion of the Tibeto-Burman Family of Sino-Tibetan languages,
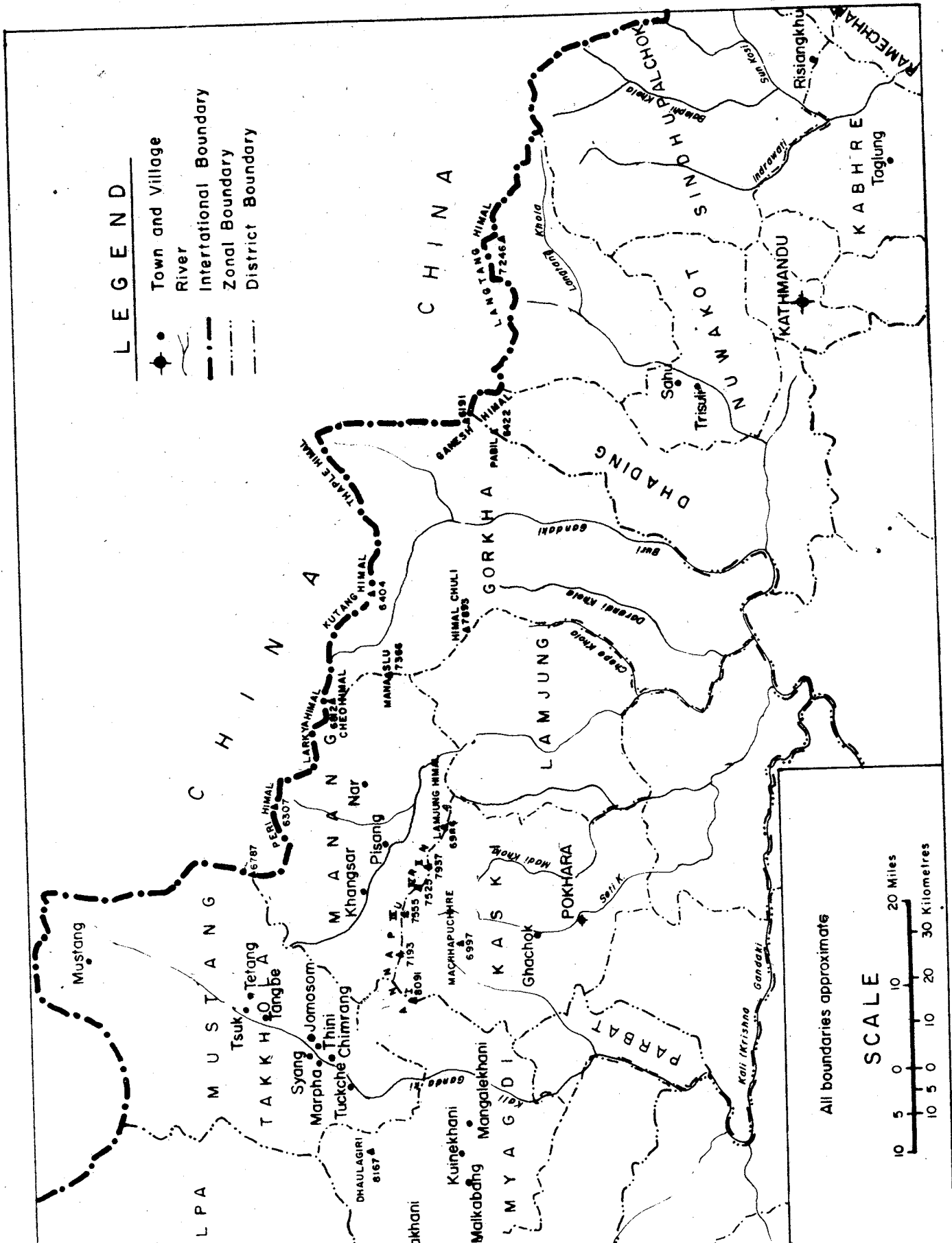according to the classification of Robert Shafer. Shafer's

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Gurung Branch comprises Tamang, Gurung and Thakali. To these should be added Manangba (also called Nyi-shang), and the language spoken in the Nar valley, North of the Manang valley. These last two forms of speech were not classified by Shafer. They clearly belong together with Tamang, Gurung and Thakali. They must not be classified with the dialects of Mustang and Dolpo as part of Tibetan, as is sometimes assumed on general cultural grounds. The reconstructed ancestor of the whole Tamang sub-family (Shafer's "Gurung Branch" plus Manangba and the Nar language) is designated by the initials TGTM, standing for Tamang-Gurung-Thakali-Manangba (Nar material was not used in this study).[2]

1.2 We will compare eight forms of speech belonging to this group. According to the traditional way of identifying population groups in Nepal, their speakers belong to the four groups mentioned above. Whether these sociological divisions also correspond to linguistic divisions is not clear at this point. We use these ethnic names because, with the addition of a village name, they identify without ambiguity the people from whom language samples were collected, hence their form of speech.

Manangbas are a small group living in a well defined area where communications are easy. Dialectal variation between Manangba villages, from Pisang to Khangsar, is either nul or very limited. Gurung and, even more so, Tamang are spoken over large areas and there is a lot of geographical variation in dialect. With these two groups, forms of speech have to be identified by the name of the village where

2. Michael Vinding tells me that the dialects spoken in the villages of Tangbe, Tetang, and Tshuk, north of Tibetan-speaking Kagbeni, are close to, but different from, all dialects of Thakali. Thus they may qualify as new members of the TGTM family. Boyd Michailovsky suggests that the same may apply to the Chantel language spoken in Gurjakhani, Malkabang, Kuinekhani, and Mangalekhani villages of Myagdi District.

LEGEND

- Town and Village
- River
- Intertational Boundary
- Zonal Boundary
- District Boundary

CHINA

SINDHUPALCHOK

RASUWA

KABHRE

Taglung

Risiangkhu

Sun Kosi

Bhotsi Khola

Indrawati

Khola

LANGTANG HIMAL
7246

Langtang

NUWAKOT

KATHMANDU

Sanu

Trisuli

GANESH HIMAL
7191

PABIL HIMAL
6422

DHADING

GORKHA

Buri

Gandaki

Darondi Khola

THAPLE HIMAL

KUTANG HIMAL
6404

HIMAL CHULI
47893

MANASLU
7366

Chepe Khola

LAMJUNG

LARKYA HIMAL

G 6528
CHEO HIMAL

LAMJUNG HIMAL
6984

PERI HIMAL
6307

Nar

MANANG

Pisang

ANNAPURNA
7525
7355

MACHHAPUCHHRE
6997

Modi Khola

KASKI

POKHARA

Ghachok

CHINA

MUSTANG

Mustang

6787

Khangsar

7193
8091

Seti K.

Tetang

Tsuk

TAKKHOLA

Jomosom
Tangbe

Syang

Marpha

Thini

Tuckche Chimrang

PARBAT

Kali (Krishna)
Gandaki

DHAULAGIRI
8167

Kuinekhani

Mangalekhani

Malkabdhg

MYAGDI

Gandaki

SCALE

All boundaries approximate

10 5 0   10   20 Miles

10 0 10   20   30 Kilometres

they are spoken. Three varieties of Tamang are represented here. Thakalis split into three endogamous subgroups corresponding to three forms of speech. These three subgroups live in different villages but in the same rather small geographical area. The 'Tukche' dialect covers all Southern Thakkhola and Jomosom. The 'Syang' dialect covers Syang, Thini, and Chimang. Marpha is an endogamous village with its own dialect.

2. ON THE NATURE OF TONE IN THE TAMANG SUB-FAMILY

2.1 The languages of the Tamang sub-family are all tonal. In these languages the words for 'I' /^{1}ŋa/ and for 'drum' /^{3}ŋa/ for example are distinguished by pitch and melodic features only. Pronouncing the consonant and vowel properly but failing to produce the proper tonal features will lead to misunderstanding.

Each monosyllabic word, in languages of the TGTM group, can carry one of four tones. The phonetic value (mainly pitch) of these tones varies from place to place (see table §3.12) but the correspondances are regular. Take for example the two words quoted above: the pronoun 'I' and the noun 'drum'. To indicate pitch, we may use Chao Yuen-ren's system, representing pitches from low to high on a scale from 1 to 5. If you pronounce the syllable [ŋa] with a high falling tone [54] ('five-four' i.e. starting very high [5] and descending slightly to [4]) in Risiangku, you have said 'I'. Pronouncing about the same thing in Ngawal, you have said 'drum'. To say 'I' in Ngawal you must use a mid level tone [33], which, in Risiangku, would come close to the pronunciation of 'drum'. The correspondance of tone [54] in

Risiangku to tone [33] in Ngawal is regular. That is, among
the words which are shared by the two dialects, all the words
which are pronounced with the high falling tone [54] in
Risiangku are pronounced with the mid level tone [33] in
Ngawal. These words all belong to the same *tone class,* which
we call tone-1. In the same way all the words like 'drum'
which are pronounced with the 'low level tone [33] in Risiangku
and the high falling tone [54] in Ngawal form another tone
class, which we call tone-3, and so on.

2.2   Suffixes, in languages of this group, are always tonally
neutral, which means you cannot distinguish one suffix from
another suffix by pitch and melodic variations. Rather the
pitch and melody of suffixes are conditioned by the lexical
item (noun, verb, etc.) which they are added to. Thus the pitch
and melody heard on a suffix serve in fact to identify the
tone of the root to which it is added. For example the nouns
/^{1}sa/ 'earth' and /^{2}sa/ 'Niger seed (the oilseed *Guizotia*
abyssinica)' are differentiated in Risiangku Tamang by the falling
tone [54] of 'earth' and the level tone [44] of 'sesame'. This
difference is easier to hear if the locative suffix /-ri/ is
added. In this case the melody is spread out and emphasized:
/^{1}sa-ri/ 'on the ground' is pronounced with the pitch pattern
[54-44] or [54-33], emphasizing the fall characteristic of
tone-1. /^{2}sa-ri/ 'in the oilseed' is pronounced [44-44], or
[44-55] or [44-54], sometimes emphasizing the non-falling
character of tone-2 by a slight rise on the suffix. In extreme
cases a string of suffixes spreads out a complex melody, as in
Tukche Thakali where tone-4 on a monosyllable is a rising-
falling tone [121]. If two suffixes are added, the resulting
trisyllabic word will have three more or less level syllables
with the following pitches [11-22-11]. The melody is much more
easily identified spread out in this way than compressed on the
root syllable devoid of suffixes.

2.3   In all dialects for which sufficient data are available (Tukche Thakali, Risiangku and Sahu Tamang, and Ghachok Gurung), it has been observed that disyllabic morphemes show the same melodic patterns as disyllabic words made up of a monosyllabic lexeme and a suffix. So only the same four tone patterns found on monosyllabic morphemes are heard, spread out, on disyllabic morphemes. Not only is the number of classes the same, but the phonetic realization of disyllabic words with and without morpheme boundary is the same, so that e.g. Risiangku informants could not distinguish the morpheme /^{2}tari/ 'an axe' from the sequence /^{2}ta-ri/ 'horse-locative, on the horse'.

2.3   There are two exceptions to the above statement. First, in Risiangku the high falling tone (tone-1) is pronounced with a smaller fall on a disyllabic word made up of a nominal root and a suffix than on a mono-morphemic disyllabic noun.   /^{1}kuri/ 'a shovel' *is* distinguished from /^{1}ku-ri/ 'on the chest'. This is only a phonetic peculiarity in the dialect of Risiangku, but it might provide an insight into the historical origin of the second exception.

In Gurung five tone patterns instead of four have been described on disyllabic mono-morphemic nouns. The phonetic description of the five classes is roughly: High-Mid (or High-falling), Mid-High (or High-rising), Mid-Mid (or High-level), Low-Mid (or Low-rising), and Low-Low (or Low-level). The two low classes of Gurung correspond regularly to the two low classes of the other dialects; but the three high classes seem to distribute randomly into the two high classes of the other dialects.

The historical origin of these exceptions, especially the second one is still unclear. A detailed study of tone

on polysyllabic morphemes is out of the scope of this arti-
cle. We shall concentrate our attention on monosyllabic
morphemes.

2.4   In conclusion we see that with four tones on monosyl-
labic items, the TGTM languages are tonal. They are more
tonal than other semi-tonal languages like Danish or
Japanese. They are more tonal than most dialects of Tibetan.
They are less tonal than many other languages of the same
Tibeto-Burman family, like Lahu, spoken in Thailand, which
has seven tones. More important than the number of tones
is the fact that, unlike fully tonal languages like Viet-
namese or Lahu, the languages of the TGTM group do not
distinguish four tones on each syllable of a word (which
would make 16 melodies for a two-syllable word) but only
four tones *per word*.

3.   THE MUTATION OF INITIAL OCCLUSIVES AND THE
     MULTIPLICATION OF TONES ON MONOSYLLABLES

It has long been hypothesized about several Southeast
Asian languages, Chinese and Vietnamese among them, that
the distinction between a series of high tones and a series
of low tones originated from a lost distinction between
voiced and voiceless initial consonants. That mutation
occurred several centuries ago and was not directly observed.
The languages of the TGTM group exemplify this development.
Their contribution to the general theory of phonological
change is thus very important because they show in living
languages the different stages of the evolution which
progressively replaces an opposition of voiced to voiceless
initials by an opposition of low pitch to high pitch, and

how this symmetrical pattern can become concealed by ulterior developments.

3.1   *Risiangku, Sahu, Tukche, Syang, and Ghachok dialects.*
        In five dialects out of eight, Risiangku and Sahu Tamang, Tukche and Syang Thakali, and Ghachok Gurung, tone-1 and tone-2 words are high with a clear voice quality; tone-3 and tone-4 are low with a breathy voice quality. The opposition of tone-1 to tone-2, and that of tone-3 to tone-4 rest on a combination of melody and relative pitch which varies with each dialect.

3.11   Let us focus on the main contrast of the system: high-clear vs. low-breathy. This contrast correlates with an important difference in the system of initial consonants: aspirated stops do not occur on the low tones. On the high tones two series of initial stops are found, voiceless un-aspirated and voiceless aspirated. (Voicing is nowhere distinctive except very marginally in Gurung, and this possibly under the influence of loan words).

Hence, taking the velar stops as examples of all stops, we can show the co-occurrence of tones and series of initials in the following way:

	high tones		low tones	
	tone-1	tone-2	tone-3	tone-4
kh	yes	yes	no	no
k	yes	yes	yes	yes

Synchronically this means two things:

   (1) you cannot distinguish a /kh/ from a /k/ if the tone is /3/ or /4/,

or reciprocally:

(2) you cannot distinguish a high tone from a low
tone if the initial is a /kh/.

In technical terms (1) and (2) can be represented by the
formulas (1a) and (2a) or by (1b) and (2b):

(1a) kh ⟶ k /# _____ LOW

(2a) LOW ⟶ HIGH /# kh _____

(1b) "The opposition between aspirated and unaspirated
stops is neutralized under the low tones in favor of
an unaspirated archiphoneme."

(2b) "The opposition between high and low tones is
neutralized after aspirated initials in favor of high
architonemes."

The formulations (1b) and (2b) are preferable to (1a)
and (2a), because they are more complete and more explicit.
Thus (1b) states not only that (in the generative terms of
(1a)) kh 'becomes' k, but also that underlying k remains k;
and (2b) states explicitly that underlying high tones remain
high. In addition, both give prominence to the fact (and
extent) of neutralization; the importance of this is dis-
cussed in § 3.22 below.

3.12 Synchronically, (1) (whether (1a) or (1b)) is not
quite equivalent to (2) (whether (2a) or (2b)). Let us
consider in greater detail the phonetic realization of the
four tones in each dialect.[3] Using Chao Yuen-ren's tone
letters again, we obtain the following values:

	TAMANG			THAKALI			GURUNG	MANANGBA
	Risiangku	Sahu	*Taglung*	Tukche	*Marpha*	Syang	Ghachok	*Ngawal*
tone-1	54	44	55/44	54	43	43	33	33
tone-2	44	54	43	44/33	45	45	54	45
tone-3	33/22	11	33/22	11	33/22	11	11	*54*
tone-4	211	32	*51*	121	*51*	33/22	12	31

3. Non-specialists may accept the conclusion that (1) is preferable to
(2) and skip to §3.14.

In italics are the three aberrant dialects we will consider later. In the five dialects we are considering now, Risiangku, Sahu, Tukche, Syang, and Ghachok, tone-1 and tone-2 are consistently high-clear, and tone-3 and tone-4 are consistently low-breathy. But what is the feature which distinguishes tone-1 from tone-2? In Risiangku /1/ is relatively higher than /2/. In Sahu the relationship is reversed. The relative pitch of tone-3 and tone-4 is not constant either. Neither is the feature level vs. falling: in Risiangku /1/ is falling and /2/ is level; in Sahu the reverse is true.

Even inside one dialect it is difficult to define each tone as the sum of two features. In Risiangku for instance:

> tone-1 is higher than tone-2 and falling
> tone-2 is lower than tone-1 and level
> tone-3 is higher than tone-4 and level
> tone-4 is lower than tone-3 and falling

If we retain the feature "relatively higher"/"relatively lower" in our definition of tones, tone-1 and tone-3 share a feature:

	high-clear	low-breathy
relatively high	tone-1	tone-3
relatively low	tone-2	tone-4

If we retain the feature "falling"/"level", tone-1 and tone-4 share a feature:

	high-clear	low-breathy
falling	tone-1	tone-4
level	tone-2	tone-3

3.13 To come back to the relation of aspirated initial stops to tones, if we accept (2) "the opposition between high and low tones is neutralized after aspirated initials in favor of high architonemes", we should be able to break that general rule into its parts and to state either (3) or (4):

(3a)   tone-3 $\longrightarrow$ tone-1 / #kh ———
       tone-4 $\longrightarrow$ tone-2 / #kh ———

which would read more precisely as (3b)

(3b)   "After aspirated initials the opposition between tone-3 and tone-1 is neutralized in favor of their *relatively high* architoneme (pronounced like tone-1) and the opposition between tone-4 and tone-2 is neutralized in favor of their *relatively low* architoneme (pronounced like tone-2)."

(4a)   tone-3 $\longrightarrow$ tone-2 / #kh ———
       tone-4 $\longrightarrow$ tone-1 / #kh ———

which would read more precisely as (4b)

(4b)   "After aspirated initials the opposition between tone-3 and tone-2 is neutralized in favor of their *level* architoneme (pronounced like tone-2) and the opposition between tone-4 and tone-1 is neutralized in favor of their *falling* architoneme (pronounced like tone-1)."

The choice between (3) and (4) would depend on the analysis of the tones in pertinent features. Since it has been shown above that this analysis cannot be done synchronically, it would have to be an arbitrary choice. Thus formulation (2) is unsatisfactory.

On the other hand, statement (1) can easily be developed into its constituents as in (5a):

(5a)   kh $\longrightarrow$ k / # ——— tone-3
       kh $\longrightarrow$ k / # ——— tone-4

or more precisely as in (5b)

> (5b) "The opposition between aspirated and un-
> aspirated stops is neutralized under tone-3 and
> tone-4 in favor of an unaspirated archiphoneme."

So synchronically we will retain (1) over (2).

3.14 *How does the synchronic relation between initials and tones point to an older system?* First of all (1) and (2) are not historical rules. As we stated them in words there should be no misunderstanding, since a neutralization is not a process but only a relation. If the arrows of the forma- lized notation were to be read as "historically became", both (1) and (2) would be false.

3.15 If we look more closely at the phonetic realization of initial stops under the low tones we find that in the four dialects of Risiangku, Sahu, Tukche, and Syang they are often slightly voiced, although too inconsistently for voicing to be retained as phonemic. We would say synchro- nically that low pitch and breathy voice condition a certain degree of voicing in the initial. Historically, voicing is residual. We can reconstruct the old system as having had three series of initials: aspirated, voiceless, and voiced, and only two tones, which we will call tone-A and tone-B.

$$*tone-A \quad : \quad kh \quad k \quad g$$
$$*tone-B \quad : \quad kh \quad k \quad g$$

When the old voiced initials started to lose their voicing and to merge with the old voiceless unaspirated initials, the voicing opposition was gradually replaced by a register opposition combining pitch and voice quality. By the time the voicing of the old *g,*d... had become too weak and inconsistent to maintain the opposition of *g to *k, the once conditioned low-breathy variants of tones *A and *B had

become phonemic and the tonal split was completed.[4]

			*kh	*k	*g
*tone-A	high variant	tone-1	kh	k	-
	low variant	tone-3	-	-	k
*tone-B	high variant	tone-2	kh	k	-
	low variant	tone-4	-	-	k

Nothing merged with the proto-aspirated initial stops, so there are still only two tones, the old unsplit tones *A and *B on words with those initials.

3.16 I have tentatively identified tone-1 and tone-3 as deriving from the same proto-tone *A and tones /2/ and /4/ as deriving from the same proto-tone *B rather than pairing /1/ with /4/ and /2/ with /3/ because statistically in the modern languages word families include members in both tones /1/ and /3/ or in both tones /2/ and /4/ more often than they include members in both tones /1/ and /4/ or in both tones /2/ and /3/.

There are no visible traces of what the phonetic value of *A and *B might have been. This is not surprising, considering that the *A vs *B contrast is much older than the HIGH vs LOW contrast. Even this later contrast has undergone radical phonetic changes in the three dialects which we will now consider.

3.2   *The other three dialects: Marpha, Taglung, and Manang*

3.21 In Marpha Thakali and Taglung Tamang the tonal system could be described as having three high-clear tones and one low-breathy tone. The low-breathy tone is the regular correspondent of tone-3. It is low-level in these two dialects as in the five dialects which we studied before. Tone-1

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4. Asterisks indicate reconstructed forms, phonemes or tones, as opposed to forms, phonemes or tones attested in modern languages.

and tone-2 are similar to what they are elsewhere, i.e. respectively high level and high falling in Taglung, high falling and high rising in Marpha. The surprise comes with tone-4. A low or very low tone in the first five dialects, it is an extra-high falling tone in these two dialects [51].

In Manangba the system is even more different. There is no use of breathy vs. clear voice quality, but rather a normal voice for the two lower tones and a very tense quality for the two high tones. The two higher tones here are not /1/ and /2/ as expected, but /3/ and /2/. Tone-1 is lower-mid level, and tone-4 is a fall from mid to low.

3.22 In Marpha and Taglung, in spite of the dissociation of tone-4 from any breathiness, and in spite of its being the highest tone in the system, no aspirated initials occur under that tone. They do not occur with tone-3 either, but since /3/ is low this is not surprising. Under tones /1/ and /2/ aspirated and unaspirated initial stops are in opposition.

In Manangba, too, aspirated and unaspirated initial stops are in opposition under tones /1/ and /2/, although /1/ is low in this dialect. Under tone-3, although it is a clear high tone, still only unaspirated initials are found. Manangba is the only dialect to have aspirated initials with tone-4; but in Manangba there are no unaspirated stop initials on tone-4 and thus (as in the other dialects) no opposition between aspirate and unaspirate on tone-4.

This analysis demonstrates the misleading nature of generative rule formulations like (1a) or (5a). For Manangba, part of (5a) would have to be reversed to read:

$$\text{(6a)} \quad kh \longrightarrow k \ / \ \# \ \underline{\hspace{1cm}} \ \text{tone-3}$$
$$k \longrightarrow kh \ / \ \# \ \underline{\hspace{1cm}} \ \text{tone-4}$$

thus making it appear that tone-3 and tone-4 had nothing to

do with each other in Manangba, and that the relationship
between tone and initials in Manangba was fundamentally
different from that in the other dialects. But this is not
the case: The important fact is that /k/ and /kh/ are not
distinguished -- that the opposition is neutralized, as
(1b) and (5b) explicitly state; this holds true for all of
the dialects. Which of the two is pronounced phonetically
is secondary. Thus for Manang we would state:

> (6b) The opposition between aspirated and unaspirated
> stops is neutralized under tone-3 and tone-4. The
> archiphoneme is realized as unaspirated under tone-3
> and aspirated under tone-4.

The presence of a neutralization of the opposition
between aspirated and unaspirated stop initials under
tone-3 and tone-4 in Marpha, Taglung and Manang demonstra-
tes that the same consonantal mutation was at the origin
of the tonal split in these three dialects as in the other
five. The high pitch of tone-3 or tone-4 is the result of
a later evolution from a stage similar to that which we
still find in the five dialects we studied first.

4. THE TONAL SPLIT AFTER CONTINUANT INITIALS

4.1 In all dialects four tones are in opposition after
continuant initials (m, n, ŋ, j, r, l, w, s) as well as
after unaspirated initial stops. So we should assume that
two series of continuants existed before the tonal split,
a voiceless one and a voiced one, and that those series
merged at the same time as the voiced and voiceless stops
merged. To confirm this hypothesis we would like to find
some residual trace, in one dialect or the other, of
voicing of the initial sibilant on the low tones, and of

voicelessness of nasals and liquids on the high tones. The traces, if real, are very faint.

A possible trace of the old connection between voicelessness and high tone may be found in Syang dialect laterals. In Syang, it seems that all the voiced laterals on high tones reconstruct, inside the Tamang sub-family itself, to old *kl clusters. Lateral initials on high tones deriving from simple lateral initials are all voiceless (cf. "feces" vs "snake-god" in the table of cognates). This could mean that the old voiceless laterals became high-toned, while the old voiced laterals became low-toned. Then a new opposition between voiced and voiceless laterals was created on the high tones by the reduction of ancient *kl clusters. On the low tones, if the following vowel was /i/ (see "snow"), velar + l clusters became confused with the simple laterals. If the vowel was not /i/, the palatalization of *gl into /lj/ prevented its merger with the *l initial (see "place"). No new voicing opposition was created there.

It should be noted that in Marpha and Ghachok, the reflexes of *kl and of *L (voiceless *l) are reversed as compared to Syang: *kl has become hl, and *L has become l. Probably the Syang *kl cluster developped through a glottalized initial lateral to a voiced lateral. In Marpha and Ghachok cluster initial *k must have developed into a strongly fricative velar, which is the way it is pronounced nowadays in Taglung (see "head", and "wheat" in Taglung), whence the fricative + l cluster developed into a fricative voiceless lateral.

5.   APPENDIX: TABLE OF COGNATES

Notes on the table of cognates:

*TGTM stands for Proto-Tamang-Gurung-Thakali-Manangba.   The
reconstructions are only tentative.

Between pointed brackets are irregular correspondences or
doubtful cognates.

Raised H before a word indicates high tone, where the data
available does not distinguish between tone-1 and
tone-2.   This is the case for all published data on
Tukche.   Any word marked tone-1 or tone-2 in the
Tukche column is actually based on my own elicitation
in Gopang (see map).

Raised L means low tone, where the data available does not
distinguish between tone-3 and tone-4.

Initial /h/ in Taglung has the allophones [h], [χ], and [x].

In the reconstructions, M, N, Ŋ, J, R, L stand for voiceless
m, n, ŋ, j, r, l.

c and ch have been retained in words quoted from Summer
Institute of Linguistics publications, where they
transcribe IPA [ts] and [tsh].

The rest of the transcription follows the IPA system.

TABLE OF COGNATES

	*TGTM	RISIANGKU	SAHU	TAGLUNG	TUKCHE	MARPHA	SYANG	GHACHOK	MANANG
dze	*pho^A				H pho	^{1}pho	H pho	^{1}pho	^{1}phʷo
heart	*tiŋ^A	^{1}tiŋ	^{1}tiŋ		H tin	H tin	H tin	^{1}ti	^{1}ti
fodder	*tʃhi^A		^{1}chi	^{1}tɕhe	H chi	H tʃhi	^{1}tʃhi	^{1}chi	^{1}tshi
daughter in-law	*tsaŋ^A	^{1}tsaŋ	^{1}caŋ	^{1}tsaŋ	H caŋ	^{1}tsaŋ	H tsaŋ	^{1}cõ	^{1}tsaŋ
food	*kan^A	^{1}kan	^{1}ken		H kʌn	H kʌn	H kʌn	^{1}kaẽ	^{1}kjẽ
chest	*ku^A	^{1}ku	^{1}kutto	^{1}ku	^{1}ku	^{1}ku	^{1}ku	^{1}ku	^{1}ku
faeces	*kli^A	^{1}kli	^{1}kli	^{1}khli	H ki	^{1}hli	^{1}li	^{1}ʎi	
hair,head	*kra^{A,B}	^{1}kra	^{1}kre	^{1}hwa	H tʌ	^{2}kjʌ	^{2}kja	^{1}kre	^{2}krʊ
cubit	*kru^A	^{1}kru	^{2}kru-^{2}naŋ	^{1}hu	H tu	^{1}ku	^{1}ku	^{1}kru	^{1}kru
waist	*kre(t)^A	^{1}ke:	^{1}keppa	^{1}ke:	H tʃe	^{1}kʌe	^{1}kʌe	^{1}kre	^{1}kre
ropeway	*praŋ^A	^{1}praŋ 'bier'	^{1}praŋ 'firestand' 'ladder'	^{1}praŋ 'bier'	H praŋ	H praŋ	L praŋ	⟨^{3}prẽ⟩ 'ladder'	^{1}praŋ
nose	*Na^A	^{1}na	^{1}na	^{1}na	^{1}nʌ	^{1}nʌ	^{1}nʌ	^{1}na	^{1}nʊ
hand	*Ja:^{A}	^{1}ja:	^{1}ja:	^{1}ja:	^{1}ja	^{1}ja	^{1}ja	^{1}jo	^{1}ja
fire	*Mje^A	^{1}me	^{1}me	^{1}me	H me	^{2}mi	^{2}mi	^{1}mi	^{1}mie
tail	*Me:^{A}	^{1}me:	^{1}me:	^{1}me:	H me	^{1}me	^{1}me	^{1}mi	^{1}me
goat	*Ra^A	^{1}ra	^{1}ra	^{1}ra	H rʌ	^{1}rʌ	H rʌ	^{1}ra	^{1}ʒʊ
steam	*(h)Laŋ^A	^{1}hlaŋmo		^{1}laŋ	^{1}hlaŋmʌ	H laŋbo	H hlaŋma	H lõma:	
snake-god	*Lu^A	^{1}lu	^{1}lu	^{1}lu	H lu	H lu	H hlu		

gloss	*TGTM	RISIANGKU	SAHU	TAGLUNG	TUKCHE	MARPHA	SYANG	GHACHOK	MANANG
belly	*pho^B	²pho	²pho	²pho	ᴴpho	²pho	²pho	²pho	²phʷo
horse	*ta^B	²ta	²tapu	²ta	ᴴtʌ	²tʌ	²tʌ		²tʳ
dishes	*taŋ^B	²taŋ	²taŋle	²taŋ	ᴴtaŋ	²taŋ	ᴴtaŋ	²tõ	²taŋ
hoe	*to:^B/two^B	²to:		²to:	ᴴto	²to	ᴴto	²tu	²to
thread	*trup^B	²ʈup	¹ʈup		ᴴhrup	²hru	²hru	²ru	²tu
ten	*tsjui^B	²tsʸi	²ci	²tsju	ᴴtsju	²tsju	ᴴtʃju	²cju	²tsjy
chin	*kam^B	²kam	²kam		²kʌm-sʌ 'molar' ⟨khotoŋ⟩	²kʌm	²kʌm	²kã:	??²kʌnta
hole	*khuŋ^B	²khuŋ	²khuŋ			²khuŋ	ᴴkhĩ̃ŋ	²khĩ	²hum/huŋ
water	*kjui^B	²kʸi	²ki	²kju	ᴴkju	²kju	ᴴkju	²kju	²kjy
nine	*ku(:)^B	²ku:	²ku	²ku(:)	²ku	²ku	²ku(:)	²ku	²ku
voice	*kat^B	²kat	²ket		ᴴkʌi	ᴴkʌi	²kʌe	¹kae	
siblings	?*t(h)et^B	²thetmai	²thet		ᴴthe	²the	²te	²ti	²the
saliva	?*t(h)au^B	²tho			ᴴtho	ᴴtho	ᴴto	²tu	²tha
eye	*Mi:(ŋ)^B	²mi:	²mi:	²mi:	ᴴmi	²mi	²mi	²mi	²mi
fontanel	*ŋwa^B	²wa			ᴴŋo	²ŋo	ᴴŋo		²ŋo
bird-trap	*ŋ̃wa^B	²wa	²wa		ᴴŋo	²ŋõ	ᴴŋo	²ŋõ	²ŋo
tongue	*Le(:)^B	²le:	²le	²le	ᴴle	²le	ᴴhl(j)e	²le	
face	*Li:^B	²li:	²li:	²li:	ᴴli	²li	²hli	²li	
louse	*ʃjat^B	²ʃjat	{²sjet / ¹sjai}	²ʃje:	ᴴsje	²ʃje	²ʃje	²se	²ʃje

gloss	*TGTM	RISIANGKU	SAHU	TAGLUNG	TUKCHE	MARPHA	SYANG	GHACHOK	MANANG
wife	be^A				^{3}pe	^{3}pe	^{3}pe		^{3}pıɛ
leaf	ba:^{A}	^{3}pa:	^{3}pa:	^{3}pa:	^{3}pa	^{3}pa	^{3}ba	^{3}po	^{3}pa
beer-mash	bap^A	^{3}pap				^{3}po	^{3}po	⟨^{2}pa:⟩	^{3}pe
cowshed	braŋ^A	^{3}praŋ	^{3}praŋ	^{3}praŋ	^{3}praŋ	^{3}praŋ	^{L}praŋ	^{3}prõ	^{3}praŋ
skin	ɖi^A,⟨ɖwi⟩	^{3}ʈi	^{3}ʈi	^{3}ʈi	^{3}ʈi	^{3}ʈi	^{3}ʈi	⟨^{3}ʈubi⟩	^{3}ʈi
nest	dzaŋ^A	^{3}tsaŋ	^{3}caŋ	^{3}tsaŋ	^{3}caŋ	^{3}tsaŋ	^{3}tsaŋ	^{3}cõ	^{3}tsaŋ
point	dzo^A	^{3}tso	^{3}co		^{3}co	^{3}tso	^{L}tso	^{3}co	^{3}tsʌ
lid	gaɣ	^{3}kap	^{3}kap		^{3}kʌp	^{3}ko	^{3}ko	⟨^{2}ka:⟩	^{3}kje
back	go^A	^{3}ko	^{3}ko	^{3}ko	^{3}ko	^{3}ko	^{3}ko	^{3}ko	^{3}ko-^{3}te
hill	gaŋ^A	^{3}kaŋ	^{3}kaŋ	^{3}gaŋ	^{3}kaŋ	^{3}kaŋ	?^{1}kaŋ		^{3}kãn
intestines	gruŋ^A	^{3}kruŋ	^{3}kruŋ			^{3}kum	^{3}kum		
man	mi^A	^{3}mi	^{3}mi:	^{3}mi	^{3}mi	^{3}mi	^{3}mi	^{3}mi	^{3}mi
forehead	nɔ^A	^{3}ŋo	^{3}ŋo	^{3}ŋo	^{3}ŋo	^{3}ŋo	^{3}ŋo	^{3}ŋo	
friend	ro(:)^A	^{3}ro	^{3}ro:	^{3}ro:	^{3}ro	^{3}ro	^{3}ro		

	*TGTM	RISIANGKU	SAHU	TAGLUNG	TUKCHE	MARPHA	SYANG	GHACHOK	MANANG
one	*grik^B	^{4}kik	^{4}ki:	^{4}ki	^{4}ṭi	^{4}kʁi	^{4}gɨ	^{4}gri	^{4}hʁi
wheat	*grwa^{B,A}	^{4}kwa	^{3}wa	^{4}hwa		^{4}ko	^{4}ko		^{4}ʃo
eagle	*grwat^B	^{4}kwat	^{2}wet		^{4}ṭe	⟨^{3}tʃjʌ⟩	⟨^{L}tʃjʌ⟩	^{4}krwe	^{L}hʁʌ
cf.falcon	?				^{H}tha	?1khjʌ	?2khjʌ		?^{3}kjo:pa
lungs	*glwap^{B,A}	^{4}klop			^{4}kjʌw	^{3}ljʌp	^{L}ʃjopʃja	^{3}ɬoba	^{4}khja
place	*gla:^{B,A}	^{4}kla	^{4}kla:	^{4}kla:	^{3}kja	^{4}lja	^{4}lja	^{3}ɬo	^{4}khĩ
snow	*gliŋ^B	^{4}kliŋ	^{4}kliŋ		^{4}kin	^{4}lin	lim	?2ɭi	^{4}khje
work	*gjat^B	^{4}kjat		^{4}ke:	^{4}ke	^{4}kje	^{4}ke	^{4}ke	^{4}khjẽ
road	*gjam^B	^{4}kjam	^{4}kjam	^{4}kjam	^{4}kjʌm	^{4}kjʌm	^{4}kjʌm	^{4}gã:/^{4}gjã:	^{4}hʁʌ
enemy	*gra^B				^{4}tʌ	^{4}tʌ	^{L}ta		
tumpline	*da:^{B}	^{4}ṭa:		^{4}ṭa:	^{4}ṭa	^{4}ṭa	^{4}ḍa	^{L}ṭo	^{4}tha
house	*dim^B	^{4}tim	^{4}tim		^{4}tim	^{4}tin	^{L}dim	^{4}dĩ	^{4}thĩ
strength	*baŋ^B	^{4}paŋ	^{3}paŋcen		^{4}paŋ	^{4}paŋ	^{4}paŋ	^{4}bõ	^{4}phaŋ
load	*dot^B	^{4}tot	^{4}tot	^{4}toi	^{4}te	^{4}te	^{4}tʌe	^{4}ti	
cow	*me^B	^{4}me	^{4}me	^{4}me	^{4}me	^{4}me	^{4}me	^{4}me	^{4}mie
garlic	*no:^{B}	^{4}no	^{4}no:	^{4}no:	^{4}no	^{4}no	^{4}no	^{4}nu/?^{3}nu	^{4}no
thief	*jo^B	^{4}jo:	^{4}jo	^{4}jo	^{4}jo	^{4}jo	^{4}jo	^{4}jo	^{4}jo
gold	*mar^B	^{4}mar	^{4}mar	^{4}mar	^{4}mʌr	^{4}mʌr	^{4}mʌr	^{4}ma:ra	^{4}mar

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