

An investigation of
the tones of Lhasa Tibetan

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Maria Hari

The author of this thesis claims that Lhasa Tibetan has more tonal contrasts than has hitherto generally been recognized. The proposed tonal classification has interesting consequences for the segmental phonology, in particular for the voicing status of initial stops and for some aspects of the phonology of stem compounds. No attempt has been made to adhere strictly to a specific school of phonology; but the presentation of the material has been influenced by classical phonemic, generative, and natural phonology theory. A special effort has been made throughout the study to give a fair amount of phonetic data in support of the analysis proposed.

Chapter 1 deals briefly with the segmental phonology of Lhasa Tibetan. Only the aspects which are especially relevant for the suprasegmental contrasts are highlighted.

Chapter 2 gives a detailed exposition of the suprasegmental contrasts and describes the most important pitch variations and the tonal behavior of stem compounds and suffixes.

Chapter 3 first discusses the phonological representation of tone. The tone system of Lhasa Tibetan does not require multivalued features; the four contrastive tone patterns naturally fall into two intersecting binary features; feature 1 comprises an opposition in voice quality,

and feature 2 an opposition in pitch movement. In this context Lhasa Tibetan is compared with some Tibeto-Burman languages of Nepal which exhibit similar tonal contrasts. Then the status of the morpheme is examined and established as the distributional unit for the tonal contrasts. The chapter also comments on four previous tone analyses of Lhasa Tibetan, and on the pitch movement contrasts in the light of Tibetan orthography.

The main body of the thesis is followed by two appendices: (1) vowel height approximation, and (2) classified vocabulary.

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In presenting data in this study I have used the following conventions to indicate different levels of representation:

Phonological representations are enclosed in solidi: /'naku/. Any representations which give more details about the phonetic surface realization than the phonological representation are enclosed in square brackets: [nəgu]. This means that data in square brackets will represent transcriptions of varying degrees of 'narrowness'--the degree varying according to the demands of the problem under discussion. (The remarks introducing the example sets comment on this where necessary).

The phonetic symbols are those of the International Phonetic Association as interpreted and expanded by the linguistics department of the University of Edinburgh. The following remarks concern symbols and interpretations of particular importance for this study.

- [a] represents the unrounded low central vowel. (It is not the very fronted sound of Daniel Jones' cardinal vowels).
- [ə] unrounded half-close central vowel
- [ɜ] unrounded half-open central vowel
- [ɚ] rounded high central vowel
- [ɞ] rounded half-close central vowel

- [e̤] A double quote under a vowel symbolizes breathy voice quality. (For the definition of breathy voice see section 2.1.).
- ⊥ This diacritic is used to indicate raising of vowels, while τ is used for lowering, e.g. [e̤]--[e̤τ].
- [se.ʔ̣τ̣] A second lowering sign under the length dot means that the vowel height is further lowered. If the vowel height is relatively constant throughout the vowel duration only one diacritic appears.
- + The plus symbol is used for advanced and the minus symbol for retracted consonants and vowels, e.g. [k₊] vs [k₋], or [a₊] vs [a₋].
- [β̥] A hook under a consonant indicates incomplete closure of the articulators and frictionlessness for fricatives.
- [b̥] The devoicing symbol under or above voiced consonants indicates that these sounds are either very weakly voiced or voiceless with lenis articulation.
- [g̥] unreleased glottal stop
- [ʔ̣] glottal constriction (also called laryngealization); this feature is described in section 1.1.4.

For the phonetic representation of pitch, lines are used which sketch the course of the pitch height of the words. Such pitch profile sketches usually appear after the segmental representation of the word, but occasionally also above or below, e.g. /'naku/ [nə̄gṽ| ̄] or [nə̄gṽ] 'nose'. For the abstract symbolization of the contrastive pitch contours in phonological representations see section 2.2.1., table 3.

List of abbreviations

adj.	adjective
f	feminine
h	honorific word*
imp.	imperative form
l	locative
lit.	literary form (Though this study is mainly concerned with the colloquially spoken language, occasionally a literary form has been included to illustrate a certain contrast.)
m	masculine
n	noun
nu	numeral
pl	plural
poss.	possessive
p.p.	past participle of verbs
pr	pronoun
qw	question word
sg	singular
s.o.	someone
s.th.	something
t	temporal
v(itr)	intransitive verb
v(tr)	transitive verb

*Footnote see next page.

List of abbreviations cont.

v. h. appr. vowel height approximation

A comma between English glosses means that the glosses are synonyms (coextensive in sense).

A slash between English glosses means that the LT entry has two unrelated meanings (homophones in LT).

A slash between two Tibetan entries means that these are variant forms.

* Lhasa Tibetan has several levels in its hierarchy of honorific speech. In this study the vocabulary of any level above the ordinary one has been marked 'honorific' without distinguishing between different levels. For a number of the most common words the language has different morphemes, e.g.:

ordinary	honorific	meaning
/'kaŋpa/	/'ɕəhp/	'leg, foot'
/lahkpa/	/'tɕhak/	'hand, arm'
/'khjɔ̃ra/	/kheraŋ/	'you, sg'
/'ŋjɔ̃h/	/sih?/	'buy, v'

But in many cases honorific terms can also be formed by compounding a honorific term with an ordinary one, e.g.:

/'ŋjuku/	/'tɕhak-'ŋjuk/	'pen'
/ku/		'statue'
/'suhkpu/	/ku-'suhk/	'body, figure'
/tshe/	/ku-tshe/	'life'
/'kha/	/'ɕəh/	'mouth'
/'tshe/	/'ɕəh-'tshe/	'vegetables'

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Introduction

"There is a great diversity in statements on Tibetan tones. This is not the healthy diversity of differing interpretations." Such is the judgement of Shefts-Chang (1968a:49) on the present state of studies of the Tibetan tone system. She goes on to explain that the different studies of the past have had different goals; but she feels that discrepancies are nevertheless apparent, and she concludes: "Even granting such differences in goals, there should be a common ground of phonetic observation. It is not there."

Recent investigation of the Tibetan phonology has convinced me that this judgement is not unjustified. It seems that some subtleties of the Tibetan tone contrasts have gone largely unnoticed so far, and that the neglect of these contrasts has led to unnecessary complications on the segmental level of phonological descriptions.

One aim of this study, then, is to present my contribution to the study of phonetic details of Lhasa Tibetan¹ tones. (Whether it will be accepted as "common ground of phonetic observation" is of course a different issue!)

¹Previous scholars have pointed out that the dialectal differences within Tibetan are quite wide (e.g. Miller, 1955a). For the purpose of this study I have limited myself to the description of the tone system of Lhasa Tibetan. This designation is generally used for the speech of the upper class people of Lhasa. It seems to be the most prestigious and most widely understood dialect of Tibetan. I am confident that other Tibetan dialects will exhibit similar tone systems.

The main informant, upon whose speech this study is based, has been Mrs Tashi Kyi. (təʃi ki, amtʃok-'tshan). Her credentials as an informant for Lhasa Tibetan are the following: she is a Tibetan refugee who married the son of a Lhasa business family, and together with her husband she settled in Kathmandu, Nepal. She had lived in an extended family set-up which included her mother-in-law and several other members of her in-laws' family for seven years before the investigation for this study was undertaken. This environment ensured the constant use of her mother tongue. Further, Tibetan refugees in Kathmandu make efforts to retain their cultural identity and social cohesion. They form ' 'ki?-'tuhk ' associations, which are groups of families who commit themselves to help each other out in times of need, and they socialize intensely within these groups.

It is mainly this present set up which should have enabled Tashi Kyi to be a reliable informant for Lhasa Tibetan. Her life story would not necessarily make her an ideal informant. Her father originally had a farm in Eastern Tibet (Amdo-Khamba district). He was also a business man, and

Further I want to contribute to the understanding of the nature and the systematic organization of the segmental and suprasegmental phenomena in the phonology of Lhasa Tibetan.

One question which concerns the systematic organization of the suprasegmental phenomena needs to be thrown up right at the outset of this study. It is the following: What is the relevant domain for contrastive pitch patterns in Lhasa Tibetan? Is it the syllable, the morpheme, the word, or the phonological phrase? As far as I am aware this question has not been discussed in any detail in the literature. Most studies simply assume that Tibetan is a syllable tone language (cf. Roerich, 1957:23; Richter, 1964:45; Sedláček, 1961; Chang and Shefts, 1964:1). One lone exception to this general assumption is the thesis put forward by Sprigg, who represents Lhasa Tibetan as a word tone language (Sprigg, 1955:134; 1968/69:38, 43). These two hypotheses are almost opposite on the scale of possibilities, and it is quite

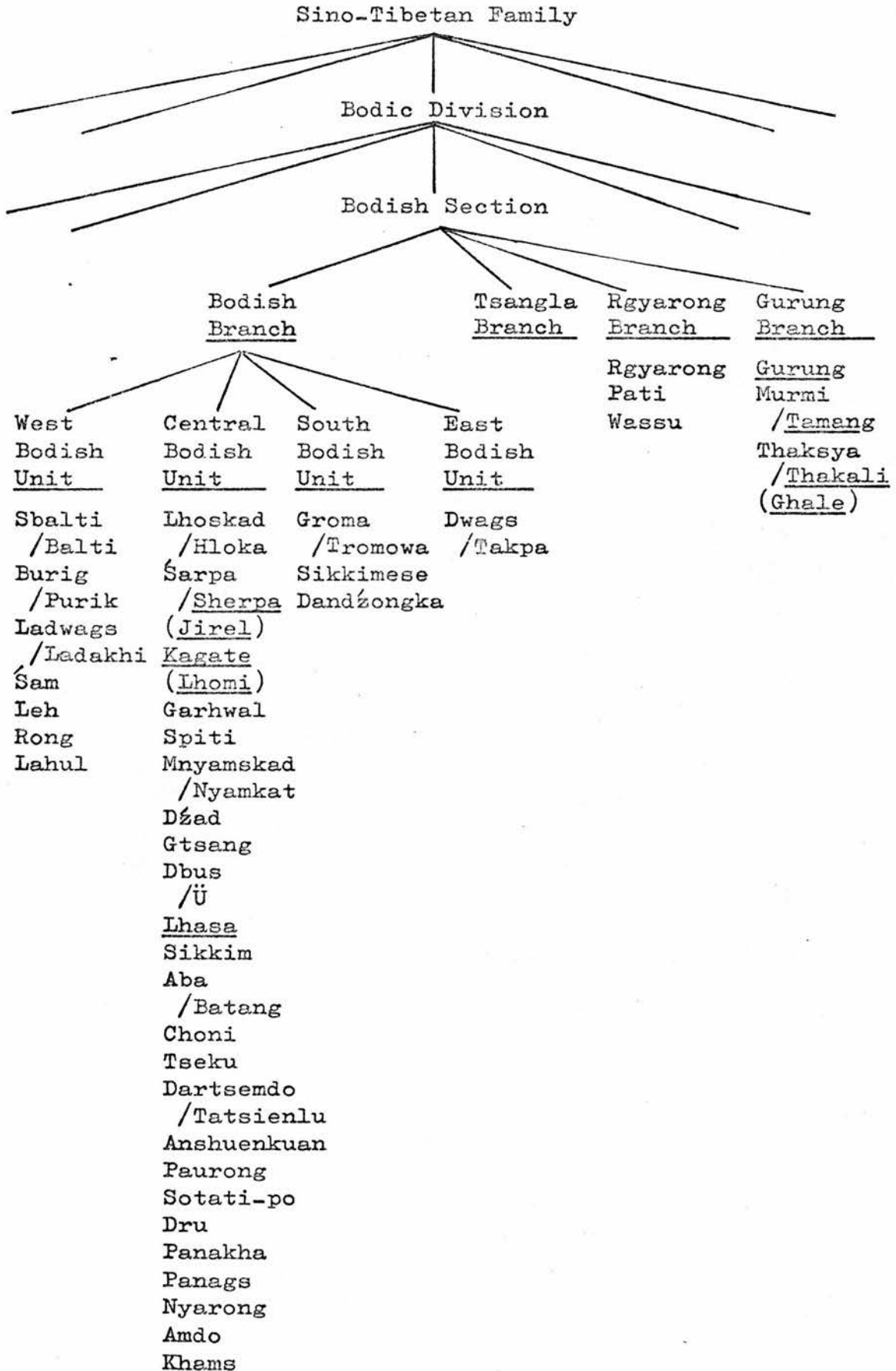
Footnote 1 cont.

the family moved to Lhasa when Tashi was still a little girl. In 1959 the family fled to India, and they stayed in refugee camps, first in Kalimpong and then in Maisur. When Tashi was about 17 she had the opportunity to go to Europe. Together with 42 other Tibetan girls she was educated in a home in the Swedish countryside. She stayed abroad for about five years and got secretarial training. Her good command of English was a great help in the investigation and I have relied heavily on her judgement in determining the meaning of words.

surprising that they have been able to coexist unchallenged so far. In the following exposition I will challenge both of them. I will argue that in Lhasa Tibetan it is neither the syllable nor the word which is the relevant domain for contrastive pitch patterns. I hope to present convincing evidence that the relevant unit for these suprasegmental contrasts is the morpheme; and we will see that with this Lhasa Tibetan falls into line with several other Tibeto-Burman languages, notably with those of the Bodish Section² of Nepal.

²The term Bodish Section is taken from Shafer's classification of the Sino-Tibetan family (Shafer, 1966). This has proved to be quite accurate in regard to the various Tibeto-Burman languages in Nepal. Shafer's subdivisions of the Bodish Section are given in the table on the following page. A slash between two names indicates alternative names for a given language. Names in round brackets do not appear in Shafer but have been added by me on the basis of the findings of members of the Summer Institute of Linguistics in Nepal. Languages which have been investigated or are under investigation by the Summer Institute of Linguistics are underlined since I will refer to them occasionally in this study.

For a comparison of Shafer's classification with other classifications see Hale(1973. Part IV: 2-11).



No attempt has been made in this study to adhere strictly to a specific phonological school. In my development as a linguist I first became acquainted with the classical phonemic approach, and I haven't denied this heritage; but the present analysis of Lhasa Tibetan has also been influenced by the theory of generative phonology. This will be apparent throughout the study, and occasionally attention will be drawn to the advantages of a generative approach over a classical phonemic one.

In referring to the less redundant transcription of the data than the phonetic one, the term phonological representation will be used, and the units of this representation will be called phonemes. Phonemic will be opposed to phonetic in referring to the different levels of representation. The use of the term 'phonemic', however, does not imply that the phonological representation is to be equated with a phonemic transcription as defined in classical phonemic terms. Though on the whole not drastically different, the phonological representations of this study are in some instances more abstract than classical phonemic principles would allow. The issue of plausible abstractness for underlying representations crops up several times. For example, the investigation of vowel height approximation (cf. appendix 1) has convinced me that a certain degree of abstractness is indispensable in order to reach a plausible solution. The discussions of the glottal feature complex (cf. section 1.1.4.) and of the secondary vowels (cf. section 1.3.4.),

on the other hand, show that an extreme degree of abstractness leads to linguistically counterintuitive solutions. In such cases the more concrete interpretations have been favored. The issue of abstractness is also discussed extensively in my comments on Kjellin's analysis of Tibetan tones (cf. section 3.3.d).

This study has also benefited from the contributions of natural phonologists to linguistic theory, especially from their efforts to make a case for the syllable in phonological theory, (e.g. Hooper, 1972; Vennemann, 1972). Essentially I agree with the basic assumption of natural phonology that phonological representations should be natural (e.g. Bruck et al., 1974: introduction) but would not necessarily subscribe to all the constraints which have been proposed so far.

This study is organized as follows: Chapter one, in order to give some background for the discussion of the tone system, deals with some aspects of the segmental phonology. The other two chapters are devoted to the tones of Lhasa Tibetan. Chapter two describes the suprasegmental system in detail, and chapter three discusses various matters related to the proposed tone analysis.

In order to set the scene for a discussion of the suprasegmental features it is necessary to give a short overview of the segmental phonology and syllable structure of the language. This is the object of the first chapter of this study. The consonants and vowels of Lhasa Tibetan have been described quite extensively, and my observations are mostly in accordance with the earlier studies. (Cf. references for Tibetan). Therefore I will highlight here only those aspects of the segmental phonology which are especially relevant for the suprasegmental system. Further, I will also point out the areas where I diverge from other analyses.

1.1. Phonological consonants

Lhasa Tibetan (henceforth abbreviated as LT) has twenty-four consonant phonemes. They are presented in table 1 on the following page.

The aspects of the consonant system which need to be discussed in some detail are the following: palatal nasal and stops; retroflex stops; intervocalic /w/ and /p/; and the glottal stop. Each aspect is taken up separately in the following four subsections.

	labial	dental	dento- alveolar	post-alveolar		velar	glottal
				retroflex	laminal		
<u>stops and affricates</u> unspirated aspirated <u>fricatives</u> obstruents	p	t	ts	tʃ	tʃ	k	ʔ
	ph	th	tsh	tʃh	tʃh	kh	
			s		ʃ		h
<u>nasals</u> <u>liquids</u> voiced voiceless sonorants <u>glides</u>	m	n				ŋ	
		l	r				
	w	l̥			j		

Table 1: Consonant phonemes

1.1.1. Palatal nasal and stops

Tibetan specialists will notice that the palatal nasal [ɲ], and the palatal stops [c] and [c^h], which in most descriptions of the Tibetan consonant system are listed as contrastive entities, do not appear in table 1. This is because I regard them as allophones of their velar counterparts. This interpretation can be justified by the restricted distribution of the palatal/velar contrast; it does not occur before the primary front vowels /i/ and /e/. (For a discussion of the terms 'primary' and 'secondary' vowels cf. section 1.2.5.). Before these two vowels only advanced velar consonants occur phonetically, and therefore they can be interpreted as allophones of the velars. Before the remaining vowels (/u o a y ø ε/) we do observe contrast between velar and palatal articulation on the phonetic surface. The palatal articulation, however, has a distinct palatal off-glide, which makes it plausible to interpret it as a sequence of velar stop plus palatal glide. The alternative interpretation with a velar and a palatal series of stops involves three additional phonemes and a statement of restricted distribution for velars. As far as the rule complexity for the derivation of low level phonetic details is concerned the two solutions seem to be about equally complex. For the first interpretation, which postulates a velar series only, we need to state the following details (illustrated with /k/ only, but equally applicable to /kh/ and /ŋ/):

/k/ → [c] / — /j/
 → [c] or [cj] / — /i/
 → [c̲] or [cj] / — /e/
 → [k₊] / — /y ø ε/

For the second interpretation, which postulates a velar and a palatal series, the following details need to be stated:

/k/ → [k₊] / — /y ø ε/
 /c/ → [c] or [cj] / — /i/
 → [c̲] or [cj] / — /e/
 → [cj] / — /a u o y ø ε/

At this point both solutions seem to be about equally justifiable: With the first interpretation the phonemic inventory is reduced by three phonemes and the distribution of velar stops is not restricted, but it results in a more complex statement for syllable structure. With the second interpretation we have three more phonemes and restricted distribution for velars, but a less complex statement for syllable structure. I cannot quite see, at this point, what kind of evidence would be needed to prove that one solution is truer than the other. The main reason for choosing the first one for this study is that it is easier to handle typographically.

Example set (1) illustrates the extreme fronting of velars before primary front vowels.

(1)

/'kip/ ³	[ci·ʔ¹/cji·ʔ¹]	be happy, prosperous
/keʔ/	[c _{ɛ̄} ·ʔ¹/cj _{ɛ̄} ·ʔ¹]	neck, n
/khi/	[c ^h i / c ^h ji]	dog
/'khe/	[c _{ɛ̄} ^h ·ʔ¹ / c _{ɛ̄} ^h ji]	profit, n
/ŋiʔ/	[ŋi·ʔ¹ / ŋji·ʔ¹]	sleep, n
/ŋeʔ/	[ŋ _{ɛ̄} ·ʔ¹ / ŋ _{ɛ̄} ji·ʔ¹]	find, v

While the contrast between velar and palatal articulation before non-front vowels is readily perceived it is less so before secondary front vowels because velars are also somewhat fronted before these. Examples for contrast before secondary front vowels are given in sets (2) - (4). Further, each subset contains an example with palatal articulation before the corresponding non-front vowel; non-front vowels are fronted after glides with the result that the distinction between front and non-front vowels is quite subtle in this environment.

(2)

/'kjuhʔ/	[ʃj _ɥ ·ʔ¹]	knowledge
/'kyhʔ/	[ʃ _ɥ ·ʔ¹]	courtesy
/'kjuh ^h k/	[ʃj _ɥ ^h ·ʔ¹ / ʃj _ɥ ^h k¹]	run, v

³For the details of interpretation of phonological representations and phonetic transcriptions see 'Transcription conventions and abbreviations'. They are placed before the introduction to this study.

(3)

/kɔʔ/	[kɔ.ʔ ⁺]	install, establish, v
/kjɔʔ/	[kjɔ.ʔ ⁺]	escort, v
/kjok/	[cjɔ.ʔ ⁺ /cjɔk ¹]	limp, v
/'njɔh/	[njɔ _h .ʔ ⁺]	buy, v
/nɔʔ/	[nɔ.ʔ ⁺]	fry, v
/'njɔʔ/	[njɔ.ʔ ⁺]	become mad

(4)

/keh/	[ŋge:] ₊ ₊	bathe, wade through water
/'kje/	[jje:] ₊ ₊	become advanced
/'kja/	[jja] ₊ ₊	beard / one hundred
/khe/	[k ^h e:] ₊ ₊	load, n
/khjeʔ/	[chje.ʔ ⁺]	difference, n
/khjak/	[chja.ʔ ⁺ /chjak ¹]	be cold, freeze

At this point a short comparison with other languages from the Bodish Section⁴ may be useful. Thakali, Western Tamang, Gurung, Kagate, for example, are like LT with respect to the distribution of palatal and velar consonants: no contrast is found before unrounded front vowels /i/ and /e/. Parallel restrictions hold for the distribution of dento-alveolar and post-alveolar sibilants and affricates in the languages enumerated above. But LT has had a different development regarding the sibilants and affricates.

⁴For the details of classification see footnote 2 in the introduction and footnotes 6 - 10 in this chapter.

Dento-alveolar and post-alveolar sibilants and affricates. In LT the distribution of sibilants and affricates is not restricted by the following vowels. Dento-alveolar and post-alveolar sibilants and affricates contrast before all vowels and must therefore be regarded as separate phonemes. The examples in sets (5) - (7) illustrate the contrasts before all vowels.

(5) Sibilants

/si?/	politics	/sihŋ-tuh?/	fighting, n
/'ɸik/	louse	/ɸihŋka/	field
/'seh?/	hold out	/'seka/	crack, n
/'ɸeh?/	be afraid	/ɸeeko/	mirror, n
/sy?/	churn, v	/'sɸ?/	feed / worship, v
/ɸy?/	peel, v	/'ɸɸ?/	throw out (e.g. liquids)
/so/	tooth	/soŋ/	say, h
/ɸo/	dice, n	/ɸoŋ/	cry, v, h
/'sahk/	drop, v		
/'ɸahk/	put /split (itr)		

(6) Unaspirated affricates

/'tsi/	paint, n	/'tse/	peak, n
/tɸik/	one	/tɸe?/	tongue
/tseh?pu/	beautiful	/tsak/	pile up, sift
/tɸeh?/	measure, v	/tɸak/	iron, n

(6) cont.

/ 't s o m /	poem	/ t s u k /	plant, v
/ 't s o m /	rob, v	/ t s u k /	let, allow, v
/ t s p ? /	cook, v	/ t s y h ? /	enter
/ t s p ? /	keep, v	/ t s y h /	hold fast, v

(7) Aspirated affricates

/ t s h i k /	burn, v	/ t s h e /	life
/ t s h i /	wipe	/ t s h e /	open, v
/ ' t s h o r /	feel (by touch)	/ ' t s h u /	vinegar
/ ' t s h o m /	jump, v	/ t s h u /	water, n
/ t s h e ? /	limit, n	/ ' t s h a m /	meditation
/ t s h e ? /	clothing	/ ' t s h a m /	religious dance
/ t s h o n /	colour, n	/ ' t s h y /	be admitted
/ ' t s h p ? /	religion	/ ' t s h y h ? /	idea

1.1.2. Retroflex stops

Unlike palatal stops, retroflex stops traditionally do not occur in phoneme inventories of Tibetan. They are usually interpreted as a sequence of dental stop and /r/. Historically they do of course derive from various stops clustering with /r/, but the historical evolution of the language shows progressive elimination of syllable initial consonant clusters. This process seems to have reached almost the summit in the modern language, where no other initial consonant clusters than the velars followed by the high front glide /j/ are tolerated (cf. section 1.3.4.). Thus this characteristic tendency for initial cluster simplification suggests that retroflex stops have now become single units.⁵

In other languages of the Bodish Section various combinations of stops with liquids are still preserved. As examples I would like to refer to five languages of the Bodish Section in Nepal.

Gurung⁶ (Glover, 1969:43) preserves the following syllable initial clusters involving stops and liquids (combinations involving the glides /j/ and /w/ are not included):

⁵If the drive towards syllable initial cluster simplification were used as evidence for the contrastive status of the palatal consonants, there would remain no syllable initial consonant clusters in the language.

⁶See next page.

pr phr br mr kr khr gr nr

pl phl bl ml kl

Western Tamang⁷ (Taylor, 1969:34) has preserved:

pr phr kr khr mr

pl phl kl khl

Thakali⁸ (Hari, 1969:32) has preserved:

pr phr mr

pl phl ml and rarely tr

Jirel⁹ (Strahm and Maibaum, 1971:59) shows only three combinations , and all three are rare:

pr phr gr

⁶The Gurungs are one of the largest tribal groups of Nepal (approximately 150 000 speakers). The highest concentration of Gurung communities is found in the central hill region (west of Kathmandu).

⁷The total number of Tamang speakers in Nepal is round 500 000. They are located in the hills all around Kathmandu. There seem to be several quite distinct dialects of Tamang. The Western Dialect which I refer to here has been investigated in a Tamang village near Trisuli (north-west of Kathmandu).

⁸The Thakali region lies in Nepal in the northern part of the Dhaulagiri zone along the upper Kali-Gandaki river. The Thakali speakers number about 3 - 5 000.

⁹Jirel is spoken in the Jiri and Sikri valley of the Dolkha District in the hills east of Kathmandu. There are some 3 000 Jirel speakers.

Kagate¹⁰ (Hoehlig and Hari, 1976:53) also preserves only three combinations, but they occur quite frequently:

pr phr br

It is interesting to see that these five languages all have retroflex stop phonemes which contrast with the cluster combinations. LT, however, has not preserved any such syllable initial clustering, and this strongly supports the single unit interpretation.

As far as the phonetic realization is concerned I have observed that in the pronunciation of older people retroflex stops still are released with a short period of central friction (which sounds r-like), but this is not the case in the pronunciation of younger speakers, notably my main informant.

1.1.3. Intervocalic /w/ and /p/

Word initially there is a clear contrast between /w/ and /p/. Evidence for this is given in example set (8) below.

(8)

/wəŋ/	[w ₊ ʌŋ]	power, n
/pəŋ/	[pɜŋ]	flat piece of ground
/wəhmʉ/	[w ₊ ɝm ₊ ɥ]	fox
/pəhŋkoʔ/	[b _o ɜŋg _o ʔ ₊]	chest (body part)

¹⁰Kagate is the language spoken by a small minority group located in the higher hills north of Ramechap (Nepal, East No. 2).

But the identification of intervocalic /w/ and /p/ presents a particular problem. On the phonetic surface these phonemes can both be realized as a bilabial fricative with open approximation in the intervocalic position: [β]. If this sound occurs adjacent to a rounded vowel it will show some lip rounding, but not otherwise. (Cf. example set 9).

(9)

[ⁿ d _β β [^]]	archer	(/tahpa/)
[d _β β [^]]	month	(/'tahwa/)
[t _β β [^]]	horse man	(/tapa/)
[k _β β [^]]	pillar	(/kawa/)
[p ^h o _β β [^]]	wooden cup	(/'phopa/)
[t ^h o _β β [^]]	hammer, n	(/'thowa/)
[t ^h o _β β [^]]	taste, n	(/'t ^h ohpa/)
[t ^h o _β β [^]]	smoke, n	(/thohwa/)

(10)

	contraction	hardening	
/tahpa/	---	[ⁿ d _β β [^]]	archer
/'tahwa/	[d _β β [^]]	---	month
/tapa/	---	[t _β β [^]]	horse man
/kawa/	[ka:]	---	pillar
/'phopa/	---	[p ^h o _β β [^]]	wooden cup
/'thowa/	[t ^h o:]	---	hammer, n
/'t ^h ohpa/	---	[t ^h o _β β [^]]	taste, n
/thohwa/	[t ^h o:]	---	smoke, n

The recorded pronunciation of the examples in set (9) is representative of a fairly fast but explicit style of speech. Since we find that both phonemes can be realized phonetically identically we must raise the question whether they do in fact contrast in this environment. If we limited our investigation to this particular style of speech we would have a case of complete overlap of allophones in this position, and to postulate an underlying contrast would not be justified. That these two phonemes do contrast also in this position becomes evident only through close observation of different speech styles. The examination of various speech tempos shows that the intervocalic occurrences of $[\beta]$ have diverging variation potential. This is illustrated in example set (10) which contains the same words as example set (9). Contraction occurs in a faster and less explicit style of speech than the one recorded in set (9); but only some $[V\beta\Lambda]$ sequences are susceptible to it. Hardening of $[\beta]$ occurs in a slower and more explicit style of speech than the one recorded in set (9), and we find that just those words which do not undergo contraction in the less explicit style respond to hardening. Thus hardening and contraction are in complementary distribution, and though there is partial overlap between intervocalic /w/ and /p/ on the phonetic surface, the underlying identity of $[\beta]$ can be established through the observation of the divergent variation potential in different styles of speech. To sum it up,

we may say that on the one hand, in less explicit speech underlying /Vwa/ sequences¹¹ respond to contraction while underlying /Vpa/ sequences do not. On the other hand, in more explicit speech underlying /Vpa/ sequences respond to hardening while underlying /Vwa/ sequences do not. Therefore the underlying identity of the phoneme can be identified by the different variation potential despite of the fact that in the most commonly used style of speech there is a complete overlap of allophones.

1.1.4. The glottal stop

The glottal stop does not generally appear in consonant phoneme inventories of LT. Proposing it as a phonemic element therefore requires some justification. The phenomenon involves a whole complex of phonetic features and exhibits a remarkable (and sometimes vexing) flexibility in phonetic realization.

Phonetic manifestations. In order to discuss the phonemic status of the glottal stop it is necessary to expose the phonetic manifestations of the feature complex in some detail in the various environments it occurs in. At the

¹¹The discussion is limited to sequences ending in /a/ because the distribution of vowels after /w/ is severely restricted: /a/ is the only vowel which can be observed after this phoneme in any position. Therefore /Vwa/ sequences are always compared with /Vpa/ sequences.

same time care will be taken to demonstrate that the feature contrasts with zero. This is necessary because its presence has often been overlooked by previous investigators.

The first environment to consider is the final margin of monosyllabic morphemes with primary vowels.¹² In this position the variation potential is most striking; we find that final unreleased glottal stop [ʔ̚] normally varies with final unreleased velar stops on the one hand, and with a sharp fall in pitch entailing some extra length on the preceding vowels on the other hand. Variants with final [k̚] are characteristic for an overdistinguished style of speech, while the other two variants occur in more relaxed and faster speech. Here [̃ʔ̚] is generally observed before pauses (of varying length) and the mere pitch fall in other positions. We also note that morphemes with nonfront primary vowels /a, u, o/ have a variant with final [k̚] almost without exception; but among those with primary front vowels /i, e/ only some have such a variant, while others never occur with final [k̚]. (Further possible implications for this observation are discussed in section 1.3.4.).

Illustrations of the variations described above and

¹²For the discussion of the segments it will be frequently necessary to refer to primary and secondary vowels; /i, e, a, u, o/ are the primary, and /ɛ, y, ø/ the secondary ones. A justification for this dichotomy is given in section 1.2.5.

evidence for contrast with final zero (morphemes ending in V) are given in set (11). Since the appearance of the glottal stop modifies the pitch profiles of syllables the phonetic examples are given with superimposed pitch profile sketches in this section.

(11)

/'tshik/	[tshik ¹ / tshik ¹ ? / tshik ¹]	joint, n
/'tsi/	[tsi]	paint, n
/tpek/	[tpek ¹ / tpek ¹ ? / tpek ¹]	tongue
/pe/	[pē]	proverb
/thuk/	[thuk ¹ / thuk ¹ ? / thuk ¹]	mind, n, h
/thu/	[thū]	curse, n
/rohk/	[rohk ¹ / rohk ¹ ? / rohk ¹]	help, n
/roh/	[ro]	corpse
/'thahk/	[thahk ¹ / thahk ¹ ? / thahk ¹]	rock, n
/'tah/	[dā]	enemy

The second environment to consider is the final margin of monosyllabic morphemes with secondary vowels. Here the variation potential is more restricted. Final unreleased glottal stop fluctuates with the pitch fall exponent, but variation with an oral stop cannot be observed in any style of speech. Illustrations for these variations and

evidence for contrast with final zero are given in set (12). Morphemes with primary front vowels which do not exhibit variation with velar stop are also included in this set.

(12)

/phy/	[p ^h ȳ:]	offer, v
/phy?/	[p ^h ȳʔ ¹ /p ^h ȳ [·]]	a little food offering
/lyh/	[l _u ȳ:]	body
/lyh?/	[l _u ȳʔ ¹ /l _u ȳ [·]]	fertilizer
/mɸ/	[m̄ɸ:]	admire
/mɸ?/	[m̄ɸʔ ¹ /m̄ɸ [·]]	plough, v
/tɸeh/	[ⁿ dɸe:]	visit, v
/tɸeh?/	[ⁿ dɸeʔ ¹ / ⁿ dɸe [·]]	measure, v
/'tʰih/	[t ^h i:]	ask
/'tʰih?/	[t ^h iʔ ¹ /t ^h i [·]]	write
/pe/	[p̄e]	proverb
/ke?/	[c _ɪ ɸʔ ¹ /c̄ _ɪ ɸ [·]]	neck, n

The third environment to consider is the final margin of disyllabic morphemes. Here too, we find that final [ʔ¹] contrasts with zero, and the variation potential is as follows: [ʔ¹] occurs in more explicit speech and varies with the pitch fall exponent in faster speech. Variation

with oral stops is normally not observed. This is somewhat surprising since disyllabic morphemes have only primary vowels in second syllables and we have seen that for monosyllabic morphemes variation with [kʰ] is very frequent after primary vowels. We could therefore expect to find it after the primary vowels here too. The reason why this is not the case is followed up in sections 1.3.2. and 1.3.4.

(So as not to interrupt the exposition here, the conclusion is given there; it does not significantly affect the argument for the interpretation of the feature complex.)

Examples for contrast and variation in the third environment are given in set (13).

(13)

/thama/	[tʰā ₁ mā ₁]	end, n
/thama?/	[tʰāmāʔ ₁ /tʰāmā ₁]	cigarette
/'kjahkpa/	[ʃjæ ₁ kpa ₁]	fat person
/'kjahkpa?/	[ʃjæ ₁ kpa ₁ ʔ ₁ /ʃjæ ₁ kpa ₁]	stick, n
/'ɸihmi/	[ɸim ₁ t ₁]	cat
/'tihmi?/	[d ₁ im ₁ t ₁ ʔ ₁ /d ₁ im ₁ t ₁]	key
/ɸee ₁ ko/	[ɸe ₁ t ₁ ʔ ₁ g ₁ o ₁]	mirror, n
/ruko?/	[ɹ ₁ u ₁ g ₁ o ₁ ʔ ₁ /ɹ ₁ u ₁ g ₁ o ₁]	bone
/'mehle/	[m ₁ e ₁ l ₁ e ₁]	chin
/ɸohke?/	[ɸo ₁ g ₁ e ₁ ʔ ₁ /ɸo ₁ g ₁ e ₁]	morning

(13) cont.

/ɸuku/	[ɸ̄ḡḡ̄]	paper
/'tshilu?/	[tsh̄ilūʔ' / tsh̄ilūʔ]	white fat on meat

The forth environment to consider is the medial consonant margin of disyllabic morphemes and of derived disyllabic words. (This excludes stem compounds). On a more superficial level of observation the feature complex under discussion seems to have quite a restricted distribution; it is generally first observed word finally and word medially before suffixes with pitch contour 4. (For the pitch classification of suffixes cf. section 2.5.1. Further, the reason for the fact that the feature is more easily observed before suffixes with pitch contour 4 is discussed in sections 2.3.3., and 2.5.1.). Careful listening, however, reveals that it also occurs medially in disyllabic morphemes and in derived disyllabic words before all suffix categories, notably also before assimilating suffixes. That is, a final glottal stop of a monosyllabic morpheme is retained if this morpheme becomes the first element of a derived disyllabic word. (This needs to be stressed because most other descriptions of LT I am aware of give the impression that the feature is deleted in this environment). The phonetic realization of medial glottal stop takes the form of glottal constriction. Auditorily it can be discriminated by the following signals: The articulation of the preceding vowel sounds somewhat constricted and we observe a

slight dip in pitch at the end of the vowel duration. There is normally no extra length. The glottal constriction seems to set in early during the vowel articulation and there may be a very brief period of voicelessness before the following segment. Nonconstricted vowels in comparable environments show an evenly flowing, unbroken pitch course, they sound 'lighter', and may end in a very brief period of voiced breath.

Lindqvist (1969:28) reports that physiologically the glottal stop gesture, in addition to the glottal closure, normally involves a constriction "... at a level above the true vocal folds... (it) is made between the tubercle of the epiglottis, the cuneiform cartilages, and the arytenoid cartilages ... Besides the use of the aryepiglottic sphincter EMG measurements have shown that all adductor muscles are active during a glottal stop." I assume that the production of the glottal stop in LT involves similar mechanisms. Further we can assume that what I have termed glottal constriction also involves some degree of constriction above the true vocal folds. The initial gesture is the same as for glottal stop, but it is abandoned before a complete closure is reached at any point. Lindqvist comments on this possibility as follows: "The mechanism associated with the glottal stop gesture can of course be invoked to different degrees and we will therefore call this gesture 'laryngealization' and the extreme position 'glottal stop'."

(1969:28). He also points out that some authors refer to laryngealization as 'upper larynx constriction'. It is very likely then, that the glottal constriction of LT involves upper larynx constriction, just as glottal stop also involves constriction above the true vocal folds. The sharp pitch fall which precedes the glottal stop, and the slight dip in pitch which accompanies glottal constriction find a natural physiological explanation. Lindqvist observes: "From a mechanical point of view it is very likely that the aryepiglottic muscles which are active in laryngealization will bring about a shortening of the vocal folds." (1969:29). Thus, with the shortening (and thickening) of the vocal folds the fundamental frequency drops. Lindqvist reports that a rapid pitch drop is generally observed before glottal stops. As an example he cites the glottal stop (st/d) of Danish.

A last quote from Lindqvist further throws light on the nature of glottal constriction in LT. He observes: "Since the laryngealization gesture is used also for protection [of the trachea] it can be quite fast." (1969:29). During the investigation of the feature I have repeatedly been baffled by the rapidity with which LT speakers execute medial glottal constriction without imposing any extra length on the affected vowel.

Example set (14) illustrates the contrast between medially constricted and nonconstricted vowels in disyllabic

morphemes. In example set (15) the same contrast is further illustrated with the inclusion of derived words. The derived items of this set are all formed with a suffix of the assimilating category. Because of the nature of the suffix these words are tonally not distinct from disyllabic morphemes, and this allows us to contrast the two types of words with each other; the medial glottal has the same manifestation before assimilating suffixes as morpheme medially. In order to clarify some details of the phonetic transcriptions of these examples I should further point out that medial glottal constriction has certain effects upon the surrounding segments which may help in the perception of the feature. Regarding vowel height approximation, glottal constriction tends to partially block the approximation of a preceding vowel. This means that in an approximating environment nonconstricted vowels tend to be slightly higher than constricted ones (cf. appendix 1.1.d). Regarding stop variation, we observe that stops which are preceded by glottal constriction tend to be articulated with less voicing than truly intervocalic stops. The difference is not very noticeable nor is it maintained very consistently except perhaps for /t/ and /t̚/. Overlooking glottal constriction in this environment might lead to /t/ : /d/ and /t̚/ : /d/ contrasts. (See also section 1.1.5.--Notes to table 2).

(14)

/kowa/	[k _w oβ _w 1--]	animals'skin, leather
/tɕo?wa/	[tɕo?β _w 1--]	dung
/pemu/	[pemu 1--]	knee
/tɕe?mu/	[tɕe?mu 1--]	peas (without pods)
/'tɕhoto/	[tɕ'ɛdo 1--]	lip
/a?ton/	[a?tõ: 1--]	yawn, n
/thohwa/	[th _w oβ _w 1--]	smoke, n
/joh?wa/	[j _w oβ _w 1--]	handle, n
/'phopa/	[ph _w oβ _w 1--]	wooden cup
/'pho?wa/	[ph _w o?β _w 1--]	a certain spot above the stomach (body part)

(15)

/'keh-mu"	[g _w em _w 1--]	old woman
/'keh?-mu"	[g _w e?m _w 1--]	laughter
/kɕ?-pa"/	[kɕ?b _w a 1--]	command, n
/thɕpa/	[th _w ɕb _w a 1--]	forehead
/'ɕuhku/	[ɕ _w g _w u 1--]	tail
/'juh?-pu"/	[j _w ɕ?β _w u 1--]	gutter
/'lepa/	[leba 1--]	brain
/'ne?-pu"/	[ne?b _w u 1--]	innkeeper, m
/kjo?-pu"/	[cjo?b _w u 1--]	poor thing
/khjoka/	[ch _w jega 1--]	husband

In order to round off the picture of phonetic manifestations of the glottal feature complex we need to consider it briefly in syllable initial position. The four environments mentioned so far always involved syllable final positions. Phonetically the glottal stop also occurs syllable initially, but here it appears to be noncontrastive; all word initial high register vowels are preceded by glottal plosion, and all word initial low register vowels are preceded by breathy voice. This is illustrated in example se (16). (The noncontrastive status of these features is further discussed in section 1.3.1.).

(16)

/ 'u?/	[ʔu·ʔ ¹ ˀ]	breath, n
/aku/	[ʔə _ˀ gə _ˀ - -]	paternal uncle
/ 'ara?/	[ʔa _ˀ a _ˀ ·ʔ ¹ ˀ ˀ]	whisky
/ 'əh?/	[ʔ _ˀ ə _ˀ ·ʔ ¹ ˀ]	light, n
/ 'ohma/	[ʔ _ˀ o _ˀ ma _ˀ ˀ -]	milk, n

Phonological interpretation of the feature complex.

So far we have seen that the feature complex is contrastive in word medial and final position and that the phonetic manifestation varies from an oral consonant via glottal stop and constriction to suprasegmental pitch features. The question arises whether this complex should be given a segmental or a suprasegmental interpretation. That this is a genuine question becomes apparent when we look at some of the more recent treatments of Tibetan phonology. As an

example I may cite the analysis of Chang and Shefts on which their Manual of spoken Tibetan (1964) is based. Comparing their data with mine it becomes evident that they consider the final glottal stop to be part of the syllabic nucleus, and that they have interpreted it partly as a tonal and partly as a segmental feature. The tonal part is the falling pitch which all these syllables carry, and the segmental part is the 'geminate' vowel nucleus which is obligatory for all open syllables with falling pitch. ('Geminate' is the term used by Chang and Shefts for VV-sequences, since all VV-sequences have identical vowel quality.) If the syllable ends in a nasal consonant the nasal may carry the falling pitch.

As far as the phonetic length of the vowel is concerned, I find that this feature is very unstable for my informant; some extra length may or may not be there. The Manual of spoken Tibetan does not give any details at this point, but Shefts discusses this aspect briefly in an unpublished memorandum (Shefts Chang, 1968b : 8), where she states "... 'geminate' oral vowels with falling tones may be approximately the same length, and at times (probably coincident with the occurrence of the unreleased glottal stop) even shorter than 'single' vowels with nonfalling tones." She supports this observation with some experimental measurements, and these show that the 'geminate' vowels are generally about 2 - 4 centiseconds longer than the 'single' vowels. This

seems to me a negligible difference in length, since the measurements of the duration of 'single' vowels which she gives range from 14 - 22 centiseconds. But the abrupt pitch fall on the 'geminate' vowels is striking enough, and Chang and Shefts seem to conclude that this is sufficient phonetic evidence for assuming two underlying vowels.

The correspondences as outlined above concern mainly the word final occurrences of the feature complex. For the medial occurrences no unambiguous correspondences can be established. The examination of the relevant data shows that where I have observed glottal constriction in the examples of set (15) and (16), they have observed various other features; in some items a 'geminate' vowel appears but it has a level pitch; in others they register higher vowels, e. g. ôô instead of oo ; still others have 'single' vowels with level pitch. These observations seem to indicate that the feature is manifested medially in some form also in the speech of their informants.

It is evident that on the phonetic surface the language exhibits a strong tendency to replace final consonants by tonal features, and the pattern of variations indicates the direction of change in which the language is proceeding: Syllable final oral stops are replaced by glottal stops; the glottal stop induces a pitch fall on the preceding vowel; and at the next stage the glottal stop is dropped as well. Thus the consonantal feature has turned into a supra-

segmental one. But on the phonological level modern LT has not quite reached the last stage yet. At the present stage of the development we can still find strong evidence for the segmental interpretation of the feature complex. The evidence for this is summed up in the following paragraphs under (a) - (c).

(a) In some environments the pitch exponent variant frequently varies not only with glottal stop but also with oral stops, especially with [k¹]. This has already been exemplified in set (12).

(b) In some derivations the glottal complex alternates morphologically with the oral stops [k] or [p]. Examples for such alternations are given in set (17).

(17)

/tuhk/	[¹ du·ʔ ¹ / ¹ duk ¹]	Bhutan
/tuhk-pa"/	[¹ dukpɜ]	Bhutanese
/rohk/	[ɹo·ʔ ¹ /ɹok ¹]	help, n
/rohk-pa"/	[ɹokpɹ]	companion
/'kip/	[cji·ʔ ¹]	be happy, prosperous
/'kip-nəh/	[cjinɛ ₁]	having been happy
/təʔ-pu"/	[tɜʔβu]	thin
/təp-ɜʔ"/	[tɜpɜʔ ¹]	thinnest
/'mik/	[mi·ʔ ¹ /mik ¹]	eye
/'mik-'tsum/	[miktsum]	eye blinking
/'mik-'pu/	[mikpɹ]	eyebrows

(c) In the process of compounding intervocalic /m/ and /k/ of disyllabic morphemes are realized as [ʔʔ] if these morphemes are the second component of a compound. This is illustrated in example set (18). (Further details are given in section 2.4.5.--Cutting point for originally disyllabic components).

(18)

/'ʃohkoʔ/	[ʃ _ᵛ o _ᵛ g _ᵛ o _ᵛ ·ʔʔ]	potato
/'ʃeɦ-ʔʃohk/	[ʃ _ᵛ e _ᵛ ·ʃ _ᵛ o _ᵛ h _ᵛ ·ʔʔ]	potato, h
/ʃika/	[ʃ _ᵛ i _ᵛ g _ᵛ ʔ]	habit
/nam-ʃik/	[nə _ᵛ m _ᵛ ʃ _ᵛ i _ᵛ ·ʔʔ]	weather
/'ŋjuku/	[ŋ _ᵛ j _ᵛ u _ᵛ g _ᵛ u _ᵛ]	pen
/'tʃhak-'ŋjuk/	[tʃ _ᵛ h _ᵛ ʔ _ᵛ ·ŋ _ᵛ j _ᵛ u _ᵛ ·ʔʔ]	pen, h
/thamaʔ/	[tʰ _ᵛ a _ᵛ m _ᵛ a _ᵛ ·ʔʔ]	cigarette
/'ʃeɦ-tham/	[ʃ _ᵛ e _ᵛ ·d _ᵛ a _ᵛ ·ʔʔ]	cigarette, h
/'ohma/	[ʰ _ᵛ o _ᵛ m _ᵛ ʔ]	milk, n
/'ʃeɦ-'ohm/	[ʃ _ᵛ e _ᵛ ·o _ᵛ ·ʔʔ]	milk, n, h

Points (a) to (c) above indicate that [ʔʔ] derives from oral consonants in some morphemes. The segmental interpretation allows us to derive the pitch variants unambiguously by phonetic rules. But the reverse is not true; if we choose a suprasegmental interpretation alternating and varying forms cannot be derived unambiguously; and while a phonetic rule which derives pitch features from segmental

features is a very natural one, a phonetic rule which did the reverse would be a very unnatural one. We could of course resort to a segmental representation where alternation or variation with oral stops is observed, and to a suprasegmental representation in the other instances. Apart from the fact that such a split up of the feature complex does not seem very desirable anyway, there is a further argument which supports segmental representation in all cases. This concerns the morpheme tone hypothesis. From the preceding examples we can see that the glottal stop or constriction is a feature which is relevant for the syllable: it may not only occur at the end of morphemes or words but also in the final margin of first syllables of disyllabic morphemes. In chapter 3 I will argue that in LT the relevant domain for the truly suprasegmental contrastive pitch patterns is not the syllable but the morpheme (cf. section 3.2.). If the influence which the glottal feature has on pitch profiles were taken as the primary exponent and given a suprasegmental status, this would destroy the morpheme tone hypothesis. The result would be a strangely complicated skewing between morpheme tone and syllable tone features. (For more detail on this see section 3.2.). Provided, then, that we accept the morpheme tone hypothesis for LT, the fact that the glottal feature complex is relevant for the syllable represents further evidence against the suprasegmental interpretation of it.

Thus the suprasegmental interpretation is to be rejected in favour of the segmental one. But it remains to discuss what segments are required. Since we observe alternation and variation between glottal stop and other consonants, we must investigate whether it is possible to derive all glottal stops from oral consonants. The observations which are relevant in this context are summed up in points (d) to (f) below. They show that there is not enough synchronic evidence for all instances of glottal stops to be derived from oral stops.

(d) There are lexical items with glottal stops which have no derivations and where consequently no alternation can be observed. Some examples are given in set (19).

(19)

/tʰoʔwa/	[tʰoʔβʌ]	dung
/'tʰohʔwa/	[dʰoʔβʌ]	flea
/johʔwa/	[joʔβʌ]	handle, n
/aʔra/	[ʔaʔʌ]	^o mustache
/'phoʔwa/	[pʰoʔβʌ]	a certain spot above the stomach
/neʔma/	[neʔma]	wrinkle, n
/mehʔtoʔ/	[meʔtoʔʔ]	flower, n
/tehʔtaʔ/	[ʔdeʔtaʔʔ]	slipping, n
/thamaʔ/	[tʰamaʔ]	cigarette

(e) For morphemes which show variation between final [ʔʼ] and [kʼ] the surfacing of [k] in first components of compounds can be predicted in terms of the initial consonant of the second component. In this environment [k] will regularly surface if the following consonant is /ts, tsh, t, th, p, ph, s, ɸ/. Before other consonants and before vowels it will be realized as [ʔ]. But we find that there are morphemes with a final glottal stop which do not surface as [k] in the expected environments. Some examples are given in set (20). They show that it would be incorrect to derive all final occurrences of [ʔʼ] from /k/.

(20)

/rihʔʼ/	[ɿi.ʔʼ]	mountain
/rihʔpon/	[ɿi.ʔbõ:]	rabbit
/rihʔ-'tse/	[ɿi.ʔdʒe]	mountain peak
/'neʔʼ/	[ne.ʔʼ]	holy place
/'neʔ-pu"/	[neʔβu]	innkeeper, m
/'tehʔʼ/	[de.ʔʼ]	stay, live
/'tehʔ-'sa/	[de.ʔsa]	living place
/nehʔʼ/	[ne.ʔʼ]	beat, v
/nehʔ-pa"/	[neʔβa]	punishment

(f) A more abstract interpretation of the glottal stop is investigated in section 1.3.4. in connection with distributional restrictions of phonemes within the syllable and the interpretation of secondary vowels. There I will show that the observed distributional restrictions almost allow us to derive secondary vowels from underlying final dental consonants and glottal stops from oral consonants. But the hypothesis fails because of the occurrences of medial glottal constriction in disyllabic morphemes (cf. set 19). Further crucial evidence for the failure of the hypothesis is presented in section 1.3.4. (cf. set 71).

The conclusion, then, is that LT has a phonemic glottal stop, and further that syllable final /k/, /p/, and /m/ can be realized as [ʔ] on the phonetic surface. The variation between [k] and [ʔ] is fairly free, that is, it is mainly conditioned by speech style and tempo. But alternation between [p] and [ʔ], or [m] and [ʔ] respectively occurs mainly in certain morphologically defined environments.

For the determination of the phonological representation of morphemes we can apply the alternation constraint: morphemes which show variation or alternation between [ʔ] and an oral consonant have an underlying oral consonant, while morphemes which exhibit neither variation nor alternation have an underlying glottal stop.

The alternation constraint allows us to postulate a unique phonological representation for a given morpheme by a principled standardization. This criterion has been applied to the entries of the vocabulary appendix (cf. appendix 2). However, I am not wholly convinced that the unique representation really reflects the competence of native speakers. Just as an investigator is not likely to have access to all the possible alternations because of limitations in the investigation, a native speaker may also not have immediate access to all the alternations because of limitations in memory and usage. This observation may have some theoretical implications for phonological representations.

1.1.5. Consonant variation

The variation possibilities for consonants are very rich in LT, especially for the stops and affricates. It is beyond the scope of this study to go into all the details of consonant variation. Tables 2 and 3 on the following pages therefore summarize only the most important observations and the explanatory remarks which follow point out the details which seem to be most relevant for the tone analysis.

The top row of the tables characterizes the relevant environments for the occurrence of the variants listed in the columns below. The numbers in the tables refer to the notes accompanying the tables and are distinguished by the bracket from the numbers of the general footnotes.

phoneme	initial ¹⁾ before high register vowels; medial after voiceless segments	initial before		medial after nasal ³⁾ consonants	medial; intervocalic and between /?/ end vowel	final if phonological phrase final
		low register vowels; with pitch contour 1 morphemes	with pitch contour 2 ²⁾ morphemes			
/p/	[p]	[p̚ / b]	[b / ^m b]	[b]	[p̚ / b̚ / b̚ / β̚] ⁵⁾	[p̚]
/k/ ⁴⁾	[k]	[g̚ / ɣ]	[g / ^ɲ g]	[g]	[g̚ / ɣ̚ / ɣ̚ / ɣ̚] ⁶⁾	[k̚]
/t/	[t]	[d̚ / a]	[a / ⁿ a]	[a]	[t̚ / a̚ / a̚]	
/t̚/	[t̚]	[d̚̚ / d̚̚]	[d̚̚ / ^ɲ d̚̚]	[d̚̚]	[t̚̚ / d̚̚̚ / d̚̚̚]	
/ts/	[ts]	[dz̚ / dz̚]	[dz̚ / ⁿ dz̚]	[dz̚]	[dz̚̚ / dz̚̚]	
/tɕ/	[tɕ]	[d̚ɕ̚ / d̚ɕ̚]	[d̚ɕ̚ / ^r d̚ɕ̚]	[d̚ɕ̚]	[d̚ɕ̚̚ / d̚ɕ̚̚]	
/ʔ/				medial before consonants [ʔ]		[ʔ̚]

Table 2: Variation of unaspirated stops and affricates along the voicing parameter.

Notes to table 2.

1) The terms initial, medial and final refer to the word. The variation possibilities apply in general also to compound nouns which I consider to be one word phonologically. However, with a greater degree of delicacy in phonetic observation we note some tendencies which do not agree precisely with the statements of variation here. For these details see section 2.4.3.

2) According to my observation the occurrence of initial prenasalized stops is confined to morphemes with pitch contour 2. This becomes a quite significant factor in compounding (cf. section 2.4.2.). Prenasalization, however, with pitch contour 2 items is present only in certain phonological environments. I have observed it most consistently in the nucleus of the phonological phrase. In substitution lists for sorting low register morphemes, for example, its presence or absence has turned out to be a quite reliable indicator of the identity of the pitch contour. When words are pronounced in isolation it is usually not present.

3) The medial sequence /np/ has various phonetic manifestations, varying according to different styles of speech. The following realizations can be observed:

/np/ → [n_lb / n_lβ / ã:β] (cf. examples in set 21, a).

4) For velars various degrees of fronting can be observed; for this compare section 1. 1. 1. Naturally, the parameter of fronting intersects with all the variants of the voicing parameter.

5) Consonants which occur adjacent to rounded vowels show quite strong lip rounding. Lip rounding equally intersects with the variants of the voicing parameter, and applies to all consonants where it is possible in articulatory terms.

6) The variants given for /t/ and /t̚/ are rough approximations. For stops in general, we can state that, since voicing is not a distinctive feature for these segments, there is great freedom in the use of this parameter. However, the variation is not altogether free. At a greater degree of delicacy we can observe the following rules and tendencies:

- (a) Stops are voiced after nasals; /p/ often is realized as [β] in relaxed speech.
- (b) Stops are voiceless after voiceless consonants in distinct speech. In more relaxed styles of speech the whole cluster may be voiced.
- (c) Stops tend to be voiceless after /r/. When /r/ is realized as retroflexion in the vowel or vowel length it nevertheless leaves traces in the voicing of the stop, i. e., the stop tends to be voiceless.
- (d) For /t/ and /t̚/ we further notice that the degree of voicing between vowels is very weak, and that medial /ʔ/ which is realized as glottal constriction tends to affect the voicing of the following stop as follows:

style of speech

	more distinct		less distinct
/vtV/	→ [v ₀ v]	→	[v ₀ v]
/vʔtV/	→ [vʔtV]	→	[vʔ ₀ v]

Illustrative examples for the four points made here are given in example set 21(a) - (d). A further factor which affects the degree of voicing of medial stops in compounds is discussed in section 2.4.3.

(21)

(a)

/ʔtan-pa/ [tan₁β₁/tan₁β₁/tã:β₁] send, p.p.

(b)

/jok-pu"/ [jəkpu₁/jəg₁β₁u₁] male servant

/ʔlap-pa/ [lɜp₁β₁/lɜb₁β₁] teach, p.p.

(d)

/ʔtʰoto/ [tʰodo / tʰodo] lip

/aʔton/ [ʔaʔtõ:/ʔaʔdõ:] yawn, n

/ʔkhatuʔ/ [kʰ₁ɔdu₁ʔ₁/kʰ₁ɔdu₁ʔ₁] straight, adj.

/ʔkhaʔ-tak/ [kʰaʔta₁ʔ₁/kʰaʔda₁ʔ₁] white scarf

/ʔkhoh-ʔtan/ [kʰ₁ɔdã:/kʰ₁ɔdã:] way of understanding

/lohk-ʔtan/ [l₁ɔʔtã:/l₁ɔʔdã:] way of returning

1.2. Phonological vowels

The identification of the underlying vowels of LT is far from straightforward. This is due to the extensive and intricate processes of vowel height approximation in polysyllabic words. In some cases rounding assimilation further complicates the picture. (See for example appendix 1, section 3, footnote 3). Since the tonal features are so intimately linked to the vocalic nuclei of syllables it is necessary to discuss the vowels in some greater detail than the consonants and to present evidence for the contrastive vowel qualities. I have found eight vowel qualities to be contrastive in LT. They are listed in table 4 below.

	front		central	back
	spread	rounded		
<u>high</u> (close)	i	y		u
<u>mid</u> <u>close</u> (half-close)	e	ø		o
<u>mid</u> <u>open</u> (half-open)	ɛ			
<u>low</u> (open)			a	

Table 4: Vowel phonemes

1.2.1. Vowel contrasts in monosyllables

The monosyllabic word is a convenient starting-point for the identification of contrastive vowels, since the process of vowel height approximation does not operate here. Example sets (22) - (34) give contrastive examples for those vowel qualities which are phonetically close. Special care has been given to the illustration of the /e:/ /ɛ/ contrast because it is not very readily identifiable. Set (34) is a near minimal set for all eight vowel qualities.

(22) /i/ : /e/

/'kip/	[ci·ʔ ¹]	be happy, prosperous
/'keʔ/	[c _ɛ ɛ·ʔ ¹]	give birth, sprout
/'tsi/	[tsi]	paint, n
/'tse/	[tse]	peak, n

(23) /i/ : /y/

/'lih/	[li _ɪ]	naspatti (a kind of pear)
/'lyh/	[ly _ɪ]	boil over
/'riih/	[ɽi _ɪ]	fall over, (itr)
/'ryh/	[ɽy _ɪ]	rot, v

(24) /i/ : /ɔ/

/niʔ/	[ni·ʔ ¹]	sleep, n
/nɔʔ/	[nɔ _ɔ ·ʔ ¹]	fry (tr)
/'ɔik/	[ɔi·ʔ ¹ /ɔik ¹]	louse
/'ɔɔʔ/	[ɔɔ·ʔ ¹]	throw out (e.g. water, dust)

(25) /e/ : /ø/

/tse?/	[tse·ʔ¹]	play, v
/tsø?/	[tsø·ʔ¹]	cook, v
/ne?/	[ne·ʔ¹]	find
/nø?/	[nø·ʔ¹]	fry (tr)

(26) /e/ : /ɛ/

/neh?/	[ne·ʔ¹]	beat, v
/neɪh?/	[neɪ·ʔ¹]	I (agentive)
/'ke?/	[ce·ʔ¹]	give birth, sprout
/'kɛ?/	[ke·ʔ¹]	voice, n
/'khe/	[ch̥e]	profit, n
/khe/	[kʰe:]	load, n
/khee, kher/	[che:]	bring (lit.)
/'pɛeh/	[pɛ:]	take, h
/'ɕɛh/	[ɕe:]	mouth, n

(27) /e/ : /a/

/'na?/	[na·ʔ¹]	pus
/'nɛ?/	[ne·ʔ¹]	holy place
/ta?/	[ta·ʔ¹]	mark, sign, n
/tɛ?/	[te·ʔ¹]	look, v

(28) /ɛ/ : /ø/

/'nɛ?/	[ne·ʔ¹]	holy place
/'nø?/	[nø·ʔ¹]	container
/khe/	[kʰe:]	load, n
/khø/	[kʰø:]	boil, v(itr)

(29) /a/ : /o/

/lah/	[la _ᵛ]	mountain pass
/loh/	[lo _ᵛ]	age, year
/'kak/	[ka·ʔ ¹ /kak ¹]	stop, v
/'kok/	[ko·ʔ ¹ /kok ¹]	pluck, v

(30) /o/ : /u/

/'phu/	[p ^h u]	blowing, n
/'pho/	[p ^h o]	man, male
/'lu/	[lu]	dwarf / song
/'lo/	[lo]	cough, n

(31) /o/ : /ø/

/poh [?] /	[^m bø·ʔ ¹]	cloth used to carry things
/pøh [?] /	[^m bø·ʔ ¹]	call, v
/toh [?] /	[ⁿ do·ʔ ¹ _ᵛ]	colour, n
/tøh [?] /	[ⁿ dø·ʔ ¹]	desire, v
/moh/	[mø]	she
/møh/	[mø:]	hers

(32) /u/ : /y/

/'tuhk/	[d _ᵛ u·ʔ ¹ /d _ᵛ uk ¹]	umbrella
/'tyh [?] /	[d _ᵛ y·ʔ ¹]	collect, v
/'kuhk/	[g _ᵛ u·ʔ ¹ /g _ᵛ uk ¹]	wait
/'kyh [?] /	[g _ᵛ y·ʔ ¹]	courtesy, bow, n
/'kjuh ^k /	[ʃ _ᵛ j _ᵛ ·ʔ ¹ /ʃ _ᵛ j _ᵛ k ¹]	run, v
/'kjuh [?] /	[ʃ _ᵛ j _ᵛ ·ʔ ¹]	slip on

(33) /ø/ : /y/

/kø?/	[kø.ʔ ⁺ ʔ ¹]	appoint, establish
/ky?/	[k ⁺ y.ʔ ¹]	steal
/'kyh?/	[g ^o y _h .ʔ ⁺ ʔ ¹]	courtesy, bow, n
/'køh?/	[g ^o ø _h .ʔ ⁺ ʔ ¹]	vulture

(34)

/tɕik/	[tɕi.ʔ ¹ /tɕik ¹]	one
/tɕy?/	[tɕy.ʔ ¹]	nutritious, tasty
/tɕø?/	[tɕø.ʔ ¹]	keep, v
/tɕuk/	[tɕu.ʔ ¹ /tɕuk ¹]	let, v
/tɕhok/	[tɕ ^h ø.ʔ ¹ /tɕ ^h ok ¹]	allow
/tɕe?/	[tɕe.ʔ ¹ /tɕek ¹]	tongue
/'tɕe?/	[tɕe.ʔ _T ʔ ¹]	cut, v
/tɕak/	[tɕa.ʔ ¹ /tɕak ¹]	iron, n

1.2.2. Vowel contrasts in disyllables

First syllables. In the first syllable of disyllabic words we also find eight contrastive vowel qualities. Because of vowel height approximation in disyllables some vowel phonemes have a wide range of allophones. The variants occurring before second syllables which have /a/ as their nucleus are phonetically most like the variants occurring in monosyllables, and it is in this position correspondences can best be established.

Example sets (35) - (44) give contrastive pairs for the eight vowel qualities in the first syllable of disyllabic words. Derived nouns have been included, but not stem compounds, and care has been taken to show the contrast before identical vowels in the second syllable of the word.

(35) /i/ : /e/

/ɸika/	[ɸigə]	habit
/'seka/	[seɡa]	crack, n
/'pihpə/	[biβə]	bellows, n
/'kehpa/	[jeβa]	virtue

(36) /i/ : /ø/

/thøpa/	[t ^h øβa]	forehead
/ɸika/	[ɸigə]	habit
/ṭimpa/	[ṭimbə]	cloud, n
/mømpa/	[mømba]	plough, n

(37) /e/ : /ø/

/ke?pa/	[ce?ba]	waist
/kø?pa/	[kø?ba]	command, n
/ŋempa/	[ŋemba]	snack, n
/mømpa/	[mømba]	plough, n

(38) /e/ : /ɛ/

/'seka/	[seɡa]	crack, n
/'lepa/	[leba]	brain
/'khepu/	[cheβu]	cheap
/'thepu/	[theβu]	thumb
/tse?mu/	[tse?mu]	game, play, n
/se?mu/	[se?mu]	fingernail



(39) /ɛ/ : /a/

/'lepa/	[leɸ _⊥ ḅ _⊥]	thigh, n
/lama/	[lama]	lama
/'thɛpu/	[tʰeβ _⊥ u _⊥]	thumb
/'tshapu/	[tʰɕ _⊥ β _⊥ u _⊥]	nephew

(40) /ɛ/ : /ø/

/'thɛpu/	[tʰeβ _⊥ u _⊥]	thumb
/thøpa/	[tʰøβ _⊥ a _⊥]	forehead
/tɛ?mu/	[te?mu _⊥]	entertainment
/'tsø?pa/	[tsø? _⊥ β _⊥ a _⊥]	argument

(41) /a/ : /o/

/'tʰahpa/	[tʰ _⊥ aβ _⊥ a _⊥]	monk
/'tʰohpa/	[tʰ _⊥ oβ _⊥ a _⊥]	taste, n
/somu/	[somu _⊥]	aunt
/'tshamu/	[tʰ _⊥ ɕ _⊥ mu _⊥]	niece

(42) /o/ : /u/

/tʰokpa/	[ʔ _⊥ do _⊥ kpa _⊥]	nomadic herdsman
/tʰukpa/	[ʔ _⊥ du _⊥ kpa _⊥]	Bhutanese
/phuhmpa	[pʰ _⊥ u _⊥ mbɜ _⊥]	vase
/khohmpa/	[kʰ _⊥ o _⊥ mba _⊥]	stepping on, n

(43) /ø/ : /o/

/kø?pa/	[k _⊥ ø? _⊥ β _⊥ a _⊥]	command, n
/tɸo?wa/	[tɸo? _⊥ β _⊥ a _⊥]	dung
/'tsø?pa/	[tsø? _⊥ β _⊥ a _⊥]	argument, quarrel
/'tɸhodo/	[tɸ _⊥ hodo]	lip

(44)

/t ^h ɔ̃mpu/	[^h ɔ̃mbu]	guest, feast, n
/'tyhmpa/	[^h ɔ̃mbɜ]	seventh

Identification of /e/ and /ɛ/. I have already mentioned that the identification of the phonological vowels in disyllabic words is obscured by the process of vowel height approximation. This is particularly relevant for the front vowels. But for /e/ and /ɛ/ the picture is further complicated through the influence which preceding consonants have on the height of the two phonemes. We find that certain consonants have a quite consistent and noticeable raising or lowering effect. Table 5 below tabulates the allophones of /e/ and /ɛ/ after the various consonants. The first column of the table lists the consonants in four groups, starting with those after which the highest vowel variants occur and descending gradually to those after which the lowest ones occur. In the last group the lowest variants occur after /r/, while those after /m/ and /l/ tend to be somewhat less low. Examples illustrating table 5 are given in sets (45) and (46). Elsewhere in this paper I may not have been able to maintain these subtle variations in vowel height consistently in the phonetic transcriptions; in particular, I have generally lumped together the second and the third group in other places.

preceding consonants	allophones of /e/	allophones of /ε/
ɸ, tɸ, tɸh	[ɪ]	[e]
k, kh, ŋ	[ɪ̣]	[ẹ]
other consonants	[ẹ]	[ε̣]
m, l, r	[e]	[ε]

Table 5: Consonantal conditioning of the height of /e/ and /ε/.

(45)

/ɸee/	[ɸɪ:]	glass
/'ɸeh?/	[ɸɪ̣?'] ¹³	be afraid
/tɸhe/	[tɸhɪ]	open, v
/'khe/	[kʰɪ̣]	profit, n
/ke?/	[kɪ̣?']	neck, n
/'ne?/	[nɪ̣?']	lean against
/pe/	[pẹ]	proverb

¹³In syllables closed with /ʔ/ /e/ and /ε/ have a gliding quality, that is, they are lowered in the second half. This is especially noticeable with pitch contours 2 and 3.

(45) cont.

/theh/	[t ^h e _I]	that, there
/'seh?/	[se·ʔ _I ʔ]	hold out to receive
/'meh/	[me _I]	fire, n
/'rehpa/	[ɹeβa _I]	hope, n
/'reeh-sohn/	[ɹe·sō̃ _I]	depended on
(46)		
/ʔeh/	[ʔe _I]	song, n
/'tʔeh?/	[tʔ ^h e·ʔ _I ʔ]	do
/'khe/	[k ^h e _I]	spin,
/keh/	[ŋge _I]	bathe, wade through water
/'ne?/	[ne·ʔ _I ʔ]	before
/'the?/	[t ^h e·ʔ _I ʔ]	come here, h
/pheh/	[p ^h e _I]	wool
/neh/	[ne _I]	barley
/'me-sohn/	[me·sō̃ _I]	said (lit.)
/'lepa/	[lepā _I]	thigh
/reh-sohn/	[ɹe·sō̃ _I]	tore, v(itr)

Table 5 shows that consonantal conditioning alone tends to give rise to partial overlap of the allophones of /e/ and /ɛ/. In disyllabic words the parameter of vowel height raising intersects with the parameter of vowel height approximation, and this further enhances overlap between /ɛ/ and /e/ on the one hand, and /e/ and /i/ on the other. This aspect of front vowel identification in disyllabic words is treated in detail in appendix 1, section 4.

Second syllables in disyllabic nouns. In considering disyllabic nouns we have to distinguish between stem compounds on the one hand, and disyllabic stems or monosyllabic stems plus an assimilating suffix on the other. Stem compounds have to some extent their own phonological laws, and the following observations do not apply to them. The disyllabic nouns under consideration here, then, are any disyllabic morphemes and any disyllabic noun formed with an assimilating suffix. (For suffix categorization see section 2.5.1.). In these nouns we find that the range of contrastive vowel nuclei in the second syllable is limited to /i e u o a/. The contrast between /a/ and the other four vowels is evident, and therefore no illustrative examples will be given here. The contrast between /i/ and /e/ is also quite clear, but these vowels are rare in this position, so that it is difficult to find good contrastive pairs. One pair with a contrast in a similar environment is

given in set (47). But the contrast between /u/ and /o/ is not immediately evident in second syllables. Nevertheless, it appears to be maintained also in this position; evidence for this is given in set (48).

For the nominal suffixes -pu "masculine" and -mu "feminine" the traditional orthography of Tibetan suggests an underlying /o/, but the examples of set (49) show that at the present stage these two suffixes have an underlying /u/ in LT. If the underlying vowel were /o/ we could not expect it to contrast with the underlying /o/ of disyllabic morphemes with identical vowels in the first syllables.

(47)

/ 'kapli/ [kəbli] scull

/ 'mehle/ [m_ṽe_ṽle] chin

(48)

/ 'tʃphoto/ [tʃ^hədo] lip

/ thohpu/ [t^ho_ṽβ_ṽu] load, n

/ 'tshilu?/ [tshilu.ʔ¹] white fat on meat

/ ruko?/ [ɹ_ṽugo.ʔ¹] bone

(49)

/ ηehso/ [ηe_ṽso] rest, n

/ 'keh-mu"/ [g_ṽemu] old woman

(49) cont.

/'nehtso/	[n ₊ e ₊ dzo]	parrot
/'keh-pu"/	[g ₊ e ₊ β ₊ u]	old man
/khorlo/	[k ^h o ₊ l ₊ o]	wheel, n
/khohr-mu"/	[k ^h o ₊ l ₊ mu]	rupee

1.2.3. Vowel length

Vowel length is quite an elusive feature in LT. Nevertheless it appears to play a contrastive role, though there are several restrictions for it as we will see shortly. A first restriction is that the feature is relevant only for some vowels but not for others. We will first deal with the phonemes for which no \neq length contrast can be established.

1.2.3.1. Vowels with no \neq length contrast

Vowel length is found to be noncontrastive for the secondary vowels /ε, φ, y/. The phonetic length of these vowels is conditioned by syllable structure and by morphological factors; the following length distribution can be observed: compared with other vowels /ε, φ, y/ are phonetically long in open monosyllables. Further, the length is largely retained when these monosyllables occur before a suffix with pitch contour 4. Before distinctive suffixes with other pitch contours they show an intermediate degree

of length, but before assimilating suffixes they are short. (For the definition of assimilating and distinctive suffixes see section 2.5.1.). They are also short in the first syllable of disyllabic morphemes. In syllables closed by /ʔ/ they show the same length variations as other short vowels in this position (cf. section 2.3.3.).¹⁴

Since we can state the factors which condition the length of these vowels there is no need to postulate a phonological length contrast for them, and in this paper I have chosen to represent them with single vowel symbols. If we look at Tibetan orthography we can easily discover that the secondary vowels have arisen through the fusion of final consonants with the nonfront primary vowels, and this might suggest that we should postulate underlying geminate segments for them since they derive from two segments. However, unless we find good synchronic evidence the interpretation suggested by historical considerations has to be rejected. On the synchronic level we can observe that /ɛ/, /ø/, and /y/ often appear as the result of morphological fusions, such as shown in example set (50). But at this point I think that this morphological process is not sufficient

¹⁴Position in the phonological phrase affects the phonetic length of these vowels too. But this factor, of course, affects all vowels. It is a phenomenon which is not easily captured. For the purpose of the present study this remark will have to suffice as far as the influence of sentence intonation on vowel length is concerned.

evidence for postulating two underlying segments for the secondary vowels.

(50)

/nah/	[ŋã]	I
/neh/	[ŋe:]	my
/pɪhŋ-pa"/	[pɪŋbɜ]	field worker
/pɪhŋ-pɛ"/	[pɪŋbe.]	the field worker's (genitive)
/kho/	[kʰo]	he
/khø/	[kʰø:]	his
/moh/	[mɔ̃]	she
/møh/	[mø:]	hers
/'su/	[su]	who
/'sy/	[sy:]	whose
/tʰuku/	[tʰugɥ]	child
/tʰuky/	[tʰugɥ.]	the child's (genitive)

Another observation which is relevant for the establishment of vowel length and quality contrasts is the following: in the sets for contrastive vowel qualities secondary vowels are contrasted with short primary vowels in open monosyllables in some instances (cf. sets 23, 26, and 31). This involves a systematic abstraction, for in open monosyllables the phonetically minimal contrasts among primary and secondary vowels occur only with the long primary vowels.

Length of secondary vowels before pitch contour 4 suffixes. Concerning the effect which suffixes with pitch contour 4 have upon the length of preceding open syllables with secondary vowel nuclei we need to make a further observation. This feature complex creates contrasts, which, as far as segments are concerned, look like length contrasts. Some examples are given in set (51). The verbal suffix /-pa/ has pitch contour 4 while the nominalizing suffix /-pa"/ is assimilating; this means that the pitch profiles of the two suffixes are different. (For details see section 2.5.1.). In the realization and perception of these words the main stress and focus naturally lie on the stem, and this tends to create perceptual confusion. The examples of set (52) show that suffixes with pitch contour 4 in general allow a fuller development of some features of the preceding stem vowel nucleus, and that this also leads to apparent length contrasts in syllables closed by /?/. This last observation actually applies to all vowels, not only to the secondary ones. In general we can say that such stems have the same pitch profile and length features that are characteristic of monosyllabic occurrences of these forms. This means that /ε/, /ø/, and /y/ are phonetically long before pitch contour 4 suffixes, and all vowels followed by /?/ show the sharp pitch fall and some extra length which characterizes the monosyllabic and word final occurrences of /V?/. In the last two pairs of set (52) the suf-

fixes occur after a syllable closed with a nasal. It is in pairs like these that it becomes most apparent that the contrast lies in the different pitch profiles of the suffixes and not in the length of the stem vowels.

(51)

/th ϕ pa/	[t ^h ϕ β_{ω}^{\perp} a - -]	forehead
/th ϕ -pa/	[t ^h ϕ : β_{ω}^{\perp} a - ˩]	be extra, p.p.
/ph ϵ h-pu"/	[p e β_{ω}^{\perp} u - -]	Nepalese
/k ϵ h-pa/	[k' e: β_{ω}^{\perp} a - ˩]	crack, v(itr), p.p.
/'k \jmath ϵ h-pu"/	[\jmath je β_{ω}^{\perp} u ˩ -]	king
/'k \jmath ϵ h-pa/	[\jmath je: β_{ω}^{\perp} a ˩ ˩]	become advanced, p.p.

(52)

/ne?-pu"/	[ne? β_{ω}^{\perp} u ˩ -]	fond of, h
/ne?-pa/	[ne? β_{ω}^{\perp} a ˩ ˩]	find, p.p.
/'t ϕ ?-pu"/	[t ϕ ? β_{ω}^{\perp} u ˩ -]	happy, h
/'kok-pa/	[ko? β_{ω}^{\perp} a ˩ ˩]	pluck, p.p.
/k ϕ ?-pa"/	[k ϕ ? β_{ω}^{\perp} a ˩ -]	command, n
/k ϕ ?-pa/	[k ϕ ? β_{ω}^{\perp} a ˩ ˩]	install, establish, p.p.
/loh η -pa"/	[loh η β_{ω}^{\perp} a - -]	blind person
/loh η -pa/	[loh η β_{ω}^{\perp} a - ˩]	become blind, p. p.
/m ϕ n-pa"/	[m ϕ mba β_{ω}^{\perp} - -]	plough, n
/t ϕ n-pa/	[t ϕ mba β_{ω}^{\perp} - ˩]	take out, pull out, p.p.

1.2.3.2. Vowels with length contrast

Now we need to turn to the remaining vowel phonemes for which length contrasts can be established. These are the primary vowels /i, e, u, o, a/. Though, as I have already shown, glottal constriction and final unreleased glottal stop are consonantal features it cannot be denied that their influence on vowel length and pitch profiles is very noticeable in some environments, and we therefore need to demonstrate that there is a threefold contrast between V, VV, and V?. In example sets (53) - (58) evidence for this threefold contrast is presented for the five primary vowels. The phonetic transcriptions given for the items show the length proportions involved. The examples of sets (58) - (60) show that in the same position only a twofold contrast can be established for the secondary vowels.

(53)

/pa/	[p ₊ a ₊]	meat, flesh
/tpak/	[tpa.ʔ ¹ /tpak ¹]	iron, n
/paa, pawa/	[pa: / paβ ₊ Λ ₊]	deer
/ta/	[ta]	horse
/tak/	[ta.ʔ ¹ /tak ¹]	tiger
/kaa, kawa/	[ka: / kaβ ₊ Λ ₊]	pillar
/'pah/	[p ₊ a ₊]	hat
/'pah?/	[p ₊ a.ʔ ¹]	fat film on liquid
/'paah/	[pa: ₊]	veins in jade

(54)		
/kho/	[k ^h o]	he
/t ^h o?/	[t ^h o·ʔ ^ʔ]	roof
/khoo, khowa/	[k ^h o: / k ^h oβ _{ω+}]	liquid, n
/'tho/	[t ^h o]	list, n
/'tho?/	[t ^h o·ʔ ^ʔ]	be high, v
/'thoo, 'thowa/	[t ^h o: / t ^h oβ _{ω+}]	hammer, n
(55)		
/thu/	[t ^h u]	curse, n
/thuk/	[t ^h u·ʔ ^ʔ / t ^h uk ^ʔ]	mind, n, h
/thuu, thur/	[t ^h u: / t ^h uɹ]	slope, n
/'kjuh/	[ʔ _ʔ ʔ _ʔ]	property
/'kjuh ^k /	[ʔ _ʔ ʔ _ʔ ·ʔ ^ʔ / ʔ _ʔ ʔ _ʔ k ^ʔ]	run, v
/'kjuuh, 'kjuhr/	[ʔ _ʔ ʔ _ʔ : / ʔ _ʔ ʔ _ʔ ɹ]	change, v
(56)		
/'meh/	[m _ʔ e]	fire, n
/'p ^h eh?/	[p _ʔ ɹ·ʔ ^ʔ]	be afraid
/'p ^h eeh/	[p _ʔ ɹ:]	take, h
/pe/	[p _ʔ e]	proverb
/ke?/	[c _ʔ e·ʔ ^ʔ]	neck, n
/see, ser/	[s _ʔ e: / s _ʔ eɹ]	gold
(57)		
/khi/	[ch _ʔ i]	dog
/t ^h hi?/	[t ^h i·ʔ ^ʔ]	ten thousand
/kii/	[c _ʔ i:]	middle

(57) cont.

/mih/	[m _{ii}]	man, person
/rih?/	[ɹ _{ii} ·ʔ ¹]	mountain
/riih/	[ɹ _{ii} :]	fall over, (itr)
(58)		
/tʁeh/	[^h tʁ _{ee} :]	visit, v
/tʁeh?/	[^h tʁ _{ee} ·ʔ ¹]	measure, v
/'kʒeh/	[^h kʒ _{ee} :]	become advanced
/'keh?/	[^h k _{ee} ·ʔ ¹]	become weak
(59)		
/mø/	[mø:]	admire
/mø?/	[mø·ʔ ¹]	plough, v
/'thø/	[^h t _h ø:]	hear
/'tʁhø?/	[^h tʁ _h ø·ʔ ¹]	religion
(60)		
/'lyh/	[_{ii} ly:]	boil over
/'nyh?/	[_{ii} ny·ʔ ¹]	dare
/phy/	[p ^h y:]	offer, v
/phy?/	[p ^h y·ʔ ¹]	little food offering

In sets (53) - (57) the contrast for long and short vowels has been demonstrated for monosyllables with the primary vowels /a, o, u, e, i/. However, we notice that many of the examples with long vowels have variant pronunciations which expose the source of the vowel length.

But for some morphemes my informant is not aware of fuller variant pronunciations, and I take this as an indication that vowel length has a phonological status in LT at the present stage, and it is likely to become progressively more important as the language develops further.

Vowel length in disyllabic nouns. Example sets (61)-(62) illustrate length contrasts in the first syllable of disyllabic nouns. In this position we find that the same threefold contrast between V, VV, and V? occurs. The relevance of the V/V? contrast in the first syllable has already been discussed (cf. section 1.1.4.). Since in this position the glottal does not condition vowel lengthening in normal pronunciation¹⁵ only the contrast between long and short vowels has been illustrated here. Examples for the /u/ : /uu/ contrast in disyllabic nouns are missing in my data, but this is probably due to the limitations of the data and not to any systematic restriction in the system.

Phonetically, disyllabic nouns with long [i:] and [e:] in the first syllable are also missing. This gap, however, does seem to have some systematic significance. With these two vowels we can observe that in derived non-

¹⁵Lengthening before medial /?/ in nouns has been observed only in overdistant speech.

verbal disyllables any potentially long sequences are realized as a sequence of short vowel plus glottal constriction: /ii/ → [iʔ]

/ee/ → [eʔ].

This is illustrated in set (63). The last example shows that the above statement does not apply before the suffix -la which has pitch contour 4. Thus [i:] and [e:] are avoided in certain environments in nonverbal words. (In verbal conjugations phonetic length is retained.)

(61)

/thama/	[t ^h am ₁ a]	end, n
/kaama, karma/	[ka·m ₁ a / kaɪm ₁ a]	star
/'naku/	[nəg ₁ u]	nose
/'naamu, 'narmu/	[ŋa·m ₁ u / ŋɜɪm ₁ u]	sweet, adj.

(62)

/thohpu/	[t ^h o ₁ β ₁ u]	load, n
/noohpu, nohrpu/	[no ₁ ·β ₁ u / noɪβ ₁ u]	juwel
/somu/	[som ₁ u]	aunt
/khoolo, khorlo/	[k ^h o·lo / k ^h oɪlo]	wheel

(63)

/ʔee, ʔer/	[ʔe: / ʔeɪ]	glass
/ʔeeke/	[ʔeʔgo]	mirror
/see, ser/	[se: / seɪ]	gold
/see-pu"/	[seʔβ ₁ u]	yellow

(63) cont.

/'neepa, 'nerpa/	[₁ neʔβ̣3 / ₁ neɪβ̣3]	storekeeper
/'teehma, 'tehrma/	[₀ deʔṃ3 / ₀ deɪṃ3]	a big plate
/'ηii/	[ɲi:]	two
/'ηii-pa"/	[ɲiʔβ̣3]	second
/'ηii-la/	[ɲi:ḷ3]	to two

The same tendency to avoid long vowels in specific environments can be observed in noun compounds, but we will see that there it applies to the other primary vowels as well, not only to /ii/ and /ee/ (cf. section 2.4.5.--Long vowels in first components). It may be that in the last example of set (63) the pitch contour identity of the suffix /-la/ is responsible for the nonapplication of the rule. But in the light of the evidence from compound nouns it may also be due to its initial consonant; in compounds the rule applies only before stops and affricates.

Length in second syllables. The contrastive status of vowel length needs to be examined also in the second syllable of disyllabic words. The examples of set (64) show that in this position too, we find a threefold contrast between short vowel, long vowel and short vowel followed by /?/. Because of the rarity of /oo, ee, uu, ii/ in this position the threefold contrast can only be exemplified for /a/. To exemplify the same contrasts for the other

primary vowels we have to turn to stem compounds where we do find that the threefold contrast is also relevant for these four vowels (cf. section 2.4.5.--Long vowels in second components; the various degrees of vowel length in compounding are discussed in that section). At this point we can conclude that in general length is relevant for the five primary vowels in second syllables of disyllabic words. Further, it is also in this position where vowel length is most stable in the speech of my main informant; she normally does not use alternative pronunciations here.

(64)

/thama/	[^h amā̄]	end
/thama?/	[^h ama·ʔ̄]	cigarette
/thumaa/	[^h uma·]	spoon

Elusiveness of vowel length. In introducing this section on vowel length I referred to its elusiveness. Before concluding I want to sum up the observations which have led me to make this statement. In the speech of my main informant I have observed a tendency to avoid pure short/long vowel contrasts, and there are several ways to get around it. Which one is chosen depends on the phonological environment and the style of speech. The following features are relevant here:

(a) As already mentioned, for many lexical items alternate pronunciations are still alive with syllable final /r/ or disyllables ending in /wa/. In explicit speech these

fuller forms are preferred.

(b) In the first syllable of disyllabic nonverbal words long /ii/ and /ee/ are realized as [iʔ] and [eʔ] respectively (cf. example set 63).

(c) Underlying /or/ sequences may also be pronounced with some retroflexion in the latter part of the vowel duration: [o^ʔ]. In this case a slight degree of length is usually also present but it is hardly noticeable. On the phonetic surface it leads to contrast between non-retroflexed and retroflexed vowels: [o] : [o^ʔ]. (An example is given in set (65)).

(d) In disyllabic words which have a high vowel in the second syllable the vowel length contrast in the first syllable may be replaced by a vowel quality contrast. This applies particularly to the /a/ : /aa/ contrast. In the process of vowel height approximation (cf. appendix 1) /a/ gets a wide variety of central allophones which are higher than [a] and unlike any other vowel phoneme. Underlying long /aa/ is unaffected by height approximation. In explicit speech it usually retains length also in an approximation environment (first syllable of a disyllabic word with a high vowel in the second syllable) but in less explicit speech length may be dropped and this results in a phonetic surface contrast between [a] and [ə̞] vowel quality. Pairs which illustrate this are given in example set (66).

(65)

/'khoh-na"/ [k^ho_{||}na_{||}] understand (conditional)

/kohr-na"/ [ŋg_{||}o^hna_{||}] be late (conditional)

(66)

/lahpu/ [l_{||}ə_{||}β_{||}u_{||}] radish

/naah-pu"/ [na_{||}β_{||}u_{||} / na_{||}β_{||}u_{||}] painful

/'kahpu/ [g_{||}ə_{||}β_{||}u_{||}] crawling, n

/'kaah-pu"/ [g_{||}a_{||}β_{||}u_{||} / g_{||}a_{||}β_{||}u_{||}]¹⁶ lovable, rejoiceful

/aku/ [ʔə_{||}g_{||}u_{||}] paternal uncle

/kaa-pu"/ [ka_{||}β_{||}u_{||} / ka_{||}β_{||}u_{||}] white

/'naku/ [nə_{||}g_{||}u_{||}] nose

/'naa-mu"/ [ŋa_{||}.mu_{||} / ŋa_{||}.mu_{||}] sweet

1.2.4. Nasalized vowels

The interpretation of nasalized vowels does not present any special problem. Vowel nasalization occurs very frequently on the surface, but it is evident that it is the reflex of underlying final nasal consonants, because these final nasals are frequently pronounced as segments in more deliberate styles of speech. Further, when they are realized

¹⁶The backing of the [a] in these examples can be attributed to the preceding velar.

as vowel nasalization there is often a near segmental transition between the nasalized vowel and the following segment, as illustrated in example set (67). It is therefore not difficult to identify the underlying nasals. Further, the distribution of the final nasal consonants is restricted in such a way that there is only a small area of possible overlap. (See below in this section: Distribution of final nasals). Before we discuss these distributional restrictions we need to consider briefly two other aspects of nasalized vowels, namely the number of contrastive qualities and the length of nasalized vowels.

Contrastive qualities for nasalized vowels. Phonetically nasalization occurs with all observed vowel qualities. Contrast is easily established for [ã:], [õ:], [ž:], [ũ:], and [ĩ:]. But this is not the case for the [ẽ:] : [ē:] complex. Here we find that in nasalized syllables, or in phonological terms, in syllables closed by a nasal consonant, no contrast between mid close and mid open front vowel can be found. The variation in vowel height is conditioned by the preceding consonant in a manner which parallels the height variations for oral /e/ and /ɛ/ (cf. table 5). That is, the highest variants occur after /p, tɕ, tɕh/ and the lowest variants after /m, l, r/. Medium variants occur after other consonants. Therefore only one underlying unrounded mid front vowel needs to be postulated in nasalized syllables,

and I arbitrarily symbolize it with /e/.¹⁷ The parameter of height variations conditioned by preceding consonants for /en/ is illustrated in example set (68).

(67)

/khola sɔn tɛ?/ [kʰola sɔ̃:ʔ t̃ɛ:ʔ¹] Give him seeds.

/khola ɕin tɛ?/ [kʰola ɕĩ:ʔ t̃ɛ:ʔ¹] Give him wood.

/khola 'men tɛ?/ [kʰola mɛ̃:ʔ t̃ɛ:ʔ¹] Give him medicine.

(68)

/ɕen/ [ɕẽ:] know

/tɕen/ [tɕẽ:] eye, h

/nehn/ [nẽ:] listen, obey

/'khen/ [kʰẽ:] know, h

/tshen/ [tʃhẽ:] name, h

/then/ [tʰẽ:] pull, v

¹⁷The representation would be less arbitrary if the archiphoneme /E/ were used here. This would represent the fact that it is an obligatory neutralization environment. (I have not used it because I have a dislike for capitals in representations which is of course not a strictly linguistic reason).

The contrast between /e/ and /ɛ/ does generally not occur in closed syllables, except before /?/. I am drawing attention to the neutralization of it before /n/ because of the striking allophonic variation which is observed there.

(68) cont.

/tʰeɦn/	[tʰē:] τ	remember
/'teɦn/	[dē:] τ	undercover
/'men/	[mē:]	medicine
/leɦn/	[lē:] τ	answer

Vowel length and nasalization. Further we need to observe that no length contrasts can be established for syllables closed with nasals. After the interpretation of [ṽ:] as V plus nasal consonant this is not surprising, for long vowels, if they are interpreted as such, only occur in open syllables. Phonetically nasalized vowels are always longish compared with oral short vowels in comparable positions.

Distribution of final nasals. The nasal consonants which occur in LT are /m, n, ŋ/. In the syllable final margin their distribution is somewhat restricted; /m/ occurs after the primary vowels /a, o, u, e, i/, but not after the secondary vowels /y, ø, ε/. Final /m/ is pronounced as a segment. Of the remaining two nasals, /ŋ/ occurs only after /a, o, i/, and /n/ only after /e, ø, y, i/. Thus the interpretation of nasalized vowels can be tabulated as shown in table 6. It becomes evident that only [i:] has the potential of representing either of the two underlying nasals. (The distributional restrictions

for syllable final consonants in general are further explored in section 1.3.4.).

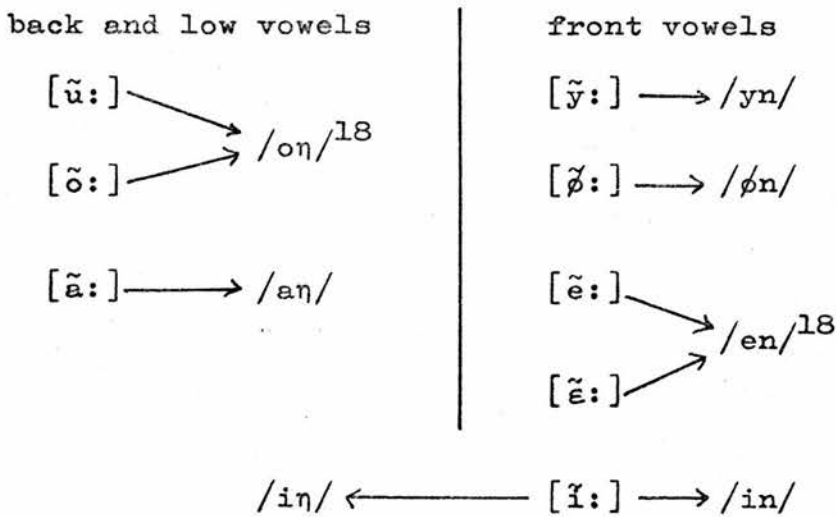


Table 6: Interpretation of nasalized vowels.

1.2.5. Primary and secondary vowels

In the preceding discussion I have occasionally referred to /i, e, u, o, a/ as primary vowels, and to /ɛ, ø, y/ as secondary vowels. Assuming such a dichotomy in the vowel system needs some justification. We can make several synchronic observations which show that the secondary vowels do in fact not have quite the same status as the primary ones. This mainly shows up in their distribution.

¹⁸We have already seen that the contrast between /e/ and /ɛ/ is neutralized before final /n/. Similarly, the contrast between /o/ and /u/ is neutralized before final /ŋ/.

Various restrictions have already been pointed out in the preceding sections and I will sum them up here.

(a) The contrast between short and long vowel duration is not relevant for secondary vowels. They have the somewhat strange characteristic of being long in certain environments while short in others. This seems strange in that vowel length is contrastive for the other vowels.

(b) In second syllables of disyllabic nouns secondary vowels do not occur. (For the definition of 'disyllabic' in this context see section 1.2.2.-- Second syllables in disyllabic nouns).

(c) The contrast between /e/ and /ɛ/ is not relevant in closed syllables, except if closed by /?/.

(d) The list of final consonants after secondary vowels is limited; only /?/ and /n/ occur.

From these synchronic observations it can be gathered that LT must have had only five vowels at some earlier stage, and that /ɛ, y, ø/ have been introduced at some later stage; hence the label 'secondary'.

The pattern of restrictions for the distribution of syllable final consonants in relation to the preceding vowels also indicates the historical source of the secondary vowels. This and the possible consequences for the phonological representation of secondary vowels and the glottal stop will be investigated further in section 1.3.4. At this point I simply want to point out that there is synchronic evidence for the dichotomy in the vowel system.

1.3. Syllable and morpheme structure

The syllable and the morpheme are units which need to be referred to frequently for the description of the suprasegmental contrasts of LT. Syllable structure is especially important for the phonetic realization of tonal contrasts, and the morpheme is the distributional unit for the phonemic contrasts. (These aspects will be discussed in detail later in this study). It is therefore useful to describe these basic units briefly before the exposition of the suprasegmental contrasts.

Though in the earlier writings on generative phonology no theoretically significant status has been accorded to the syllable, more recently several linguists have shown the shortcomings of this position and have advocated the introduction of the syllable into generative theory (e.g. Fudge, 1969; Yen, 1973; Anderson and Jones, 1974; Venemann, 1972; Hooper, 1972). The arguments and proposals of the cited papers seem convincing to me, and it is therefore not out of order to have a syllable section in a phonological description influenced by generative thinking.

The first thesis of Anderson and Jones' paper (1974) tackles the problem of establishing syllable boundaries and I basically accept their criteria for the delimitation of the syllable. They are the following: Associated with each syllable there is a unique sonority peak which can be identified by native speakers. The permissible initial and

final consonant clusters of monosyllabic formatives are the criterion for dividing medial consonant clusters of polysyllabic formatives and words. The syllable boundary for each syllable is pushed out from each sonority peak as far as the constraints for initial and final clusters permit. In cases of alternative possible division, overlap is permitted, that is, a given consonant may belong to both syllables.

To permit overlapping syllable margins seems to me right in principle; but as far as the syllabification of LT is concerned, there is no need for it. Instead, the following two conventions appear to do justice to the syllabification of LT:

(a) The longest medial cluster being no more than CC, the syllable boundary always falls between the two consonants.

(b) Single intervocalic consonants always belong to the following syllabic nucleus.

Convention (b) makes the claim that the open syllable type is preferred over the closed type in LT wherever possible. The strong tendency to eliminate all final consonant margins on the phonetic surface (cf. section 1.3.2.) supports this claim. Convention (a) by itself is actually sufficient for unambiguous division of medial CC sequences but the constraint of permissible initial and final sequences of monosyllabic formatives provides an explanation for

it and also provides a criterion for the division of medial CCG sequences (which occur in compounds).

Anderson and Jones envisage lexical entries as unstructured^u for syllabicity, and the first part of structure assignment involves the designation of syllabic elements and assignment of syllable boundaries. Brown (1972: 40-41) takes a similar approach in the description of the phonology of Lumasaaba. In the following I will distinguish between phonological syllable types and phonetic surface patterns for LT. With this I seem to deviate from Anderson and Jones' hypothesis, and follow Fudge's proposal (1969) who also makes a distinction between phonetic and phonological syllable. The fact is that we can observe various levels in syllable patterning in LT (and probably in any other language as well), but at this point it is not clear to me whether syllabification has in fact a theoretical status in the underlying representation, or whether what I have called phonological syllabification represents the maximally distinct phonetic manifestation of syllabification. I have to leave this question open here.

1.3.1. Phonological syllable types

The eight phonological syllable types of LT are listed in table 7 below.

open types	closed types
CV	CVC
CVV	
CGV	CGVC
CGVV	
V	VC

Table 7: Phonological syllable types of LT.

(G = glide).

Regarding vowel initial syllables we observe that these are preceded by the following consonant-like features on the phonetic surface if they occur word initially: high register morphemes are preceded by glottal plosion ([ʔ]), and low register morphemes by a short period of breathy voice ([ɦ]). In this connection we must note that vowels in the first syllable of a word can be preceded by three glottalic features, namely glottalic plosion, voiceless glottal friction, or breathy voice. Their distribution is shown in figure 1 below. The first two features occur only before vowels with high register and there they contrast with each other. The third feature occurs only before vowels with low register and is in complementary distribution with each of the first two features.

high register	[hamba] 'lie'(n)	[ʔani.ʔ] ↓ 'nun'
low register	[ʔ _h oma] ↓ 'milk'(n)	

Figure 1: Word initial distribution of glottalic features.

Taking the register contrast for granted, we only need to symbolize one of the initial glottalic features in order to preserve the contrast before word initial high register vowels. We have the choice between [ʔ] and [h]. At a first glance it seems that we have to make an arbitrary choice: we can choose to symbolize /h/ and state that it has the two allophones [h] and [ʔ]. But the other choice might seem even more attractive; [h] occurs only in syllable initial position while [ʔ] also occurs in syllable final position, and we have already seen that we need a phoneme /ʔ/ for some of these instances (cf. section 1.1.4.). So if we symbolize syllable initial glottal plosion we can do away with the phoneme /h/ altogether. We will simply have to state that phonological word initial vowels are phonetically preceded by voiceless friction in high register, and by breathy voice in low register. That neither of these two solutions is quite correct becomes apparent from the following fact: word initial glottal plosion and breathy

voice are lost if the same morphemes occur in noninitial position (e.g. as second components in a compound word). Voiceless friction, on the other hand, does not exhibit this unstable behaviour; it occurs consistently with a given morpheme. From this we can conclude that LT has a phoneme /h/ while word initial prevocalic glottal plosion and breathy voice are subphonemic features which need not be symbolized in phonological representations.

1.3.2. Instability of syllable final margins

The set of possible syllable final consonants is restricted to the following seven phonemes:

- (a) Stops: / p k ʔ /
- (b) Nasals: / m n ŋ /
- (c) Liquid: / r /¹⁹

Closed syllables fall into three types according to the nature of the final consonant, type (a) with final stops,

¹⁹Final /l/ has practically disappeared in the speech of my main informant. I have observed it only in the morpheme [ʔo: / ʔoɪ] 'plough' which occurs in [tʰoŋʔo:] 'plough'. If the second component of the compound is pronounced in isolation, final [l] sometimes occurs; but I consider this to be an archaic form, since it is normally only used compounded with /'tʰoŋ/ 'plough'; in the compound final [l] has not been observed. I conclude therefore that the modern phonological representation of the compound is /'tʰoŋ-ʔoo/.

type (b) with final nasals, and type (c) with final liquid. An interesting feature of syllabicity in LT is the strong tendency to eliminate syllable final margins on the phonetic surface; this can be observed for all three types. In the process of the elimination some of the contrastive features of the eliminated margins are transferred to the nucleus of the syllable, thus causing various nuclear modifications. These are summarized in table 8 below.

type of the eliminated margin	modifications on the nucleus	examples
oral stop ↓ glottal stop →	{ some vowel length, pitch fall	/'ɸik/ → [ɸik̄ / ɸīʔ / ɸī̃] /'kahk/ → [ḡak̄ / ḡāʔ / ḡā̃] /kɸʔ/ → [k̄ɸ̄ʔ / k̄ɸ̄̃]
nasal →	{ vowel nasalization and length	/saŋ/ → [sāŋ / sā̃:] /'rihn/ → [ɹ̄in̄ / ɹ̄ĩ:]
liquid →	vowel length	/'mahr/ → [māɹ / mā̃:] /ɸer/ → [ɸēɹ / ɸ̄ɹ:]

Table 8: Modifications on the syllabic nucleus through the elimination of syllable final margins on the phonetic surface.

We notice that oral stops usually go through the intermediate stage of glottal stop; the glottal stop variant represents a more explicit form than the variant with pitch and length features only. At the present stage in the development of the language constant switching back and forth between these alternative realizations takes place; but it is not altogether free variation. The following observations give some indications for the conditioning factors without claiming to be exhaustive, however.

(a) The position of the syllable in the word, phonological phrase, and utterance is relevant. E. g., final margins in the second syllable of a word are normally eliminated.

(b) The degree of desired explicitness is relevant (style of speech).

(c) The bilabial finals /m/ and /p/ are much more resistant to elimination than the other finals.

(d) Among morphemes with final /r/ some seem to be more resistant to elimination than others. This is actually somewhat of a problem. It may mean that some morphemes have /Vr/ only as phonological representation and others two alternative representations, /Vr/ and /VV/. I have not been able to investigate this systematically enough to be conclusive here. (In the vocabulary appendix I have in fact taken the latter position).²⁰

Footnote 20 see next page.

1.3.3. Phonetic surface patterns

Although there are no underlying CC and VVC sequences within the syllable, such syllable types occur on the phonetic surface as a result of contractions and vowel deletions, and the same processes also give rise to syllables with other final consonants than the ones listed in the previous section. Example set (69) illustrates this. Unexpected sequences and finals are underlined in the phonetic transcriptions.

(69)

/sum-tsa/	[sum <u>ts</u>]	about three
/tʃon-ru/	[tʃ ^h o <u>ŋʃ</u>]	cause to become smaller
/'kʃeh?-tsa/	[ʃj _ɪ e? <u>ʃts</u>]	about eight
/'tho?-ru/	[t ^h o? <u>ʃ</u>]	cause to become higher

²⁰ A plausible explanation for the behaviour of these morphemes has been brought to my attention by Roger Lass. He suggests that material like this is normally symptomatic of ongoing change; we observe a change in progress with 'lexical diffusion'--i.e. only certain morphemes (as yet) are subject to the change. For the morphemes with /Vr/ sequences in LT this would mean that the majority is already affected by the change; but a few would have to be marked as not yet having been reached by the change. The same principle probably applies to the elimination of the other syllable final consonants, because there, too, some morphemes appear to be more resistant than others.

(69) cont.

/səh?-'koh rəh? sah/	[səʔgəʔeʔs]	they say (you) must build...
/soh?-rəh?-'təhəh?/	[səʔtəʔ]	kind of, sort of
/'mar-ru, 'maa-ru/	[ma:ɹ]	cause to become lower
/'taŋ-'koh sah/	[taŋgəʔs]	they say (you) must send...
/thah-kaa-tsa/	[tʰaga:ts]	just about there
/'suuh-'təhəh?/	[sʰt:tʰ / sʰt:ɹ]	a manner of shouting
/nahŋ-la/	[nã:l]	inside, into

1.3.4. Phoneme distribution within the syllable

Consonants of the initial margin. In a simple initial margin consisting of a single C all consonants except glottal stop occur.

In a complex initial margin with the CG structure, /j/ is the only glide which occurs, and the velars /k, kh, ŋ/ are the only consonants which may precede it.

Vowels of the nucleus. Single vowel nuclei can be filled by any vowel (but there are co-occurrence restrictions between vocalic nucleus and syllable final margin; these will be discussed in the following paragraphs).

Double vowel nuclei are always filled by identical vowels and only the five primary vowels occur. On the phonetic surface long vowels occur frequently, but if all the mor-

phemes which show variation between [Vr] and [V:], and [Vwa] and [V:] respectively were excluded from underlying phonological patterns, double vowel nuclei would be relatively rare. Some examples of morphemes where no variation has been observed are given in set (70).

(70)

/ʔii/	two	/moo/	grandmother
/ʔkii/	loud shout	/ʔthon-ɸoo/	plough, n
/riih/	fall over		
/seeh/	say	/naah-pu"/	painful
/ʔreeh/	depend on	/ʔkaah-pu"/	happy, lovable
/ʔseeh/	take, h	/ŋaa-pu"/	early

Co-occurrence restrictions between nucleus and final margin. A closer examination of these restrictions causes us to take a more abstract look at the secondary vowels and the glottal stop. The co-occurrence restrictions are summarized in table 9 on the following page. The top row lists the vowel phonemes and the rightmost column the possible final consonants. Occurring VC sequences are filled in in the appropriate cells. For non-occurring sequences a dash appears in the corresponding cell.

Looking at the distribution of final nasals we realize that /m/ and /ŋ/ do not occur after secondary vowels. Further, in the row for the dental nasal the cells for /un/ and /on/ have a dash but we find /yn/ and /ɸn/ listed for the secondary vowels.

* marginal occurrences; needs further investigation, cf. p. 74-75.

i	e	a	u	o	y	ø	ɛ	<u>nasals</u>
im	em	am	um	om	-	-	-	/m/
in	en	(an) [*]	-	-	yn	øn	-	/n/
iŋ	(eŋ) [*]	aŋ	oŋ		-	-	-	/ŋ/
								<u>stops</u>
ip	ep	ap	up	op	-	-	-	/p/
ik	ek	ak	uk	ok	-	-	-	/k/
i?	e?	(a?)	(u?)	(o?)	y?	ø?	ɛ?	/?/
								<u>liquid</u>
ir	er	ar	ur	or	-	-	-	/r/

Table 9: Summary of the co-occurrence restrictions between nucleus and syllable final margin.

This distribution would allow us to say that fronting of nonfront vowels occurs before dental nasals, and we could postulate the following derivation:

/on/ → [ø:]

/un/ → [ÿ:]

In order to get a coherent system we should be able to derive all secondary vowels from final dentals.²¹ Looking at

²¹This analysis for secondary vowels has in fact been proposed by Kjellin (1976a:137); but he does not discuss it in detail.

the distribution of final stops we realize that /p/ and /k/ also don't occur after secondary vowels, and we further notice that /t/ is missing in the list of possible finals. The next logical step then is to postulate the following derivations:

/ut/ → [y?]

/ot/ → [ɔ?]

/at/ → [ɛ?]

Now we still need to derive secondary vowels in open syllables. Since the liquid /l/ is a dental and is missing in the list of finals we can derive these from an underlying final /l/:

/ul/ → [y:]

/ol/ → [ɔ:]

/al/ → [ɛ:]

Thus the derivation of secondary vowels is quite straightforward. But having postulated an underlying /t/ for [ʔ] in some environments, we should be able to eliminate the glottal stop from the phoneme inventory altogether. This would make the hypothesis much more attractive. The occurrences of glottal stops after primary front vowels presents no problem; since these have no 'umlaut' counterparts we can postulate:

/it/ → [iʔ]

/et/ → [eʔ]

But problems do arise with the occurrences of glottals

after the primary non-front vowels. These sequences are put in brackets in table 9 because they have a somewhat limited distribution: so far I have observed non-varying /a?/, /u?/, and /o?/ sequences mostly in disyllabic words. Monosyllabic words usually show variation between final glottal and velar stop. (A few monosyllabic morphemes involving these sequences are listed in the vocabulary appendix, e.g., /'ηa?/ 'ask for, /ηa?/ 'mantra', /ɕo?/ 'come', /soh?/ 'eat', but this may be due to limitations in observation). But in any case we have to account for the occurrence of these sequences in disyllabic words. Example set (19) gives some illustrations (cf. section 1.1.4.). Where the glottal occurs after the second vowel nucleus in disyllables, postulating a final /k/ is quite plausible; we have seen that in second syllables final margins normally don't surface (cf. section 1.3.2.a). However, where the glottal occurs after the first vowel nucleus, /k/ is implausible because in this environment we expect /k/ to surface, or at least to observe variation between [k/g] and [ʔ] on the surface, but such variation is not observed for those items. A final /t/ cannot be postulated here because fronting of the vowels doesn't take place.

A further set of morphemes which cause problems for the derivation of phonetic glottal stop and glottal constriction from underlying oral stops is given in example set (71).

(71)

/'tho?-pu"/	[t ^h oʔβ _u]	high
/'tho?-pʰʔ"/	[t ^h oʔpʰʔ]	highest
/'tʰo?-pu"/	[tʰoʔβ _u]	happy, h
/'tʰo?-pʰʔ"/	[tʰoʔpʰʔ]	happiest, h
/tok-pa"/	[toŋb _a]	hungry
/tok-pʰʔ"/	[tokpʰʔ]	hungriest
/tʰap-pu"/	[tʰəʔβ _u]	thin
/tʰap-pʰʔ"/	[tʰəʔpʰʔ]	thinnest

For the first two adjectives of set (71), /'tho?-pu"/, and /'tʰo?-pu"/, we cannot postulate a final /t/ because fronting of the vowel does not take place. We also can't postulate a final /k/ because [k] never surfaces in these morphemes; thus /ʔ/ contrasts with the syllable final /k/ of words like /tok-pa"/. (The words of set (71) are recorded in a uniform style of speech). We also cannot postulate final /p/ because we must expect it to surface in the superlative forms as it is the case for /tʰap-pu"/. Thus, from the examples of sets (19) and (71) we must conclude that there are morphemes for which we cannot postulate one of the oral stops /k/, /t/, or /p/ for the derivation of surface glottal features. But after all, we do still have another voiceless unaspirated stop in the stop inventory

which so far has been absent from the list of final consonants; so why not postulate an underlying /t/ in these environments?! The result would be unambiguous but certainly not plausible to Tibetan speakers. Therefore I see myself forced to abandon the more abstract interpretation of secondary vowels and glottal stop and to accept these items as phonemes of LT.

1.3.5. Morpheme structure

Restrictions for the distribution of phonemes within the syllable have already been stated. Additional conditions can be stated for disyllabic morphemes; these are summarized in table 10. In general we observe a heavy concentration of distinctive features manifested on the first syllable of a morpheme while second syllables have a considerably smaller manifestation potential for contrasts.

	<u>first syllable</u>	<u>second syllable</u>																
<u>pitch:</u>	primary exponent of the distinctive pitch features	in the 'back water' of distinctive pitch features																
<u>vowels:</u>	all vowels occur	only primary vowels occur																
<u>consonants:</u>	<table border="1"> <thead> <tr> <th><u>initial</u></th> <th><u>final</u></th> </tr> </thead> <tbody> <tr> <td>all consonants occur</td> <td>same as</td> </tr> <tr> <td>C/CG contrast occurs</td> <td>syllable</td> </tr> <tr> <td></td> <td>final</td> </tr> </tbody> </table>	<u>initial</u>	<u>final</u>	all consonants occur	same as	C/CG contrast occurs	syllable		final	<table border="1"> <thead> <tr> <th><u>initial</u></th> <th><u>final</u></th> </tr> </thead> <tbody> <tr> <td>no aspirated and</td> <td>same as</td> </tr> <tr> <td>no retroflex C's,</td> <td>syllable</td> </tr> <tr> <td>no CG margins</td> <td>final</td> </tr> </tbody> </table>	<u>initial</u>	<u>final</u>	no aspirated and	same as	no retroflex C's,	syllable	no CG margins	final
<u>initial</u>	<u>final</u>																	
all consonants occur	same as																	
C/CG contrast occurs	syllable																	
	final																	
<u>initial</u>	<u>final</u>																	
no aspirated and	same as																	
no retroflex C's,	syllable																	
no CG margins	final																	

Table 10: Distributional restrictions of contrastive features for disyllabic morphemes.

2.1. The intersection of voice quality and pitch movement

With this chapter we turn to the main concern of this study--the tones of Lhasa Tibetan. The suprasegmental contrast system of this language comprises two binary features. One feature involves a contrast in voice quality and the other a contrast in pitch movement. The intersection of these two features results in four contrastive pitch patterns (cf. figure 2). The morpheme and not the syllable is the domain for which these contrasts are relevant. Nevertheless the syllable plays an important role in that the most salient phonetic features of voice quality and pitch movement are realized on the vocalic nucleus of the first syllable of the morpheme. The subsequent voiced segments of the morpheme are of course also affected, but they are overshadowed by the first syllable. Morphemes are either monosyllabic or disyllabic. A more detailed discussion of the morpheme as the distributional unit for contrastive pitch patterns follows in section 2.2. For the moment it is sufficient to note that the features under discussion will be most clearly manifested on first syllables of morphemes, and that references to syllable types concern these syllables.

We will now first turn to a closer examination of voice quality. This feature opposes modal voice to breathy voice, that is, vowels are phonated either with modal voice or with breathy voice. Concomitant with the voice quality contrast we also observe a substantial difference in pitch level in most environments: modal voice is accompanied by a relatively high pitch and breathy voice by a relatively low pitch. (The influence of different environments on the pitch level of the registers will be discussed later in this section). In the following the correlation of relatively high pitch and modal voice will be called high register and the correlation of relatively low pitch and breathy voice will be called low register. 'Register' has been used quite widely for different phonation types in South East Asian languages, and it is a convenient abstract term for such a correlation of voice quality and pitch.

The physiological mechanisms involved in producing the voice qualities are, as far as I could observe and deduce, the following: During the phonation of high register vowels the larynx is raised above its neutral position and for low register it is slightly lowered. This can be observed externally. For the subject I observed most closely, the raising was more pronounced than the lowering. For high register the thyroid cartilage moved up 2 - 3 cm, while for low register it moved down $1/2$ - 1 cm. Vertical

displacement of the larynx is observed in many languages, and Catford (1964:34), for example, comments on this as follows:

"As is well known, larynx-raising is a common accompaniment of high pitch (presumably because the larynx is braced up to the hyoid bone to withstand the strong pull of the crico-thyroid muscle acting to stretch the vocal folds), and larynx lowering often accompanies the production of (long) voiced stops..."

I assume then, that in LT too, the vertical displacement of the larynx is mainly used to achieve the relatively high and low pitch levels. But auditorily we can further observe that high register vowels sound clear and perhaps slightly metallic, while low register vowels sound somewhat muffled and breathy. The two registers are characterized by a different mode of vibration, and my impression is that this is not solely a consequence of the different pitch levels, but that a different glottal aperture is used for each register. This is not easily observed; but the study of Laver's detailed work on voice quality (1975 and 1976) has allowed me to draw the conclusion that high register links relatively high pitch with modal voice, while low register links relatively low pitch with breathy voice. For the definition of breathy voice Laver cites Catford (1964), agreeing with him that its characteristics are a "... combination of breath and voice: glottis relatively wide open: turbulent airflow as for 'breath' plus vibration of vocal folds. The vocal

folds do not meet at the centre line: they simply 'flap in the breeze'." (Catford, 1964:32). Regarding the muscular activities for breathy voice Laver adds the following details:

"The muscle tension adjustments necessary for breathy voice can thus be seen as minimal adductive tension and weak medial compression, just enough to allow aerodynamic forces in the large volume of transglottal airflow to superimpose a very inefficient vibration of the vocal folds (...). The one laryngeal tension factor that is controlled more finely is longitudinal tension, in the production of appropriate variations of fundamental frequency for the purposes of intonation. We can assume that the degree of longitudinal tension is rather low, generally. High pitched breathy voices seem rare." (1976:103).

In order to understand this definition of breathy voice correctly we must realize that, though the lax setting of the vocal folds and their incomplete adduction does allow a larger egressive airflow, this does not necessarily result in audible friction. Laver comments on this as follows: "Many writers have used the label 'breathy' to describe components in given phonatory qualities that should rather have been called 'whispery', in the terms presented here." (1976:103). As far as the breathy voice of LT is concerned, audible friction does not normally occur. But

speakers may produce it in very distinct speech, especially on open monosyllabic morphemes.

The characteristics of modal voice, which is the voice quality of the high register in LT, are according to Catford and Laver the following: Catford says that the full glottis is involved during phonation "both ligamental and cartilaginous, functioning as a single unit" (Catford, 1964:32). Laver further specifies the muscular activity of the vocal folds:

"The production of modal voice is (...) carried out with only moderate adductive tension and medial compression, and with moderate longitudinal tension when the fundamental frequency is in the lower part of the range used in ordinary conversation. The vibration of the larynx in this condition is regularly periodic, efficient in producing vibration, and without any audible friction brought on by incomplete closure of the glottis." (1976:85).

The modal voice setting of high register in LT may also involve a certain degree of muscular tenseness in the overall setting of the larynx; but the vowel quality is not affected by this tenseness.

Though I have not been in a position to make any voice quality experiments with Tibetan speakers which could prove this hypothesis I am quite confident that these are the physiological mechanisms involved in the phonation of high

and low register of LT. Dr. Laver listened to some taped utterances of LT and identified the voice qualities as modal and breathy voice in terms of his descriptive framework for laryngeal activity; and further, his own demonstration of these voice qualities I perceived to be very similar to the register contrast of LT. Therefore I conclude that register is not merely a pitch feature, but that it is linked with voice quality features that are characterized by different glottal apertures.

The second feature of the suprasegmental system of LT involves pitch movement. A basically level pitch course is opposed to a moving pitch contour. In the high register the moving contour is falling, and in the low register rising. The pitch movement opposition seems to be a pure pitch contrast. Regarding the physiological mechanism involved in the production of it no special observations have been made. Some phoneticians admit that the control of fundamental frequency changes in speech is still not known in detail (e.g. Lindqvist, 1969:29). But they report that for lower pitch the vocal folds are shorter and thicker and for higher pitch longer and thinner. I assume here that the necessary pitch adjustments for the contours are brought about by adjustments of tension in the vocal folds.

To sum up the discussion then, the suprasegmental features of LT comprise the two binary features of voice

quality (register) and pitch movement, and the intersection of these results in four contrastive pitch contours.

Figure 2 gives a schematic representation of the suprasegmental contrasts of LT. The high vs low register opposition is on the vertical parameter and the basically level vs moving pitch contour opposition on the horizontal parameter. The numbers in the left hand bottom corner of each cell are the reference numbers which will be used in referring to the four different pitch contours.





	moving pitch contour	basically level pitch contour
<u>low register</u> (breathy voice)	1 	2 
<u>high register</u> (modal voice)	3 	4 

Figure 2: Schematic representation of the suprasegmental contrasts of LT.

The shape of the contrastive pitch profiles (or contours) is represented by lines in this study. In view of the subtlety of the tonal distinctions this seems the most instructive representation. In the low register the initial pitch level of the rising contour (pitch contour 1) is

somewhat lower than the one of the level contour (pitch contour 2). In the high register the initial pitch level of the falling contour (pitch contour 3) is somewhat higher than the one of the level contour (pitch contour 4).¹

The approximate relation in which the four pitch contours stand to each other is expressed graphically in figure 3. The five lines are reference lines to five equally distant pitch levels. They are not to be equated to the five lines of the musical staff but represent more closely spaced pitch levels.

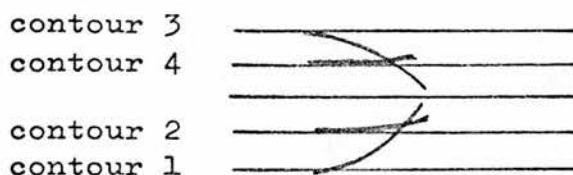


Figure 3: Graphic representation of the four contrastive pitch contours.

¹In assigning numbers to the pitch contours I have followed the tradition of using the lowest number for the lowest pitch and higher numbers for higher pitches. Since pitch contour 3 starts ideally at a somewhat higher level than pitch contour 4 it should have the higher number. The reason which prevented me from switching the numbers is the systematic correspondence between contour 1 and 3 on the one hand, and between contour 2 and 4 on the other. (For the details see section 3.1. --Pairing of the contours). With the arrangement chosen odd numbers are reserved for the pair of moving contours and even numbers for the pair of basically level contours.

The contours as represented, though they are quite close to the phonetic reality, are not to be taken as absolutely phonetic. They represent some degree of phonological abstraction insofar ^{as} ~~that~~ I have aimed at abstracting any overlaid intonation factors. This is particularly relevant for contours 2 and 4, where I have used the term 'basically level' in order to give them a common denominator. In actual speech the basic contours will most often exhibit some overlaid intonation or transition features which modify them, so that contour 4 often ends in a fall and contour 2 in a rise. We also must keep in mind that that when monosyllabic words are pronounced in isolation the contours of such items will manifest a heavy overlaid intonation pattern which modifies the contours considerably, especially at the end.

The most neutral environment for establishing basic contours appears to be the first syllable of disyllabic morphemes. In monosyllabic words transition features modify the end of the contour somewhat in most environments. The kind of abstractions which are involved in the representations are further exposed in the section on pitch variation and the example sets given there show the different contours in various phonological environments (cf. section 2.3.).

The distance between the pitch levels of high and low register varies according to the position in the utterance.

The general up- and downdrift of an utterance with neutral intonation is sketched out in figure 6 (cf. section 2.3.4). It shows that the distance between the pitch levels is greatest in the nucleus of an utterance. In musical terms high and low register are normally one minor third to one fourth apart in this position; the distance between the level contours 2 and 4 is a minor to a major third, and the moving contours start barely half a step higher or lower.

Before turning to a detailed exposition of the contrasts on the different morpheme types two aspects of the tone analysis presented here need to be discussed in some detail. They concern the role of register in previous descriptions of LT, and the role and nature of register in this analysis. We have just seen that voice quality is intimately linked with pitch level in that modal voice conditions relatively high pitch, and breathy voice relatively low pitch. The features are so intimately linked that other scholars working on Tibetan have always taken the pitch as the primary exponent of the contrast. Looking at three analyses of Western scholars we can draw the following parallels: What I propose^o as a contrast of voice quality corresponds to Sprigg's (1968/69 and others) high tone and low tone words. It also corresponds to Chang and Shefts' (1964:1) high and low tone on single vowels, or to Sedláček's (1961:183) category of high tones and category of low tones.

This contrast then, has long been recognized and is the feature which has given LT the reputation of being a tone language. However, since I suggest in this study that this is not a purely tonal phenomenon, and that the primary exponent of the contrast is voice quality, it follows that if these were the only tone contrasts in LT we would not need to call it a tone language. Though this feature is superimposed on vowels, it can be said to be of the same nature as creaky voice, or nasalization. However, as already stated above, the register contrast is only one of the features of the suprasegmental system of LT. The other feature, that is, the pitch movement contrast, I consider to be of a purely tonal nature, and therefore LT still deserves the designation 'tone language'.

Regarding the role and nature of register in this analysis the following questions need to be discussed: Why is it necessary to appeal to the intersection of two binary features, and what evidence is there for the claim that voice quality and not pitch is the primary exponent of the register contrast? If pitch were taken to be the primary exponent we could postulate a tone system with four contrastive pitch contours on one parameter. Would such a representation be adequate for the suprasegmental contrasts of LT? The observations which provide an answer to these questions are the following: The phonetic realization of the register contrast in different phonological environments suggests that the voice quality features are just as

important, or perhaps even more important for the perception of the registers than the pitch features. In addition to that LT exhibits grammatical correspondences which clearly point to two intersecting parameters on the systematic level.

We will first turn to a closer examination of the phonetic realization of register in different environments.

The pitch level difference for high and low register is maintained quite consistently in the more prominent parts of the utterance, but in the less prominent parts, where intensity is fading away, we find that high and low register often have nearly the same pitch level. (See also section 2.3.4.). Nevertheless, register contrasts are not neutralized in such environments; the voice quality contrast is maintained, and presumably it becomes the more important clue for perception. The organisation of the utterance into more and less prominent parts is, of course, subject to many significant variations. These cannot be described in detail here; but the two sentences of example set (72) are an attempt to illustrate the observation mentioned above. In the first sentence the less prominent parts are two post-positioned phrases; they are uttered with low intensity and the pitch level difference is much smaller than in the prominent part, but the low intensity seems to favor voice quality perception; pitch contour movements are short too, but nonetheless, both contrasts, register and pitch movement are preserved in all environments.

In the second sentence the pitch of the first occurrence of the morpheme /'thahn/ 'and' further illustrates my point on voice quality. It is in the prominent part of the utterance, but in order to emphasize the enumeration it is pronounced with deliberate hesitation. Being emphasized, it starts on a relatively high pitch, and due to the hesitation the rise is prolonged; but even in the latter part of the rise low register voice quality breaks through as a series of creaks. The pitch of the final attitude particle /mi/ is also revealing. A low register particle in this position would be only trivially lower, but would nevertheless exhibit distinctive voice quality features.

(72)

/ani 'thøn 'johŋ-pa rch?, nah-tsoh ; ta sɔhn 'tɕhəh? ./

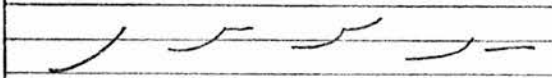
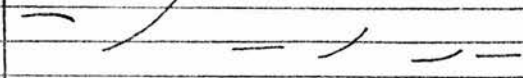
'And then we left, riding on horses.'

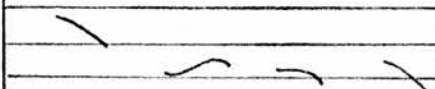
prominent	less pr.	least prominent
[ʔəni tʰø: jombɜ ɬe:ʔ]	ŋandzɔ	ta sɔ̃: tɕʰe:ʔ]
4 3 1 2	2 2	4 2 1

/'mahr tɕh-ki" tɕh-ki", nah-tsoh; ta-'thahn tsoh-'thahn
 theh-teh 'juk-ɕahk tuhk mi ./

'As we kept going upwards we saw horses, hybrid yaks and similar things abandoned.'

(72) cont.

less prominent					more prominent				
[ma: ₁ du: ₁ gi du: ₁ gi na: ₁ ndzo: ₁]					tada: ₁ ???' ndzodā: ₁ t'ende: ₁				
									
1	2	2	2	2	4	1	2	1	2 2

less prominent			
jɬk'ɕa: ₁ ? du: ₁ mi: ₁]			
			
3	1	2	4

As far as my observation goes neither the register nor the pitch movement contrasts are leveled out by intonation patterns. On the contrary, I have been repeatedly impressed by the consistent retention of these contrasts in all environments. What does level out to some extent is the pitch level difference, but the voice quality contrast is maintained. The fact that pitch has generally been taken as the primary exponent of register seems to have led to some strange statements about the status of tone in Tibetan, such as the following:

"Words in citation form have clear lexical tone and many minimal pairs can be found. Indeed Tibetan is classically listed as a tone language. In utterances, however, tonal distinctions are very nearly leveled out, and a sentence intonation system takes its place. (...) Only in very restricted places can any of the

tonal contrasts be found. On a sentence level, Lhasa Tibetan is in no sense a typical tone language." (Gleason, 1961:300).

The suggestion that a language should have a tone system for citation forms and some very restricted places of the sentence seems rather extravagant. While LT may be 'in no sense a typical tone language' in that the tone contrasts are subtle, it nevertheless makes consistent use of the lexical voice quality and pitch contour of any given morpheme. Certainly it also uses pitch variations for various intonation patterns, but the suprasegmental parameters can accommodate and reconcile both systems.

To pursue the argument on voice quality further we need to look at the behavior of register in stem compounding and suffixation. These processes also create environments where pitch level differences are minimized. In the domain of compounding we find that in second components of stem compounds the pitch profile dimensions are reduced (cf. section 2.4.1.), but the phonetic contrast is retained, and I presume that here again, voice quality is the important clue for perception. This seems to be especially relevant in distinguishing between contours 2 and 4 in second components because both have a basically level pitch. Two illustrations are given in set (73). The pitch level difference between contour 2 and 4 in the second components is so slight that if no attention is paid to voice quality features the contrast is

easily missed.

(73)

/4 tɕhu-ɬahm 2/	[tɕ ^h ʌŋd̪əm — —]	shore
/4 tɕhu-n-tsham 4/	[tɕ ^h ʌndzəm — —]	water boundary
/2 ɕuhk-ɕihŋ 2/	[ɕ ^h ʌkɕi: — —]	field, h
/2 ɕuhk-ɕih 4/	[ɕ ^h ʌkɕi: — —]	wood, h

In the domain of suffixation we find that assimilating suffixes give rise to an additional contrast dimension among suffix morphemes, and this creates rather subtle pitch contrasts between suffixes with pitch contour 2 and 4, and with assimilating suffixes. For a more detailed exposition of this situation I refer to section 2.5.1. and especially to example set (188) which illustrates the contrast between these three suffix categories. We find that here too, voice quality is an important factor in the manifestation of the contrast between contour 2 and contour 4 suffixes, which are phonetically quite distinct, but without reference to voice quality it is difficult to say how.

The grammatical evidence that points to the intersection of two features is found in the rules of pitch shift that a large number of verb stems follow for transitivity shifts: for these stems a shift in transitivity entails a shift from low to high register; contour 2 stems shift to contour 4, while contour 1 stems shift to contour 3. This

aspect of LT (and of some related Bodic languages) is discussed in detail in section 3.1. The conclusion there is, that it represents solid evidence for the intersection of two binary features on the systematic level.

To sum up the argument here, then, we can say that LT affords grammatical evidence which points to the intersection of two binary features and phonetic evidence that the two features are physiologically of a different nature. Therefore it is necessary to appeal to the intersection of two binary features for an adequate description of the suprasegmental contrasts of this language, and the recognition of the importance of voice quality makes the system more plausible and consistent.

2.2. Contrastive pitch contours on stem morphemes

The morphemes of an inflecting language naturally fall into two categories according to their grammatical function. On the one hand we have stem morphemes with a predominantly lexical function, and on the other hand the affix morphemes with a predominantly relational function. There is no clear cut between these two morpheme categories in LT as far as their tonal behavior is concerned. Basically the same features account for the suprasegmental contrasts among stem and suffix morphemes. We will see, however, that the suffix system exhibits one additional contrastive feature which presumably arose from the different function of the suffixes (cf. section 2.5.1.). This shows that the different nature of the two morpheme categories is reflected to some extent on the phonological level, and in exposing the contrasts it is convenient to look at the two domains separately.

Domain of relevance for pitch contours. Traditionally LT has been described as a syllable tone language. The only reason why this hypothesis has been able to survive so long, I assume, is that the overwhelming majority of morphemes in LT are monosyllabic. Nevertheless, there are a few disyllabic morphemes, especially among the nouns, and their tonal behavior should no longer be overlooked. Examining the tonal possibilities for the second syllable of truly disyllabic morphemes we find that they are zero; that is,

no morphemes exhibit pitch contrasts on their second syllables. The phonetic pitch profile of these syllables is subordinated to the tonal characteristics of the morpheme as a whole. Thus the domain which is relevant for contrastive pitches in LT is the morpheme and not the syllable. This hypothesis has already been mentioned in the introduction, but further elaboration and justification for it has to wait until after the presentation of the basic contrasts, the examination of the tonal behavior of stem compounds, and the tonal behavior of suffixes (cf. section 3.2.). For the presentation of the contrastive evidence care has been taken to distinguish between monosyllabic and disyllabic morphemes. This is sufficient because morphemes containing more than two syllables have not been observed.

Syllable final margins and pitch contours. The most striking modifications of the four contrastive pitch contours are caused by the syllable final margin of the first syllable of a morpheme. We can distinguish five syllable types according to the effect the final margin (or its absence) has on the pitch contour of a morpheme. They are the following:

- (CG) V (open syllables with short vowels)
- (CG) V? (syllables closed with a glottal)
- (CG) VN (syllables closed with a nasal)
- (CG) VC (syllables closed with other consonants)
- (CG) VV (open syllables with long vowels)

Though the final glottal is analyzed as a stop consonant its presence has a unique effect on the pitch contour of the syllable, and it may alternatively be realized by pitch features only in certain environments. (Cf. figure 5 later in this section, and section 1.3.2.). For this reason syllables with a final glottal are not included here with the (CG)VC type, but listed as a separate type. Since the nature of the syllable initial margin is unimportant for the realization of pitch contours it will be represented just with C in the subsequent schematic symbolizations of syllable types.

Symbolization of pitch contours. In the following sets the examples are first given in the phonological representation. For the transcription of the suprasegmental features the following conventions are used:

(a) Breathy voice quality is symbolized with an h after the vowel; that is, the two contours of the low register both have an h after the vowel.

(b) Modal voice is left unmarked; that is, no h appears after the vowel with the two contours of the high register.

(c) The basically level contours 2 and 4 are left unmarked.

(d) The moving contours 1 and 3 are signalled with an apostrophe before the morpheme.

In addition the pitch contour of each example is redundantly signalled by the contour reference number which pre-

cedes it. The conventions used reflect the intersection of the features. Figure 4 summarizes them with four hypothetical morphemes.

	moving	basically level
<u>low register</u>	'loh ˆ 1	loh — 2
<u>high register</u>	'lo ˆ 3	lo — 4

Figure 4: Symbolization of the suprasegmental features in phonological representations.

The use of h for the symbolization of breathy voice is not meant to suggest that voice quality is a segmental feature, or that breathy voice is a phonetic manifestation of the glottal fricative /h/. It should be taken as an abstract symbol which has been chosen for the phonological transcription because it is easier for typing than a diacritic symbol. Breathly voice has of course some phonetic resemblance to a glottal fricative which is a prop for the memory. The use of h for the symbolization of breathy voice does not interfere with the symbolization of the phoneme /h/ because the latter occurs only in syllable initial position of high register morphemes, while the h for breathy voice always appears after the vowel.

2.2.1. Monosyllabic stem morphemes

In the presentation of the contrastive evidence for the fourfold pitch contrast care has been taken to show that it is relevant for morphemes of any syllable shape. The arrangement of the example sets follows the classification of syllable types according to the nature of syllable finals.

Example sets (74) - (85) illustrate the contrast between basically level and moving pitch contour for morphemes with CV syllable shape.

Sets (74) - (76) first illustrate the contrast for low register. Set (74) gives minimal pairs for the pitch contrast, set (75) contrasts in analogous environments, and set (76) minimal pairs for underlying short but phonetically long vowels.

(74)

2 /tɕhah/	[tɕ ^h a —] ²	tea
1 /'tɕhah/	[tɕ ^h a ↘]	bird

²The transcriptions in square brackets in this section are semiphonetic; only those consonant and vowel variations are indicated which are especially relevant in the suprasegmental context. For consonants this affects mainly the voicing parameter of morpheme initial stops, and for vowels mainly the duration of the vocalic nucleus. Other details are omitted.

(74) cont.

2 /koh/	[ŋg _o ˘]	head
1 /'koh/	[g _o /]	door
2 /tah/	[ⁿ da _u ˘]	bow and arrow
1 /'tah/	[da _o /]	message

(75)

2 /phuh/	[p ^h u _u ˘]	son, boy
1 /'t ^h uh/	[t ^h u _u /]	boat, ship
2 /tsoh/	[ⁿ dzo _o ˘]	hybrid between cow and yak
1 /'toh/	[do _o /]	stone, n
2 /tseh/	[ⁿ dze _u ˘]	leprosy
1 /'meh/	[me _u /]	fire, n

(76)

2 /p ^h eh/	[p ^h e _u : ˘]	song
1 /'p ^h eh/	[p ^h e _u : /]	mouth, h
2 /lyh/	[ly _u : ˘]	body
1 /'lyh/	[ly _u : /]	boil over, v(itr)

Sets (77) - (79) illustrate the same contrast for high register. Set (77) contains a minimal pair, set (78) contrasts in analogous environments, and set (79) minimal pairs for underlying short but phonetically long vowels.

(77)

3 /'na/	[na ˘]	five
4 /na/	[na -]	drum, n

(78)

3 /'sa/	[sa ˘]	earth, ground
4 /sa/	[sa -]	meat, flesh

3 /'pu/	[pu ˘]	hair, fur
4 /ku/	[ku -]	statue

3 /'tho/	[tho ˘]	list, n
4 /kho/	[kho -]	he

3 /'tʰhi/	[tʰhi ˘]	throne, n
4 /khi/	[khi -]	dog

(79)

3 /'tshɛ/	[tshɛ: ˘]	vegetables
4 /khe/	[kʰɛ: -]	load, n

3 /'thɔ/	[thɔ: ˘]	hear
4 /thɔ/	[thɔ: -]	be extra, left over

Sets (80) - (85) illustrate the fourfold pitch contour contrast in analogous segmental environments. While sets of three contrasting pitch contours with identical segments are not uncommon, minimal sets for all four patterns are rare. In the sets which illustrate the fourfold pitch con-

trast, therefore, the segments are often not identical, but they are similar enough to exclude any conditioning ^{of} ~~on~~ pitch.

(80)

3 /'ka/	[ka ˘]	command, speech
4 /t̥a/	[t̥a ˉ]	head hair
2 /t̥ah/	[n̥d̥a ˘]	bow and arrow
1 /'t̥ah/	[d̥a ˘]	enemy

(81)

3 /'ŋa/	[ŋa ˘]	five
4 /ŋa/	[ŋa ˉ]	drum, n
2 /ŋah/	[ŋa ˘]	I
1 /'kah/	[g̥a ˘]	saddle, n

(82)

3 /'lo/	[lo ˘]	cough, n
4 /so/	[so ˉ]	tooth
2 /loh/	[lo ˘]	age, year
1 /'ŋoh/	[ŋo ˘]	face (in certain contexts)

(83)

3 /'ny/	[ny: ˘]	silver
4 /phy/	[p ^h y: ˉ]	offer, v
2 /lyh/	[ly: ˘]	body
1 /'t̥yh/	[d̥y: ˘]	snake

(84)

3 /'khe/	[k ^h ε: ˘]	spin, v
4 /khe/	[k ^h ε: —]	load, n
2 /kheh/	[k ^h ε: ˘]	litter, n
1 /'t ^h eh/	[t ^h ε: ˘]	mule

(85)

3 /'nje/	[nje: ˘]	make s. o. lie down
4 /re/	[re: —]	tear, v(tr)
2 /reh/	[re: —]	tear, v(itr)
1 /'nje ^h /	[nje: ˘]	lie down, v(itr)

Example sets (86) - (94) deal with morphemes of the CV? syllable shape. In this group the basic contour profiles are considerably modified by the occurrence of the final glottal stop, and vowel length is also affected by it. At the end of a phonological phrase /ʔ/ is usually realized as [ʔ¹] and preceded by a sharp fall in pitch. This fall is naturally deeper and therefore more noticeable with the high register pitch contours, and the vowel seems to be longer too. This, however, may be an acoustic deception (i.e., the extent of the pitch fall may produce an illusion of length).

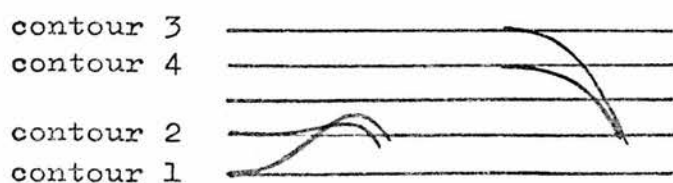


Figure 5: The four pitch contours as modified by final /ʔ/.

Sets (86) and (87) illustrate the contrast for low register, and sets (88) and (89) for high register. Sets (90) - (94) are examples of the fourfold contrast. Set (90) contains the only minimal set for the fourfold pitch contrast I have discovered so far.

Low register contrasts for CV?-morphemes.

(86)

2 /pøh?/	[^m b _h ·?¹ ↘]	call, v
1 /'pøh?/	[b _o ·?¹ ↗]	swell up
2 /sih?/	[s _i ·?¹ ↘]	buy, h
1 /('rah) 'sih?/	[s _i ·?¹ ↗]	get drunk

(87)

2 /təh?/	[ⁿ d _e ·?¹ ↘]	rice
1 /'kjəh?/	[^g j _e ·?¹ ↗]	eight
2 /søh?/	[s _ø ·?¹ ↘]	build
1 /'søh?/	[s _ø ·?¹ ↗]	milk, v

High register contrasts for CV?-morphemes.

(88)

3 /'na?/	[ⁿ a·?¹ ↘]	ask for, order s. th.
4 /na?/	[ⁿ a·?¹ ↘]	mantra
3 /'tsø?/	[^t s _ø ·?¹ ↘]	argue
4 /tsø?/	[^t s _ø ·?¹ ↘]	cook, v

(88) cont.

3 /'tɕɕʰ?/	[tɕɕʰ·ʔ¹ ˩]	cut! imp.
4 /tɕɕʰ?/	[tɕɕʰ·ʔ¹ ˩]	keep it! imp.
3 /'keʔ/	[ke·ʔ¹ ˩]	bear, sprout, v
4 /keʔ/	[ke·ʔ¹ ˩]	neck, n

(89)

3 /'nɛʔ/	[nɛ·ʔ¹ ˩]	holy place
4 /sɛʔ/	[sɛ·ʔ¹ ˩]	son, h, prince

The fourfold pitch contrast for CV?-morphemes.

(90)

3 /'tɕʰ?/	[tɕʰ·ʔ¹ ˩]	pierce
4 /tɕʰ?/	[tɕʰ·ʔ¹ ˩]	look! imp.
2 /tɕʰh?/	[ⁿ dɕʰ·ʔ¹ ˩]	desire, v
1 /'tɕʰh?/	[_o dɕʰ·ʔ¹ ˩]	stay, live

(91)

3 /'sɕʰ?/	[sɕʰ·ʔ¹ ˩]	feed / worship, v
4 /kɕʰ?/	[kɕʰ·ʔ¹ ˩]	install, establish
2 /kɕʰh?/	[ŋgɕʰ·ʔ¹ ˩]	catch, v
1 /'kɕʰh?/	[gɕʰ·ʔ¹ ˩]	want, v

(92)

3 /'neʔ/	[ne·ʔ¹ ˩]	lean against
4 /neʔ/	[ne·ʔ¹ ˩]	find
2 /nehʔ/	[ne _n ·ʔ¹ ˩]	beat, v
1 /'ɕehʔ/	[ɕe _n ·ʔ¹ ˩]	be afraid

(93)

3 /'kok/	[ko·ʔ ¹ ˩]	bark, n
4 /toʔ/	[to·ʔ ¹ ˩]	round thing
2 /tohʔ/	[^h do _o ·ʔ ¹ ˨]	colour, n
1 /'tohʔ/	[_o do·ʔ ¹ ˨]	fasten, attach

(94)

3 /'ɸik/	[ɸi·ʔ ¹ ˩]	louse
4 /siʔ/	[si·ʔ ¹ ˩]	politics
2 /sihʔ/	[si _h ·ʔ ¹ ˨]	leopard
1 /'ɸihʔ/	[ɸi _h ·ʔ ¹ ˨]	four

The next group of examples (sets (95) - (105)) illustrates the fourfold pitch contrast for morphemes of the CVN syllable shape; N stands for any nasal consonant. Sets (95) - (96) contain low register, and sets (97) - (98) high register morphemes, and sets (99) - (105) illustrate the fourfold pitch contrast.

Low register contrasts for CVN-morphemes.

(95)

2 /ɲehn/	[ɲē̃ _h : ˨]	listen, obey
1 /'ɲehn/	[ɲē̃ _h : ˨]	bad
2 /kehn/	[^ŋ gē̃ _h : ˨]	responsibility
1 /'kehn/	[gē̃ _h : ˨]	old, senior

(96)

2 /tsihn/	[ⁿ dzi: ˩]	raft
1 /'tsihŋ/	[dzi: _o ˨]	water pit
2 /thohŋ/	[t ^h oŋ ˩]	well, n
1 /'t ^h ohŋ/	[t ^h oŋ ˨]	hamlet

High register contrasts for CVN-morphemes.

(97)

3 /'nam/	[nam ˨]	all, lit.
4 /nam/	[nam ˩]	sky
3 /'thoŋ/	[t ^h oŋ ˨]	drink, v
4 /thoŋ/	[t ^h oŋ ˩]	see

(98)

3 /'pɔ̃n/	[pɔ̃: _o ˨]	leader
4 /sɔ̃n/	[sɔ̃: _o ˩]	seed
3 /'tsham/	[ts ^h am ˨]	meditation
4 /kham/	[k ^h am ˩]	mood

Fourfold pitch contrast for CVN-morphemes.

(99)

3 /'ɕaŋ/	[ɕaŋ ˨]	nose, h
4 /saŋ/	[saŋ ˩]	evergreen leaves
2 /səhŋ/	[səhŋ ˨]	copper
1 /'tɕhahŋ/	[tɕ ^h ahŋ ˨]	north

(100)

3 /'tɕham/	[tɕ ^h am ˘]	religious dance
4 /tɕhan/	[tɕ ^h an —]	beer
2 /tɕahm/	[ⁿ d _ɔ am —]	nearness, l n
1 /'tɕhahm/	[tɕ ^h am ˘]	kindness, compassion

(101)

3 /'tson/	[tson ˘]	onion
4 /ton/	[ton —]	thousand
2 /tohn/	[ⁿ d _o ŋ —]	spear, trunk
1 /'tohn/	[_o d _o ŋ ˘]	face, n

(102)

3 /'num/	[num ˘]	oil
4 /sum/	[sum —]	three
2 /juhm/	[jum —]	mother, h
1 /'tuhm/	[_o dum ˘]	story

(103)

3 /'ɲin/	[ɲĩ: ˘]	heart (body part)
4 /ɕin/	[ɕĩ: —]	wood
2 /ɕihŋ/	[ɕĩ: —]	field
1 /'ɲihn/	[ɲĩ: ˘]	day (when counting days)

(104)

3 /'men/	[mẽ: ˘]	medicine
4 /tɕen/	[tɕẽ: —]	eye, h
2 /lehn/	[lẽ: —]	answer, n
1 /'tehn/	[_o dẽ: ˘]	undercover

(105)

3 /'thɔ̃n/	[tʰɔ̃: ˨]	leave, v
4 /tɔ̃n/	[tɔ̃: ˨]	take out, pull out
2 /thɔ̃hn/	[tʰɔ̃: ˨]	come out, (itr)
1 /'thɔ̃hn/	[tʰɔ̃: ˨]	meaning, n

Example sets (106) - (112) illustrate the pitch contrasts for morphemes with CVC shape. The final C stands for final consonants other than nasals and glottal stop.

Sets (106) and (107) give examples for low register morphemes, set (108) for high register morphemes, and sets (109) - (112) illustrate the fourfold pitch contrast.

Low register contrasts for CVC-morphemes.

(106)

2 /tuhk/	[ⁿ du _u k [˧] ˨ / ⁿ du _u ·ʔ [˧] ˨]	auxiliary: be
1 /'tuhk/	[_o du _u k [˧] ˨ / _o du _u ·ʔ [˧] ˨]	umbrella
2 /tahr/	[ⁿ da _r ˨ / ⁿ da: ˨]	tremble
1 /'tahr/	[_o da _r ˨ / _o da: ˨]	grate

(107)

2 /suhr/	[su _r ˨ / su: ˨]	edge, corner
1 /'ɕuhr/	[ɕu _r ˨ / ɕu: ˨]	melt
2 /kuhr/	[ŋgu _r ˨ / ŋgu: ˨]	bend, v
1 /'kjuhr/	[_o gju _r ˨ / _o gju: ˨]	change, v

High register contrasts for CVC-morphemes.

(108)

3 /'juk/	[juk ¹ ˘]	/ju.ʔ ¹ ˘]	throw, v
4 /juk/	[juk ¹ -]	/ju.ʔ ¹ ˘]	swing, v
3 /'tɕhak/	[tɕhak ¹ ˘]	/tɕha.ʔ ¹ ˘]	hand, h
4 /tɕhak/	[tɕhak ¹ -]	/tɕha.ʔ ¹ ˘]	break, v(tr)
3 /'tshik/	[tshik ¹ ˘]	/tshi.ʔ ¹ ˘]	joint
4 /tshik/	[tshik ¹ -]	/tshi.ʔ ¹ ˘]	burn, v
3 /'tɕuk/	[tɕuk ¹ ˘]	/tɕu.ʔ ¹ ˘]	put (e.g. into a bag)
4 /tɕuk/	[tɕuk ¹ -]	/tɕu.ʔ ¹ ˘]	allow, let

The fourfold pitch contrast for CVC-morphemes.

(109)

3 /'thap/	[thap ¹ ˘]	fire place
4 /khap/	[k ^h ap ¹ -]	needle
2 /phahp/	[p ^h ap ¹ -]	descend, (itr)
1 /'ɕahp/	[ɕap ¹ ˘]	leg, h

(110)

3 /'tap/	[tap ¹ ˘]	sow, v
4 /pap/	[pap ¹ -]	take down
2 /phahp/	[p ^h ap ¹ -]	descend, (itr)
1 /'lahp/	[lap ¹ ˘]	say, tell

(111)

3 /'tor/	[tor ˘ /to: ˘]	sprinkle, v
4 /kor/	[kor — /ko: —]	turn, v(tr)
2 /kohr/	[ŋg _o r ˘ /ŋg _o : ˘]	be late
1 /'kjuhr/	[ġ _{ju} r ˘ /ġ _{ju} : ˘]	change, v

(112)

3 /'ɸup/	[ɸup ¹ ˘]	sheath
4 /kup/	[kup ¹ —]	bottom (body part)
2 /phuhp/	[p ^h up ¹ —]	roll of cloth
1 /'nuhp/	[nup ¹ ˘]	west, n

The last sets of examples in this section exemplify the pitch contour contrasts for CVV-morphemes. Set (113) contains low register, and set (114) high register morphemes.

(113)

2 /seeh/	[se _e : ˘]	nail, ray /say
1 /'ɸeeh/	[ɸe _e : ˘]	take, h

(114)

3 /'kii/	[ki: ˘]	loud shout
4 /kii/	[ki: —]	middle
3 /'ŋii/	[ŋi: ˘]	two
4 /rii/	[ri: —]	cause to fall over

2.2.2. Disyllabic stem morphemes and disyllabic nouns

In discussing the tonal behavior of disyllabic morphemes we are faced with the problem that these are relatively rare in LT. Verb stems are always monosyllabic; this is typical for the Tibeto-Burman languages of the Bodish Section. But among nouns disyllabic stems are less rare in these other languages; quite a few trisyllabic stems can usually be found, too. LT seems to have had a somewhat different development, and the feature of compounding is so dominant that one is tempted to assume that every polysyllabic word is a compound. Nevertheless, there are a number of disyllabic nouns in my data for which I have no evidence of compounding, and for which I do not expect to find evidence. Some examples are given in set (115).

(115)

/'kohna/	[g̊ona]	egg
/mohmo?/	[momo?]	momo (a dish)
/tɕhura/	[tɕʰura]	cheese
/'ɕihmi/	[ɕimi]	cat
/'nehtso/	[nɛdzo]	parrot
/amɔŋ/	[ʔamõ:]	camel
/phalam/	[pʰalam]	diamond
/'tihmi?/	[d̊imi?]	key
/'ɲjahka/	[ɲjaga]	Tibetan style scales
/'jihki/	[jigi]	letter

(115) cont.

/'mehle/	[m _u e _u le]	chin
/'tchoto/	[tʃ ^h o _u do]	lip
/çahla/	[ç _u a _u la]	floor
/ahmto/	[^h a _u m _u do]	Amdo
/ani?/	[?ani?]	nun

In many instances it is quite difficult to decide whether a given disyllabic noun is monomorphemic or bimorphemic. This situation arises because nouns show a strong preference for ending in one of the following four segment sequences: /pa/, /ma/, /pu/, /mu/. At the same time these four segment sequences are the most common nominalizing and secondary noun forming suffixes, and as suffixes they have an assimilating pitch. This means that their pitch behavior will not distinguish them from second syllables of disyllabic morphemes (cf. section 2.5.1.). But we do not need to assume that every word ending in one of the segmental sequences given above is necessarily a derivative and therefore bimorphemic. Some evidence that there is in fact an underlying difference between derived and nonderived nouns of this form can be found in the compounding process. The argument for this is given in the section on compounding. (Cf. 2.4.5.--Cutting point for originally disyllabic stems). Set (116) gives some examples of disyllabic nouns ending in the segmental sequences in question for which I have no evidence that they are de-

rived; and for the ones with an asterisk we have positive evidence from their behavior in compounding that they are not derived. In adding these disyllabic stems to the list of disyllabic morphemes their number is considerably increased and consequently their tonal behavior must be taken into consideration in determining the nature of the tonal contrasts of the language. This leads us to the topic of the following paragraph which presents evidence for the pitch contour contrasts for disyllabic morphemes.

(116)

/lahpu/*	[lə bu]	radish
/'ohma/*	[ʰo _ω ma]	milk, n
/'ηihma/*	[ηi ma]	sun
/pəmu/	[pəmu]	knee
/'rohmu/	[ro mu]	cymbal
/'jahma/	[ja ma]	temples (body parts)
/khampu/	[k ^h əmbu]	peach
/'tsaŋpu/	[tsəŋbu]	river
/sahmpa/	[sa mpa]	bridge
/pakpa/	[pakpa]	skin

Pitch contour contrasts on disyllabic morphemes.

Example sets (117) - (123) illustrate the fourfold pitch contour contrast for disyllabic noun stems. The pitch profile sketches show that the basic contrastive characteristics of the contours are realized on the first syllable of the morpheme; the second syllable always has a basically

level profile at a medium pitch level, and it tends to be slightly higher after the high register contours 3 and 4 than after the low register contours 1 and 2. The word 'basic' is important in the description of the pitch profile; in actual realization it will more often not be level due to overlaid intonation factors (cf. section 2.3.4.).

The examples demonstrate that these second syllables of disyllabic nouns have no independent status in regards to tonal contrasts. Their tonal realization can be predicted from the pitch contour identity of the morpheme. That the contrastive characteristics of the contours are mainly realized on the first syllable of the morpheme must be regarded as a practical detail of the realization of the contrast. The contrast itself is a property of the whole morpheme, and the pitch contour identity does not need to be stated for each syllable but only once for each morpheme.

(117)

3 /'ɲjuk/	[ɲjagu ~]	pen
4 /ɸuku/	[ɸagu —]	paper, n
2 /tuhku/	[ʔdu _u gu ~]	pit, n (of fruit)
1 /'ɸuhku/	[ɸ _u gu ~]	tail, n

(118)

3 /'tari/	[təri ~]	axe
4 /kawa/	[kawa —]	pillar
2 /lahpu/	[ləbu ~]	radish
1 /'mahku/	[məgu ~]	boiled butter

(119)

3 /'thowa/	[t ^h owa ~]	hammer, n
4 /kowa/	[kowa —]	animal's skin, leather
2 /lohma/	[ləma ~]	leaf
1 /'kohŋa/	[kōŋa ~]	egg

(120)

3 /'lepa/	[ləpa ~]	brain
4 /pəmu/	[pəmu —]	knee
2 /çəhlum/	[çəlum ~]	round basket with lid
1 /'jəhka/	[jəga ~]	branch of tree


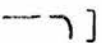


(121)

3 /'seka/	[sega ~]	crack, n
4 /çika/	[çiga —]	habit
2 /sihpa/	[si _h pa ~]	dew
1 /'çihmi/	[çimi ~]	cat

(122)

3 /'khatu?/	[k ^h ədu.ʔ ~]	straight
4 /ruko?/	[ru ^g o.ʔ ~]	bone
2 /mohmo?/	[mōmo.ʔ ~]	a Tibetan dish
1 /'çohko?/	[çōgo.ʔ ~]	potato



(123)

3 /'atʃa?/	[ʔadʒa.ʔ ¹ 	elder sister
4 /thama?/	[t ^h ama.ʔ ¹ 	cigarette
2 /tʃihma?/	[tʃ ^h ima.ʔ ¹ 	saliva
1 /'tʃah?ma?/	[dʒ ^h a?ma.ʔ ¹ 	spade, n





The examples of sets (122) and (123) show that when the second syllable of a disyllabic noun stem is closed by a glottal stop, this syllable equally does not have any independent tonal status; the pitch profiles of the second syllables are quite drastically modified, but we do not find any contrastive pitch profiles among them.

Example sets (124) - (127) give additional examples of the fourfold pitch contrast for disyllables with the inclusion of some derived nouns because some of the most minimal tone contrasts for disyllables involve derived words. Since the suffixes in question are of the assimilating type the resulting pitch profiles are identical to disyllabic morphemes of the same contour identity.

(124)

2 /tah-pa"/	[ⁿ daba 	archer
1 /'tahwa/	[^o dawa 	month

(125)

3 /'ɲama/	[ɲama 	tail, n
4 /tha-ma"/	[t ^h ama 	end, n
2 /tsah-ma"/	[ⁿ dzama 	clay pot
1 /'ʃah-mu"/	[ʃ ^h mu 	hat

(126)

3 /'kaŋpa/	[kaŋba ˘]	foot, leg
4 /paŋpa/	[paŋba —]	lap, n
2 /ɕaŋka/	[ɕaŋga ˘]	width
1 /'laŋmka?/	[laŋga.ʔ ˘]	road, path

(127)

3 /'thuk-pa"/	[tʰukpa ˘]	Tibetan dish
4 /khukpa/	[kʰukpa —]	bag
2 /tʰuk-pa"	[tʰukpa ˘]	Bhutanese
1 /'tuhk-pu"/	[dʰukpu ˘]	hardship

2.3. Variation of basic pitch contours

This section is not an attempt to present a complete description of all the pitch variation features of LT. Phrase and sentence intonation patterns are not lacking, and these features affect the basic lexical pitch contours in various ways, but the intonation system of a language is not easily captured on paper. The elaborate investigation and description it calls for fall into the domain of a thorough study of the intonation of a language, and this could not be the objective of the present study. Nevertheless, we cannot identify the basic contrasts effectively without being aware of the effects that the intonation can have upon them. The aim of this section, then, is to point out some variation features which have been especially relevant for the identification of the contrastive contours. First I will show in which environments the basic contours can best be observed, and then describe modifications of basic contours caused by certain segments, and finally some modification caused by intonation.

2.3.1. Basic contours in neutral environments

The environment where we seem to have the least interference from transition features has been found to be the first syllable of disyllabic morphemes. Set (128) exemplifies the four pitch patterns on a CV-syllable, and set

(129) on a CVC-syllable. Monosyllabic items closed by a voiceless consonant also represent a fairly neutral environment for the basic contrast patterns because the final voiceless stop naturally cuts out transition features as is shown in set (130). Reviewing the contours in these neutral environments does not imply that these are also the environments where the contrast is most easily identified. On the contrary, the short duration of the voicing period in some of these examples makes it more difficult.

(128)

3 /'ɲjuku/	[ɲjuku ˨˨]	pen
4 /ɕuku/	[ɕuku ˨]	paper, n
2 /tʂuhku/	[ʰdzuku ˨˨]	finger, n
1 /'ɕuhku/	[ɕuku ˨˨]	tail

(129)

3 /'takma/	[tagma ˨˨]	rhododendron
4 /pakpa/	[pakpa ˨˨]	skin, n
2 /lahkpa/	[lakpa ˨˨]	hand, n
1 /'kjahkpa/	[gjakpa ˨˨]	stick, n





(130)

3 /'lap/	[lapʰ ˨˨]	wave, n
4 /tɕhap/	[tɕʰapʰ ˨]	water, n, h
2 /phahp/	[pʰapʰ ˨]	descend, v(itr)
1 /'ɕahp/	[ɕapʰ ˨˨]	leg, foot, h

2.3.2. Modification by nasal segments

Syllable final nasals, if they are pronounced as segments, have been observed to cause an automatic rise in pitch during their duration. Example set (131) illustrates this first for disyllabic nouns whose first syllable ends in a nasal. It has a particularly disturbing effect on items with pitch contour 3. Normally the pitch falls over the whole duration of the syllable. But if the final is a nasal the fall is cut off through the raising effect of the nasal which results in a more level pitch profile than expected for contour 3.

(131)

3 /'kaŋpa/	[kaŋba ]	leg, foot
4 /pan-pa/	[pamba ]	lap, n
2 /saŋpa/	[sa m̩ba ]	bridge, n
1 /'loŋpa/	[lo ŋba ]	country

In monosyllabic words ending in a nasal the raising effect is more pronounced because the transition to the next word is naturally longer. Sets (132) and (133) give examples of the four pitch patterns of such items in a short utterance which acts as reference frame. The frame is first given in phonological representation and below this in broad phonetic transcription with the first sub-

stitution item inserted. Beneath this the pitch profiles are indicated by lines with the corresponding substitution item to the right. In set (132) the substitution items are followed by a morpheme with pitch contour 2, and in set (133) by a morpheme with pitch contour 4. The raising effect of the final nasal has a particularly misleading effect on pitch contour 2; the basically level pitch contour 2 rises considerably at the end so that the profile becomes very similar to the one of pitch contour 1. This means that in this environment the two pitch contours are mainly distinguished from each other by the slight difference in height of the initial pitch level.

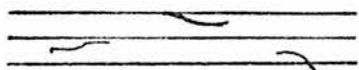
(132)

/theh-la --- tuhk./

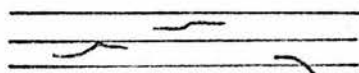
'There is ---.'

[t^he₁₁la ts^ham du¹']

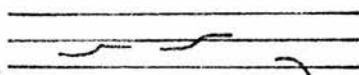
'There is meditation.'



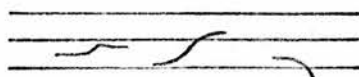
3 [ts^ham] /'tsham/ meditation



4 [nam] /nam/ sky



2 [ŋjam] /ŋjahm/ grace



1 [g^oam] /'kahm/ box

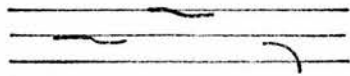
(133)

/kho-la --- tɛ?./

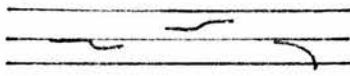
'Give him ----.'

[k^hola tson tɛ?']

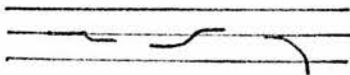
'Give him onions.'



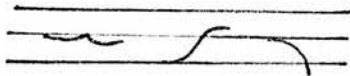
3 [tson] /'tson/ onion



4 [ton] /ton/ thousand



2 [ʰd_oŋ] /toɦŋ/ spear, trunk



1 [d_oŋ] /'toɦŋ/ face, n

2.3.3. Modification by glottal stop and glottal constriction

The final unreleased allophone [ʔ'] of underlying /?/ causes such drastic modifications of the pitch contours that it was necessary to discuss it above in the contrast section. I therefore refer here to the figure and examples given there. (Cf. section 2.2.1., figure 5, and sets 86-94).

At this point I want to comment further on the manifestation of the stem final /?/ in verb conjugations. The underlying final glottal stop is found to be retained consistently in derivations and conjugations. It is manifested

by various degrees of glottal constriction and this causes various degrees of pitch profile modification. The degree to which the basic profile is modified depends on the pitch contour identity of the following suffix. Example sets (134) - (138) show the four contrastive pitch contours on four verb stems before five different suffixes. Each suffix is representative of one of the five suffix categories we need to recognize in LT (cf. section 2.5.1.). In the example sets only the stem and suffix are given, but the pitch contour sketches are drawn from utterances, not from isolated pronunciations of these words.

In set (134) we have the four stems before the verbal suffix -pa which has pitch contour 4. Pitch contour 4 suffixes are especially light (unstressed) and show a rapid decrescendo in pitch volume; thus they allow a fuller development of the pitch contour of the preceding stems. The length and depth of the falls in which each contour ends are about the same as in monosyllabic occurrences of these contours. (The special effect of pitch contour 4 suffixes on the length of preceding secondary vowels has been mentioned in section 1.2.3.1. The two modifications are of course linked with each other).

Sets (135) and (136) give the four stems before two low register suffixes. In set (135) the suffix has pitch contour 2, in set (136) pitch contour 1. Since for the rea-

lization of these suffixes the pitch has to arrive at a lower level than for a suffix with pitch contour 4 we would expect the falls of the preceding stems to be at least as marked as before a suffix with pitch contour 4. However, this is not the case; the vowels of other distinctive suffixes are not as short and lightly stressed as those of pitch contour 4 suffixes; and it seems that for this reason the preceding contour reaches a somewhat less full development. This applies also to the contours before suffixes with pitch contour 3; this is illustrated in set (137). The falls on stems with contour 3 and 4 in particular sound less drastic before suffixes with contour 1, 2, or 3; nevertheless they are still quite noticeable.

(134) Stems before contour 4 suffix.

3 /'ɕɕʰ?-pa/	[ɕɕ:ʔβa ↘ ↗]	throw out, p.p.
4 /tsɕʰ?-pa/	[tsɕ:ʔβa ↘ ↗]	cook, p.p.
2 /sɕʰ _h ?-pa/	[sɕ:ʔβa ↘ ↗]	build, p.p.
1 /'ɕɕʰh?-pa/	[ɕɕ:ʔβa ↘ ↗]	milk, p.p.

(135) Stems before pitch contour 2 suffix.

3 /'ɕɕʰ?-sohŋ/	[ɕɕ·ʔsō: ↘ ↘]	threw out
4 /tsɕʰ?-sohŋ/	[tsɕ·ʔsō: ↘ ↘]	cooked
2 /sɕʰh?-sohŋ/	[sɕ·ʔsō: ↘ ↘]	built
1 /'ɕɕʰh?-sohŋ/	[ɕɕ·ʔsō: ↘ ↘]	milked

(136) Stems before pitch contour 1 suffix.

3 /'ɸɸʔ-'koh/	[ɸɸ.ʔgo ↘]	must throw out
4 /tsɸʔ-'koh/	[tsɸ.ʔgo ↘]	must cook
2 /sɸhʔ-'koh/	[sɸ.ʔgo —]	must build
1 /'ɸɸhʔ-'koh/	[ɸɸ.ʔgo ↗]	must milk

(137) Stems before pitch contour 3 suffix.

3 /'ɸɸʔ-'tan/	[ɸɸ.ʔdã: ↘ ↘]	way of throwing out
4 /tsɸʔ-'tan/	[tsɸ.ʔdã: ↘ ↘]	way of cooking
2 /sɸhʔ-'tan/	[sɸ.ʔdã: — ↘]	way of building
1 /'ɸɸhʔ-'tan/	[ɸɸ.ʔdã: ↗ ↘]	way of milking

Set (138) shows the same four stems before an assimilating suffix. Here the glottal constriction causes only a slight modification of the basic pitch profiles; there is merely a little dip in pitch at the end of the vowel duration, and normally no extra vowel length is observed. This parallels the effect of medial glottal constriction on the pitch profile of disyllabic morphemes and disyllabic nouns derived with an assimilating suffix. (See sec-1.1.4., and in particular, example sets 14 and 15).

(138) Stems before an assimilating suffix.

3 /'ɕʰʰ?-ki"/	[ɕʰʰ?gʷ ˨˨˨]	throw out (imper-
		fective participle)
4 /tsʰʰ?-ki"/	[tsʰʰ?gʷ ˨˨˨]	cook
2 /sʰʰ?-ki"/	[sʰʰ?gʷ ˨˨˨]	build
1 /'ɕʰʰ?-ki"/	[ɕʰʰ?gʷ ˨˨˨]	milk

2.3.4. Modification by intonation

An utterance with neutral intonation in LT is characterized by a general updrift in pitch in the onset and downdrift in the coda. A graphic representation of this is given in figure 6. The top line represents the average height of high register and the bottom one the average height of low register. We observe that the distance between the pitch levels progressively increases in the onset and decreases in the coda. The nucleus of the utterance can of course be pushed forwards or backwards. Its location seems to be governed by semantic considerations. Most often it occurs quite early in the utterance.

The intonational up- and downdrift of utterances is illustrated in set (139).

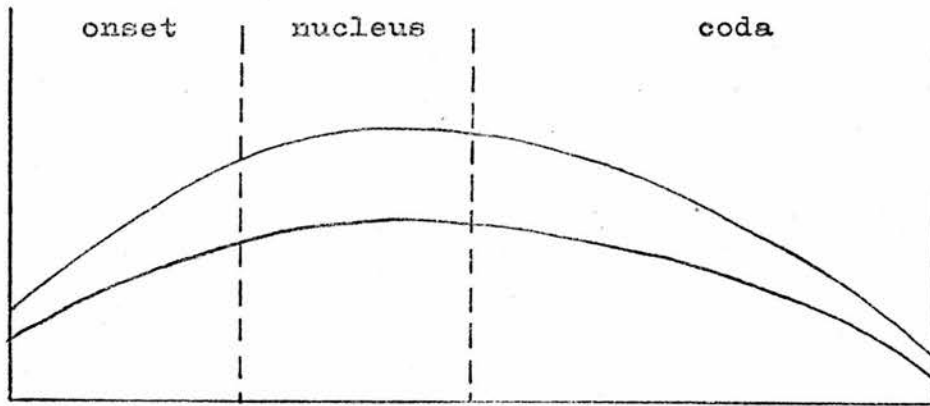


Figure 6: General up- and downdrift of the utterance intonation.

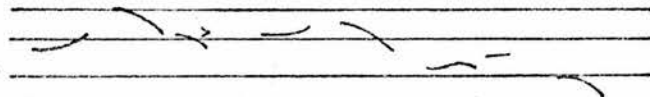
(139)

/ŋeh 'lan-le khø 'lan jahk-ki" reh? ./

my ox-comp. his ox good-suff. aux.

'His ox is better than mine.'

[ŋe: lanle^o khø: lan jəʔgi ɹe.ʔ^o]



2 3 4 4 3 2 2

/'jihki tɕik 'tan-'tsahn ŋah-tsoh 'johŋ-ki" jøh?-pa

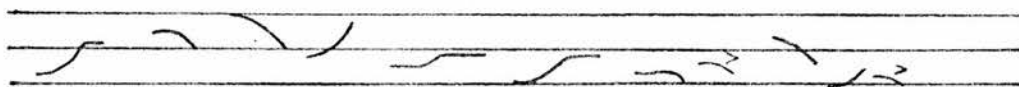
letter one send-because I-pl come-suff. aux.-p.p-

'ha-'khoh-pa reh? ./

know-suff. aux.

'Because we sent a letter they knew that we would come.'

[jigi tɕi? tanɗzã: ŋandzo junɣu jøʔβz^o haŋoβz ɹe.ʔ^o]



1 4 3 1 2 2 1 2 4 3 1 4 2

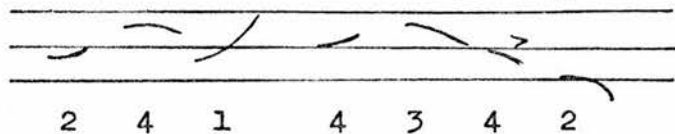
(139) cont.

/ŋah kom-'tsahn tʃhu 'thoŋ-pa reh? ./

I thirst-because water drink-p.p. aux.

'Because I was thirsty I drank water.'

[ŋa^o komdzã:^u tʃhu^o thoŋβ₃ ɿ.ɿ.ʔ¹]



- o most prominent
- u secondary prominence
- u end of phonological phrase

Pitch contour sequences. The shape of the pitch contours is also somewhat modified by the pitch identity of the following contour. This is illustrated in example sets (140) - (143). They show the same set of monosyllabic nouns in four different phonological environments. In each set the frame is first given in phonological representation. Below it appears the utterance in broad phonetic transcription with the first noun inserted, and below this the pitch profile of this utterance is sketched out on ~~o~~ three staves. For the remaining three substitution items the frame is the same. The substitution items are given on the right hand side of the page and the corresponding pitch profile of the utterances is sketched out to the left of the substitution item.

In set (140) the substitution items are followed by a word with pitch contour 4, in set (141) by a word with pitch contour 3, in set (142) by a word with pitch contour 2, and in set (143) by a word with pitch contour $\frac{1}{\cancel{2}}$. Comparing the contours of each substitution item across the four sets we do not notice any drastic modifications. Contours 1, 2, and 3 are largely unaffected by the following pitch, but for contour 4 we notice that it tends to end in a slight rise before morphemes with high register, while before morphemes with low register it ends in a fall. These examples further illustrate the general up- and downdrift of the intonation. We can see that the overall pitch level of each contour is considerably raised within the phonological nucleus of an utterance. This can best be observed where we have two words with the same pitch contour in sequence. In all these utterances the substitution item is naturally the phonological nucleus of the utterance. In set (140) the second utterance illustrates a sequence of two contour 4 words, in set (141) the first utterance a sequence of two contour $\frac{3}{\cancel{2}}$ words, in set (142) the third utterance a sequence of two contour 2 words, and set (143) the last utterance a sequence of two contour $\frac{1}{\cancel{2}}$ words. In each case we notice that the second word starts at a considerably lower level than the first. We also notice that in general in postnuclear and prenuclear items the various pitch profiles have reduced dimensions.

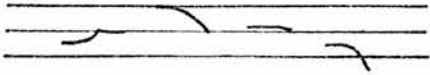
(140)

/theh-la --- sum tuhk./

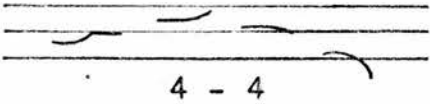
'There are three ----.'

[t^he_{||}la no. sum du_{||}?]

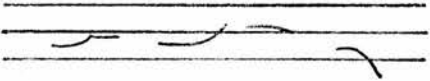
'There are three tips.'



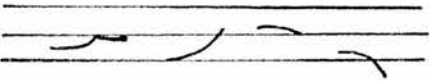
3 [no.] /'no/ tip, n



4 [ʃo.] /ʃo/ dice, n



2 [ʰdzo.] /tsoh/ hybrid between yak and cow



1 [do.] /'toh/ stone, n

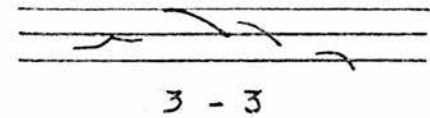
(141)

/theh-la --- 'na tuhk./

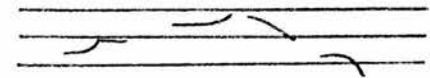
'There are five ----.'

[t^he_{||}la no. na du_{||}?]

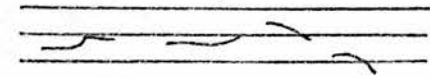
'There are five tips.'



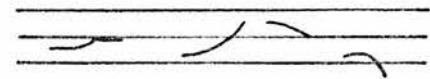
3 /'no/



4 /ʃo/



2 /tsoh/



1 /'toh/

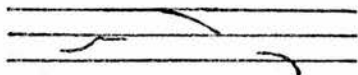
(142)

/theh-la --- tuhk./

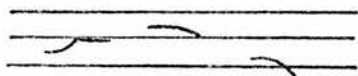
'There is a ----.'

[t^h_uela no_u du_u?]

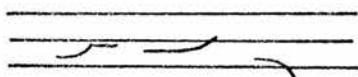
'There is a tip.'



3 /'no/ tip, n

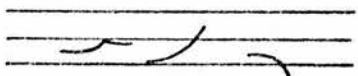


4 /ɕo/ dice, n



2 /tsoh/ hybrid yak

2 - 2



1 /'toh/ stone, n

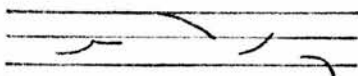
(143)

/theh-la --- 'kuh tuhk./

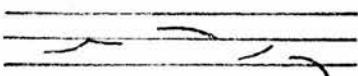
'There are nine ----.'

[t^h_uela no_u ɕu_u du_u?]

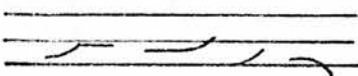
'There are nine tips.'



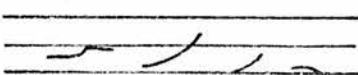
3 /'no/



4 /ɕo/



2 /tsoh/





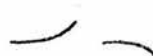
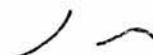
1 /'toh/

1 - 1




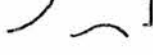
Phrase and utterance final contours. The most drastic modifications of the pitch contours occur in phrase and utterance final position. Some of these are sketched out in the remaining example sets of this section.

Example sets (144) - (146) illustrate the pitch contours of three sets of monosyllabic nouns pronounced in isolation. For the purpose of these sets, each word was pronounced twice in sequence and the pitch profiles given are drawn from such a performance. Thus, the first utterance of each word shows the pitch profile which is typical for phrase final but utterance nonfinal occurrences and the second for utterance final occurrences.

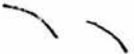
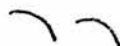


(144)

3 /'men, 'men./	[mē̃:mē̃: ]	medicine
4 /tʃen, tʃen./	[tʃē̃:tʃē̃: ]	eye, h
2 /lehn, lehn./	[lē̃:lē̃: ]	answer, n
1 /'tehn, 'tehn./	[dē̃:dē̃: ]	undercover

(145)

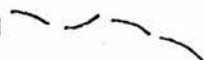
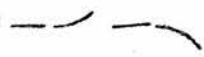


3 /'sa, 'sa./	[sa sa ]	earth, ground
4 /ʃa, ʃa./	[ʃa ʃa ]	meat, n
2 /lah, lah./	[la la ]	mountain pass
1 /'ʃah, 'ʃah./	[ʃa ʃa ]	hat

(146)

- 3 /'mak, 'mak./ [ma.ʔ ma.ʔ¹ | ] war, n
- 4 /naʔ, naʔ./ [na.ʔ na.ʔ¹ | ] mantra
- 2 /nahʔ, nahʔ./ [na_u.ʔ na_u.ʔ¹ | ] forest (lit.)
- 1 /'cahʔ, cahʔ./ [ca.ʔ ca_u.ʔ¹ | ] fat film on
liquids

Example set (147) gives a set of disyllabic nouns, each noun uttered twice in sequence. As already mentioned, in disyllabic morphemes the first syllable carries the basic contrastive contours, and overlaid intonation patterns affect the pitch profile of the second syllable more than that of the first.

(147)

- 3 /'ɲama, 'ɲama./ [ɲama ɲama | ] tail, n
- 4 /thama, thama./ [t^hama t^hama | ] end, n
- 2 /tsahma, tsahma./ [dzama^h dzama_u | ] clay pot
- 1 /'jahma, 'jahma./ [ja_uma ja_uma | ] temples
(body parts)

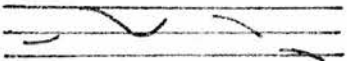
Example sets (148) - (151) illustrate how intonation can affect the pitch contours of morphemes with a final glottal. In set (146) each example ends in a glottal stop, and each contour in a fall. The examples of the following

sets show that this is not necessarily always the case; if the overlaid intonation factors are dominant enough a rise may follow after the fall. In each of the examples of the following sets the second word is emphasized somewhat. The underlining in the English translation signals the emphasized words. In the first utterance of each set the emphasized word is in the agentive form. The agentive marker for words ending in one of the primary vowels is umlaut plus the suffix /-k(i)"/, which is realized as [ʔ] or [ʔ̥] (cf. appendix 2.2.--Assimilating suffixes). The pitch profile sketches show that each contour is followed by a rise after the fall caused by the glottal constriction.

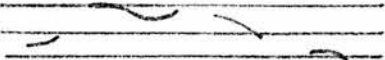
The second utterance of each set shows the same words in the genitive form, thus contrasting 'nonconstricted' with 'constricted' contours. (The genitive marker for words ending in one of the primary vowels is umlaut). The nonconstricted contours exhibit a similar intonational pitch rise at the end, but they have an unbroken pitch profile.

(148)

[di_u ly.ʔ̥ t̥ɔmsõ̃:] /tɪh 'ly-k 'tɔm-sohŋ./
 this dwarf-by rob-past
 The dwarf robbed this.

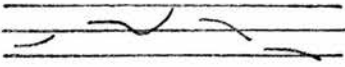


[di_u ly: tsʰaŋ rɛʔ̥] /tɪh 'ly 'tʃaŋ rɛh?./
 this dwarf-of nest is
 This is the house of the dwarf.



(149)

[di_{||} tɛ_{||}? tɕomsõ_{||}:]

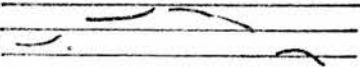


/tih tɛ-k 'tɕom-sohŋ./

this horse-by rob-past

The horse robbed this.

[di_{||} tɛ: ɲama rɛʔ_{||}']



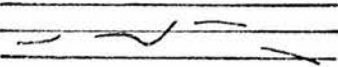
/tih tɛ 'ɲama rɛh?./

this horse-of tail is

This is the tail of the horse.

(150)

[di_{||} pʰy_{||}? nã:sõ_{||}:]

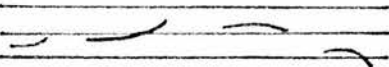


/tih phyh-k naŋ-sohŋ./

this son-by give-past

The son gave this.

[di_{||} pʰy: tɕʰaŋ rɛʔ_{||}']



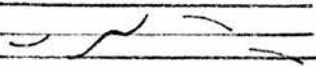
/tih phyh tɕʰaŋ rɛh?./

this son-of beer is

This is the son's beer.

(151)

[di_{||} dɛ_{||}? tɕomsõ_{||}:]

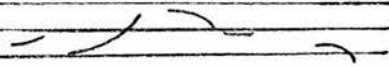


/tih 'tɕh-k 'tɕom-sohŋ./

this enemy-by rob-past

The enemy robbed this.

[di_{||} dɛ: məʔmi_{||} rɛʔ_{||}']



/tih 'tɕh 'mak-mih rɛh? /

this enemy-of army is

This is the army of the enemy.

2.4. Tonal behavior of stem compounds

Since the tonal behavior of stem compounds constitutes important evidence for the morpheme tone as against a word tone analysis it needs to be discussed in some detail. In this section we will mainly be concerned with compound nouns, and the examples will also mainly be drawn from this word category. Compounding, however, is not restricted to nouns, and as far as I have observed other nonverbal categories such as pronouns, adjectives, adverbs and numerals follow the same rules. Verbal compounds follow the same rules in some areas, but different ones in others. I have not been able to investigate all aspects of verbal compounding in detail; nevertheless, some examples of verbal compounds which throw light on the compounding process in general have been included.

Stem compounding is an extremely common feature in LT; it seems that the majority of the nouns are compounded in some way. But before we can look at the tonal behavior of the compounds some other aspects need to be discussed briefly, namely the length of compounds and the prominence features.

Length of compounds. True phonological compounds appear to have no more than two syllables. If one of the components is originally disyllabic it drops its second

syllable. There are good phonological reasons to consider any potential compounds with more than two syllables as two separate phonological words. This will be discussed later in this section. (Cf. 2.4.5.--Longer noun strings).

Prominence features. The feature referred to here is often also called stress. Stress, however, seems to be so intimately linked with high pitch for many linguists that I prefer to talk of prominence. Especially for Tibeto-Burman languages this term seems to be more appropriate; the characteristic features of prominence in LT are loudness and length of the syllabic nucleus. Pitch height may also be affected, but it has to be considered carefully in relation to lexical pitch.³

³Stress features have been neglected in this description so far, and here I can do nothing more than offer some general observations. I would claim that LT is a word stress language, with the main stress falling--as a rule--on the first syllable of the word. But some morphological factors create modifications. The following two have been observed: (a) As mentioned in the text above--in stem compounds both components are about equally prominent. (b) Certain emphatic suffixes are stressed; that is, they may be equally prominent, or at times more prominent than the first syllable of the word. (E.g. -tih, -teh 'focus', or -ee 'also')

Further, utterances are grouped into phonological phrases which tend to be rather short, and the rhythmic grouping of the syllables within such a phrase seems to be important. LT does not display the battering regularity of a typical syllable timed language such as for example Hindi.

In compounds both components are about equally prominent; that is, both syllables are about equal in loudness and duration if the underlying length is the same. On the evidence of prominence features and tonal features (as we will see shortly) compounds might be considered to be two separate words phonologically. However, the extensive assimilation processes which take place on the segmental level clearly mark them as phonological units. The two most striking processes which show the phonological unity of compounds are vowel height approximation and deaspiration and voicing of medial stops.

Vowel height approximation. This process will be exposed in detail in appendix 1. We will see that the domain of its application is defined by word boundaries. Since it is observed to apply in stem compounds this shows that these are phonologically one word, and not two.

Voicing and deaspiration of medial stops. As a first approximation we can state that underlying voiceless aspirated initial stops of the second component of a stem compound lose aspiration. These stops, then, and the underlying unaspirated stops in the same position have the same variation possibilities on the voicing parameter that medial stops have in general within the word. (For the details see tables 2 and 3, section 1.1.5.). At a greater degree of delicacy, however, we will see that there are some exceptions which are directly connected with the identity of the pitch contour of the second component. This will be discussed further in section 2.4.3.).

2.4.1. Tonal behavior of second components

Considering the strong assimilatory tendencies in compounds on the segmental level we might expect that there would be pitch assimilation as well. In view of the subtlety of the pitch contrasts in general, it is quite startling to discover that this is not the case; both components retain their underlying pitch contour. As far as their realization is concerned we observe that first component contours have their normal pitch profile dimensions while the dimensions of the second component contours are reduced. The pitch profile sketches given in the following examples attempt to show the extent of the reduction.


Pitch contrasts are generally undisputed in first components, but the contrast in the second component seems to have been largely overlooked. The reason for this, I suspect, is that pitch has usually been taken as the primary or the sole exponent of high and low register. If we listen for pitch only, the differences are subtle indeed, but as already pointed out at the beginning of this chapter, the voice quality features of high and low register are important clues for the perception of the pitch patterns. Of course pitch features play a role too, since the distinction between basically level and moving contours are also maintained. The direction and extent of the pitch movement seems to be important, more than the actual height.

The following examples focus on illustrating the contrasts in second components and are grouped accordingly. In sets (152) - (154) the second components are CV-syllables, in set (155) - (157) CVC-syllables, and in sets (158) - (160) CVN-syllables.

(152)

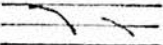
4 /ta-'ŋa/ 3 [taŋa]  horse tail

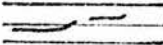
4 /ta-ɸa/ 4 [taɸa]  horse meat

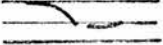
4 /ku-tah/ 2 [kunds_u]  spouse, h

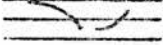
4 /ta-'rah/ 1 [tara_u]  horse shed

(153)

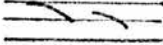
3 /'tɸhak-'tho/ 3 [tɸ^ha.ʔto]  list, n, h

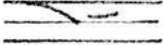
2 /ʔahm-so/ 4 [ʔd₃ms_o]  molar tooth

3 /'tɸhak-thoh/ 2 [tɸ^ha.ʔd_o]  load, n, h

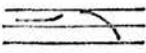
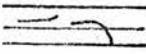
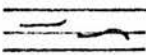
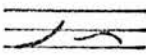
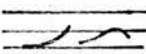
3 /'tɸhak-'toh/ 1 [tɸ^ha.ʔd_o]  stone, n, h

(154)

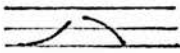
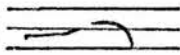
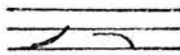
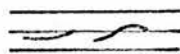
3 /'mik-'pu/ 3 [mig_obu]  eyebrows and lashes

3 /'mik-tɸhu/ 4 [mig_odɸu]  tears, n

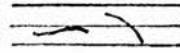
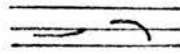
(155)

- 4 /pɪŋ-'kok/ 3 [pɪŋg^o.ʔ¹]  bark of tree
- 4 /pɪŋ-toʔ/ 4 [pɪŋdo.ʔ¹]  fruit
- 4 /pɪŋ-sohʔ/ 2 [pɪŋso_u.ʔ¹]  carpenter
- 1 /'pɛh-mohm/ 2 [pɛ_u.mo_u.ʔ¹]  momo, h (a Tibetan dish)
- 1 /'pɛh-'pohk/ 1 [pɛ_u.poh_u.ʔ¹]  potato, h

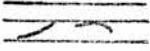
(156)

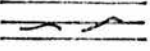
- 1 /'pɛh-'lak/ 3 [pɛ_u.la.ʔ¹]  food, h
- 2 /tɕhah-tsak/ 4 [tɕ^hadza.ʔ¹]  tea strainer
- 1 /'meh-tahʔ/ 2 [menda.ʔ¹]  glowing embers
- 2 /tɕhah-'nahk/ 1 [tɕ^hana_u.ʔ¹]  black tea

(157)

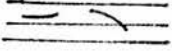
- 2 /tɕhʔ-'pik/ 3 [ʔde.ʔci.ʔ¹]  bed bug
- 2 /kheh-ŋik/ 4 [k^he.ŋi.ʔ¹]  litter, n

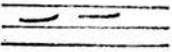
(157) cont.

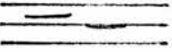
1 /'tʰahk-rih?/ 2 [tʰ_ᵛgri_ᵛ?ʔ]  rocky mountains

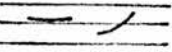
2 /ʃoh?-ʻnihm/ 1 [ʃo_ᵛ?ni_ᵛ?ʔ]  sun, h

(158)

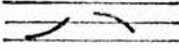
4 /tʃhu-ʻkhaŋ/ 3 [tʃ_ᵛuyã:]  bath house

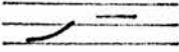
4 /ku-pan/ 4 [kubã:]  lap, n, h

4 /tʃhu-ʃahm/ 2 [tʃ_ᵛuŋdʒm]  shore

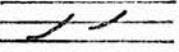
4 /tʃhu-ʻthahŋ/ 1 [tʃ_ᵛudã:]  water and...

(159)

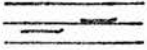
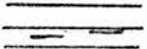
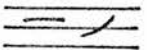
1 /'ʃeh-ʻtsoŋ/ 3 [ʃe_ᵛ.dzõ:]  onion, h

1 /'ʃeh-tsam/ 4 [ʃe_ᵛ.dzʒm]  flour made of
roasted grains, h

1 /'ʃeh-tahŋ/ 2 [ʃe_ᵛndã:]  complexion, h

1 /'ʃeh-ʻkahm/ 1 [ʃe_ᵛ.gʒm]  peas, h

(160)

2 /ɤuhk-ɤihŋ/ 4	[ɤukɤĩ:]		wood, h
2 /ɤuhk-ɤihŋ/ 2	[ɤukɤĩ:]		field, h
4 /saŋ-'nihŋ/ 1	[sãŋŋĩ:]		tomorrow

2.4.2. Insertion of nasals in compounds

In examining the stem compounds of LT we find that a number of them have a nasal consonant inserted between the two items, and this happens where neither of the two components has any underlying nasal element in the adjoint margins. At a superficial level the appearance of these nasals seems quite sporadic and presents a problem for the morphological segmentation of the compounds. Does the nasal belong to the first or to the second component or is it a truly inserted feature? And if it is the latter, what function does it have? These are the questions which a morphological analysis has to clarify. (See for example Chang and Shefts, 1965).

The recognition of the fourfold pitch contrast on any syllable type allows a very simple and plausible phonological solution to the problem of nasal insertion in most cases. First we must notice that nasal insertion occurs

only with second components with an initial stop. Further it turns out that the second component always has low register. (In my data I have one exception to this which I will comment on later). But at this point we also notice that not all the compounds with low register in second components take nasal insertion; some do and some don't. The recognition of high and low register alone does not provide any solution. The recognition of the pitch contours, however, does. After the proper identification of the pitch contours we find that nasal insertion takes place regularly before second components which have an underlying unaspirated stop initially and pitch contour 2; if the second component has pitch contour 1, the nasal insertion does not take place as a rule. At this point we remember the prenasalized series of allophones for unaspirated stops which we have observed to turn up quite regularly with pitch contour 2 morphemes in certain phonological environments (cf. table 2, section 1.1.5.). It thus becomes evident that nasal insertion in these cases is nothing more than a regular subphonemic phenomenon which will present no problem in the morphological analysis.

Some first component features also have to be taken into consideration and the full statement is as follows:

(a) An initial underlying unaspirated stop of the second component of a compound regularly shows prenasalization with a homorganic nasal if the first component ends

in a vowel or a glottal stop and the second component has pitch contour 2. Nasal insertion deletes a preceding glottal stop.

(b) Final /k/ and /p/ of first components turn into a homorganic nasal ([ŋ] and [m] respectively) before a morpheme with pitch contour 2 and an underlying unaspirated initial stop (i.e., pitch contour 2 triggers off prenasalization, but the underlying stop of the first component dominates the place of articulation).

Examples which illustrate statement (a) above are given in sets (161) - (163). In set (161) the first component ends in a short vowel, in set (162) in a long vowel, and in set (163) in a glottal stop.

(161)

/ 'rah-koh/	[raŋg _o]	goat head
/ŋjah-koh/	[ŋjaŋg _o]	fish head
/tʃhu-koh/	[tʃ ^h uŋg _o]	source of stream
/loh-koh/	[loŋg _o]	beginning of the year
/ 'sa-toh?/	[sandoʔ]	earth colored
/ʃa-toh?/	[ʃandoʔ]	flesh colored
/ 'meh-tah?/	[mendaʔ]	embers
/ 'meh-tah/	[menda]	gun
/ 'ʃeh-təh?/	[ʃeŋd _ə ʔ]	rice, h
/ 'ʃeh-tahŋ/	[ʃeŋd _ə ː]	complexion, h
/ta-tohŋ/	[tand _o ː]	spear carried on horse back
/tʃhu-tahm/	[tʃ ^h uŋd _ə m]	shore

(161) cont.

/ʃa-tsihn/	[ʃəndzɿ:]	meat fork
/'koh-tah/	[gɔŋdʒə]	doorway
/ku-tʃhɪn/	[kuŋdʒɿ:]	guest, h
/ku-tah/	[kundʒə]	spouse, h
/ku-tah/	[kuŋdʒə]	image, h
/ku-tʃohʔ/	[kundʒoʔ]	lord
/theh-teh/	[tʰendɛ]	the like, etc.
/thah-tah/	[tʰandə]	now
/kho-tsoh/	[kʰondzɔ]	they
/'tʃih-tʃhʔ/	[tʰindʒʔ]	desires to ask
/khi-tʃhʔ/	[kʰindʒʔ]	desires to bring

(162)

/see-tohʔ/	[se.ndoʔ]	gold colour
/rii-tʃhʔ/	[ri.ndʒʔ]	desires to make fall over
/paa-tʃhʔ/	[pa.ndʒʔ]	desires to light

(163)

/'ne?-koh/	[nɛŋgɔ]	pillow, n
/ne?-tʃhʔ/	[nɛndʒʔ]	desires to find
/ʃɛ?-tʃhʔ/	[ʃɛndʒʔ]	desires to tell
/'tʃih?-tʃhʔ/	[tʰindʒʔ]	desires to write

Example set (164) illustrates statement (b) above.

The last example of this set shows that there may arise a conflict between an 'underlying' oral stop and a 'phonetic surface' glottal stop in regard to the assimilation of the nasal. For the morpheme /'tʃhak/ 'hand, h' (which is most

frequently pronounced as [tɕ^ha.ʔ¹]) we postulate an underlying final /k/ because we find forms like [tɕ^haɣsem]-- /'tɕhak-sem/ 'fingernail, h', and also occasionally the variant pronunciation [tɕ^hak¹] in isolation. Therefore we should get [tɕ^handzʉ^{ʔ1}] from underlying /'tɕhak-tsu^hk/ but we observe [tɕ^handzʉ^{ʔ1}] instead. This means that in this particular compound the 'surface' glottal stop wins over the underlying velar stop as far as the assimilation of the prenasalization is concerned.⁴

(164)

/tɕ ^h ʔ/	[^h daʔ ^ʔ]	desire, wish, v
/'lak-tɕ ^h ʔ/	[^h landʔ ^ʔ]	desires to lose
/rahk-tɕ ^h ʔ/	[^h randʔ ^ʔ]	desires to get
/'lap-tɕ ^h ʔ/	[^h lɛmdʔ ^ʔ]	desires to teach
/pap-tɕ ^h ʔ/	[^h pɛmdʔ ^ʔ]	desires to take down
/luhk-koh/	[^h lʉŋgʉ]	sheep head
/tɕak-tah/	[^h tɕandʌ]	knitting needle
/thuk-kehn/	[^h tʰuŋgẽ:]	responsibility, h
/'tɕhak-tsu ^h k/	[^h tɕ ^h ɛndzʉ ^ʔ]	finger, h

⁴Since there are not many examples of this kind they can be regarded as exceptions. But they indicate that the language is in the process of replacing syllable final oral stops by glottal stops (and eventually perhaps by pitch features). In the transition stage morphemes seem to have more than one phonological representation.

Example sets (165) and (166) give the negative evidence for subphonemic prenasalization in compounds. (165) contains compounds with underlying unaspirated initial stops in the second component with pitch contour 1 morphemes, and in (166) the second components have pitch contour 2, but the underlying initial stop is aspirated. In both cases prenasalization does not take place.

(165)

/ta-'kah/	[taga]	saddle, n
/'ɕeh-'kohn/	[ɕe ·gõ :]	egg, h
/'ɕeh-'kahm/	[ɕe ·gɜm]	peas, h
/'keh-'kehr/	[gegẽ :]	teacher
/mih-'kɔh?/	[mi gɔ ?]	yeti (snowman)

/'tɕhak-'toh/	[tɕ ^h a·ʔdo]	stone, h
/'tɕhak-'kɔjɰ?/	[tɕ ^h a·ʔgɔjɰ ?]	bracelet, h
/thuk-'kohn/	[thu·ʔgõ :]	thought, h
/lahp-'taah/	[lap ta :]	grater
/'lap-'tɕah/	[lap tɕ a]	school
/'tsik-'tehn/	[tsiktẽ :]	foundation
/'kahk-'tɕih/	[g aktɕ i]	belch, n

/ɲuu-'tɕih/	[ɲu ʔdi]	snore, n
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(166)

/tɕhah-thahn/	[tɕ ^h adã :]	tea without milk
/'tɕhak-tɕhohk/	[tɕ ^h a·ʔdo ?]	friend, h
/'tɕhak-thoh/	[tɕ ^h a·ʔdo]	load, h, n

From the evidence presented in sets (161) - (166) I conclude that nasal insertion in compounds before pitch contour 2 is a regular subphonemic feature. In my data I have not observed any case where nasal insertion does not take place under the stated conditions. There are, however, a small number of compounds where a nasal appears in unexpected environments. These have to be treated as exceptions. Example set (167) gives the four examples of my data which have a nasal inserted before second components with pitch contour 1, and in set (168) we have the four examples which show an inserted nasal before pitch contour 4 with an initial aspirated stop.

(167)

/ta-m-'p ^h h?/	[tamb ^h ø?]	saddle cushion
/t ^h chu-n-'tsihŋ/	[t ^h undzĩ:]	pond
/tah-n-'t ^h oh/	[^h daŋd ^h o]	feathers on an arrow
/ph ^h h?-n-'tah/	[p ^h ønda]	Tibetan month

(168)

/t ^h chu-n-tsham/	[t ^h undzɜm]	water boundary
/'sa-n-tsham/	[sandzɜm]	territory boundary
/t ^h a-n-tsham/	[t ^h andzɜm]	hair parting
/ɕa-ŋ-khjak/	[ɕaŋk ^h ja?]	frozen meat

Set (169) below contains three compounds which exhibit unassimilated prenasalization before second components with pitch contour 2 and unaspirated initial stops. These also have to be marked as exceptions, since regular subphonemic

prenasalization is homorganic to the following stop after first components ending in a vowel. We have seen that the source for unassimilated prenasalizations are the underlying final stops of first components. This allows us to speculate that the first components of these compounds may have ended in a /p/ at some earlier stage, but consistent synchronic evidence is not available for this. (See also section 3.3.d).

(169)

/ʃa-m-təhʔ/	[ʃamqəʔ]	fried rice with meat
/tʃəh-m-tuhʔ/	[tʃʰamduʔ]	tea with roasted flour
/ku-m-tʃehʔ/	[kumdʒeʔ]	sibling, h

2.4.3. The influence of pitch contours on voicing and deaspiration of medial stops

Underlying stops before high register components and the voicing parameter. I have stated that as a general rule medial unaspirated stops in compounds have the same variants along the voicing parameter as medial unaspirated stops in noncompounds. We have also already seen that since there is no voicing contrast, there is considerable freedom of variation in medial position. For this reason it may not be immediately evident that in some compounds underlying unaspirated medial stops show more voicing than in others. Upon closer examination, however, I have found that these

stops are quite consistently more voiceless in second components with high register than in second components with low register.

Example set (170) gives some examples with underlying voiceless unaspirated stops in second components with high register. In set (171) the second components have also high register but underlying aspirated stops; these tend to have more voicing than the unaspirated ones. Set (172) gives examples with underlying unaspirated and aspirated stops and low register in the second component. These stops are the most fully voiced ones.

(170)

/pa-ta?/	[paʔʔ]	birth mark
/'tʃah-tɛ/	[tʃʰatɛ]	chicken
/pɪŋ-to?/	[pɪŋtoʔʔ]	fruit
/sɪhm-pʰɔ?/	[sɪmpʰɔʔʔ]	incense stick, h
/pɪŋ-'kok/	[pɪŋkoʔʔ]	bark of tree
/'ke?-'kjuu/	[keʔkju]	interpreter

(171)

/tʃhu-'khaŋ/	[tʃʰuχã:]	bath house
/'pɛh-'tshɛ/	[pɛdʒɛ]	vegetables, h
/'kaŋ-'thii/	[kəndi]	sole (of foot)
/mih-'tshaŋ/	[midzã:]	family
/ku-thaŋ/	[kudã:]	colored painting, h
/mih-tshe/	[midze]	life

(172)

/ɕiŋ-toŋ/	[ɕiŋd̥o:]	tree
/taŋ-'koha/	[ⁿ daŋg̥o:]	yesterday evening
/nam-'tʰuh/	[nəmqu]	aeroplane
/ɕa-'tʰih/	[ɕəq̥i]	meat knife
/sɔ-tɕah/	[sɔ' d̥ɕa]	tea, h

Underlying /kh/ and deaspiration. I have stated that as a general rule underlying aspirated stops lose their aspiration medially in compounds. In the case of /kh/, however, there are a number of compounds which consistently retain medial aspiration. Closer examination of these cases reveals that /kh/ retains aspiration in this position on pitch contour 4 components. On pitch contour 3 components aspiration may occasionally also be retained, but this is most often not the case while my informant consistently retains it on pitch contour 4 components. Examples are given in set (173). The last example of this set is exceptional in that it does not retain aspiration, but this item also shows an exceptional medial nasal insertion which may explain the loss of the aspiration.

(173)

/ɕa-kho/	[ɕak̥ ^o]	meat soup
/'ɕeh-kham/	[ɕek̥ ^{3m}]	peach, h
/'kyh-khap/	[^o g̥yk̥ ^{əp}]	needle, h
/'kyhn-kha/	[^o g̥yŋk̥ ^ə]	winter
/thaŋ-kha/	[t ^h aŋk̥ ^a]	colored painting

(173) cont.

/pa-ŋ-khjak/	[paŋc̣ɛ̃ʔʰ]	frozen meat
/tʃhu-ŋ-khor/	[tʃʰuŋgoː]	water mill

2.4.4. Medial aspirated vs unaspirated stops: A case of complete overlap?

In the segmental section of this study I have assumed that there is a good deal of complete overlap on the phonetic surface between medial aspirated and unaspirated stops. For a proper understanding of the situation we must remember that underlying aspirated stops in LT occur only morpheme-initially, never morpheme-medially (cf. section 1.3.5.). Further we must keep in mind that there is no contrast between voiceless and voiced stops. Because ^s aspirated stops occur only morpheme-initially the question of overlap with unaspirated stops arises only medially in compounds, where they can occur as the initial margin of the second component, and where they normally lose the aspiration. The underlying identity, however, is always retrievable because these second components also occur in morphologically different environments. To assume complete overlap of allophones means, that in classical phonemic terms there are no medial aspirated stops. They all have to be represented as unaspirated ones. This indeed seems to be the argument which has been adopted by Chang and Shefts in the analysis on which they have based their Manual of spoken

Tibetan (1964). Though the manual does not give much analytical detail their spelling of the data allows us to draw this conclusion. In the light of these several special cases discussed in the previous two sections (2.4.2. and 2.4.3.) we must raise the question whether a phonemic representation which assumes complete overlap is still adequate.

Prenasalization in compounds represents the first piece of evidence against the complete overlap hypothesis. We have seen that this is a subphonemic feature which appears regularly before underlying unaspirated stops which introduce morphemes with pitch contour 2, while pitch contour 2 morphemes which are introduced by an underlying aspirated stop do not induce prenasalization (cf. set (161) with set (166)). If the underlying aspiration is not represented the environment for prenasalization is obliterated. The way out in compounds is, of course, to represent the nasal segment; this however merely pushes the problem into the morphophonemic domain where this inserted nasal will have to be accounted for. Further, if the nasal segment is represented medially where it occurs, the logical consequence would be to represent it also initially where it occurs. In the section on stop variation I have pointed out that prenasalization of stops is quite a variable feature which occurs only in certain phonological environments, and therefore the representation of this feature in initial position is in no way plausible. (Cf. note 2 to table 2, section 1.1.5.).

Underlying unaspirated stops introducing high register components represent the second piece of evidence against the complete overlap hypothesis. Example sets (170) and (171) illustrate the quite consistent tendency of underlying unaspirated stops to show less voicing than underlying aspirated stops in the same position. Without the underlying contrast this tendency has no explanation.

The case of underlying /kh/ before pitch contour 4, where it doesn't lose the aspiration is a further piece of self evident evidence that the underlying aspiration of second components is not necessarily lost.

These three cases then seem to suggest that the complete overlap hypothesis for medial unaspirated and aspirated stops is not adequate. This further suggests, that certain tendencies which can be observed in the realization of these stops are probably more real to the speakers than to the analyst; they seem to be aware of the underlying identity of the stops and there are various ways of leaving traces of it on the surface. But since it is more a matter of degrees and tendencies than of tangible facts, this situation is quite problematic for classical phonemic analysis, whereas it will present no problem for a generative approach. With the latter framework the underlying contrast can be recognized and represented, and rules can state the phonetic realizations. Rules have the advantage that they can more easily incorporate tendencies than a unique representation can.

2.4.5. Further features of interest in compounding

Long vowels in first components. If the first component of a compound ends in a long vowel, the length is phonetically replaced by glottal constriction before stops. This is illustrated in example set (174). Set (175) shows that before other consonants length is retained phonetically.⁵

(174)

/ʒee/	[ʒe: -]	glass
/ʒee-tam/	[ʒeʔtam -]	bottle
/see/	[se: -]	gold
/see-'tʰi/	[seʔdi -]	golden throne
/'maah/	[ma: -]	butter
/'maah-paʔ/	[maʔpa.ʔ -]	butter and flour
/'ηii/	[ηi: -]	two
/'ηii-tʃaʔ/	[ηiʔdʒa.ʔ -]	both
/ηuu-'tʰih/	[ηuʔdi -]	snoring, n

⁵In section 1.2.3.2. we have seen that a similar rule operates in derived nonverbal disyllabic words but there it appears to be restricted to /ii/ and /ee/ (cf. example set 64). My present data at this point is a bit scarce, and I suspect that additional data might give a more unified picture. Also, in compounds the rule is not completely obligatory; in slow speech it sometimes does not apply.

(175)

/see-'ɲjuk/	[se:ɲju.ʔ ¹ - \]	golden pen
/'maah-'rihn/	[ma:ri: _u : / /]	butter price
/kaa-'jɔ/	[ka:jɔ. - \]	china bowl

Cutting point for originally disyllabic components.

In the introduction to the section on compounding I stated that if one of the components is originally disyllabic it drops its second syllable. This statement is a first approximation which needs some refinement now. We find that this shortening process respects syllable boundaries in disyllabic morphemes which have a medial consonant cluster but does not do so in disyllabic morphemes with a medial single consonant (/k/, /m/, /p/, and /r/ have been observed). In these disyllabic morphemes the medial consonant is retained in the compound and realized in various ways. Example sets (176) and (177) show that medial /k/ and /m/ are realized as glottals, and set (178) shows that medial /r/ is realized as vowel length. With set (179) we come to medial /p/, and the examples show that there is some fluctuation in its realization; it can either be realized as [p¹] or as [ʔ¹].

(176)

/'ɲjuku/	pen
/ɕika/	habit
/'ɕohko?/	potatoes

(176) cont.

/'tʃhak-'ŋjuk/	[tʃʰzʔŋju.ʔʰ]	pen, h
/nam-ɣik/	[nəmɣi.ʔʰ]	weather
/'ɣɛh-'ɣohk/	[ɣɛɣo.ʔʰ]	potatoes, h

(177)

/'ŋihma/		sun
/'ohma/		milk, n
/mohmo?/		momo (a dish)
/ɣoh?-'ŋihm/	[ɣo.ʔŋi.ʔʰ]	sun, h
/'ɣɛh-'ohm/	[ɣeo.ʔʰ]	milk, h
/'ɣɛh-mohm/	[ɣemo.ʔʰ]	momo, h

(178)

/tʃhura/		cheese
/'maah-tʃhur/	[mzʔdʃu.]	butter and cheese

(179)

/'kupa, 'kypa/		thread, n
/lahpu/		radish
/'tʃhak-'kyp/	[tʃʰa.ʔky.ʔʰ]	thread, n, h
/'ɣɛh-lahp/	[ɣɛlapʰ/ɣɛla.ʔʰ]	radish, h
/lahp-'taah/	[lapta.]	grater

At this point we also obtain some proof for the monomorphemic status of some disyllabic nouns ending in /pa/, /ma/, /pu/, or /mu/. I have mentioned earlier that not every noun ending in one of the above segment sequences is ne-

cessarily a derived word (cf. section 2.2.2.) though these segment sequences are used for the nominalization of verb stems and for the derivation of secondary nouns. Example set (180) below gives some compounds where one of the components is an originally derived disyllabic noun.

(180)

/tah-pu"/		spouse
/'tɕhah-mu"/		hen
/'tsha-pu"/		nephew
/ku-tah/	[kundu ₃]	spouse, h
/'tɕhah-tɛ/	[tɕ ^h atɛ ₃]	chicken
/ku-'tsha/	[kudz ₃]	relative, n, h

Comparing the examples of set (179) with those of set (180) we realize that medial /p/ and /m/ of disyllabic nouns exhibit divergent behavior. In set (180), where we have derived disyllabic nouns, the medial consonant is not retained in the compounds. In the examples of set (179), however, the medial consonants are retained, and this suggests that the corresponding disyllabic nouns are monomorphemic. Since there are no tonal or other phonological features which distinguish such disyllabic morphemes from derived disyllabic stems, each noun which ends in one of the above mentioned segment sequences represents a test case as to whether it is monomorphemic or bimorphemic. The compounding test, however, will work only if the sequence is preceded by an open syllable. For disyllabic nouns in which the seg-

ment sequences are preceded by a closed syllable we can only conclude by analogy that this closed syllable is not necessarily a full morpheme by virtue that it represents a morpheme in a compound. To illustrate this last statement we can take /'kaŋpa/ 'leg, foot'. This is represented by /'kaŋ/ in the compound /'kaŋ-'thii/ 'sole of foot'. We might draw the conclusion that /'kaŋ/ is the stem and /-pa/ a suffix. But the behaviour of the nouns in set (179) shows that this is not necessarily the case. There would have to be other morphological evidence to justify such a conclusion; in the case of /'kaŋpa/ none has come to my attention, and so I conclude that it is monomorphemic.

In the compounds of example set (181) the second component derives from disyllabic nouns with medial /w/. In the vowel section we have seen that such stems are one source for long vowels and I have accepted alternative representations. The compounding process, however, suggests that these nouns are basically disyllabic, and that the use of the same representation for long vowels deriving from a final /r/ and for those deriving from a final /-wa/ syllable involves a slight misrepresentation because long vowels deriving from a final /r/ retain their length in compounding (cf. set (178) and the second item of set (183)); but those deriving from a /-wa/ syllable do not retain the length in compounding. In a more rigorous approach to underlying representations the divergent behavior of these

morphemes in compounding might be used as evidence for different underlying representations.

(181)

/'lowa, 'loo/		lungs
/khowa, khoo/		liquid, n
/'tahwa, 'taah/		month
/ku-'lo/	[kulo]	lungs, h
/ɕa-kho/	[ɕak ^x o] " "	meat soup
/phəh?-n-'tah/	[p ^h ɔ̃nda] " "	Tibetan month

Vowel length in second syllables of compounds. In discussing the vowel length contrasts in second syllables we found that the threefold contrast between short vowel, long vowel, and vowel followed by /?/ is also relevant in second syllables of disyllabic words. For disyllables other than stem compounds the contrast could only be well exemplified for /a/. (Cf. section 1.2.3.2.--Length in second syllables). For the remaining vowels we have to turn to compounds to illustrate the contrast. Example sets (182) - (185) illustrate it in final syllables for /u/, /o/, /i/, and /e/. These vowels tend to be higher in final syllables than in initial ones, and the difference in length for short and long vowel is very slight.

For the secondary vowels we find, as in other positions also, only a twofold contrast. Some examples are given in set (186).

(182)

/nam-'tʰuh/	[nəmɬu]	aeroplane
/seŋ-'kjuuh/	[seŋɟɤ·]	news
/tʰa-p-'ɕuhk/	[tʰəpɕu·ʔʰ]	hair tassel

(183)

/ku-'lo/	[kulo]	lungs, h
/tʰu-'too, 'tor/	[tʰuto·]	goose pimples
/ɕiŋ-'kok/	[ɕiŋŋo·ʔʰ]	bark of tree

(184)

/nam-'ɕi/	[nəmɕi]	soul
/'kaŋ-'thii/	[kɟŋdi·]	sole of foot
/'khaŋ-'mik/	[kʰɟŋmi·ʔʰ]	room

(185)

/ku-tshe/	[kudze]	life, h
/tʰen-ɕee/	[tʰɛ:ɕu·]	spectacles, h
/ɕiŋ-tseʔ/	[ɕiŋdze·ʔʰ]	wooden scaffold for playing

(186)

/'lu-ɕeh/	[luɕe·]	song
/'ɕeh-tʰəʔ/	[ɕeŋde·ʔʰ]	rice, h
/phəh-'jyh/	[pʰe·jy·]	Nepal
/nahm-'thyhʔ/	[nəmdy·ʔʰ]	season
/kaa-'jɔ/	[ka:jɔ·]	china bowl
/'ɕeh-jɔhʔ/	[ɕe·jɔ·ʔʰ]	parched grains, h

Longer noun strings. In the introduction to the section on the tonal behavior of stem compounds I have stated that true phonological compounds can have no more than two syllables. (Cf. section 2.4.--Length of compounds). At this point I want to present some evidence for this statement. Example set (187) contains some potential candidates for tri- or quadrisyllabic compounds. As far as prominence and pitch behavior is concerned they act like disyllabic compounds: each component is equally prominent and pitch contour identity is retained. On the segmental level, however, they do not show the assimilative processes which unite the disyllabic compounds. In the third example the initial /r/ of the second component exhibits a degree of approximation and friction which is characteristic for word initial position, not for medial intervocalic position where we observe [r]. In the fourth example the initial affricate of the second component does not undergo voicing and loss of aspiration as it would be the case in a disyllabic compound, but it remains voiceless and aspirated. In view of the differing behavior on the segmental level we must conclude that noun strings which are longer than two syllables are two separate words phonologically.⁶

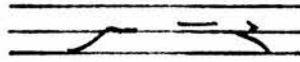
⁶When certain suffixes are added, however, compounds may become trisyllabic.

(187)

/'tʃehma kar-a/

[tʃ_him₃ ka₁ʃa]

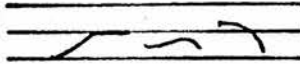
sugar



/'ɲihma mehʔtoʔ/

[ɲim₃ me_hʔtoʔʔ]

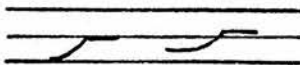
sun flower



/'tʃuhtu ruhma/

[tʃ_hud_ɥ ru_hma]

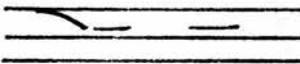
elbow



/'lanpu tʃhe/

[lan_ɥpu tʃ_he]

elephant



2.5. The tonal behavior of suffixes

The domains of compounding and suffixation are presented in two separate sections in this study. The reason for this is grammatical rather than phonological. I assume that on the grammatical level compounding and suffixation have different functions; the main function of compounding is to create additional lexical items while the suffixes are relational elements with the function of relating lexical items to each other. On the grammatical level, then, these two domains are quite distinct. On the phonological level, however, we cannot observe a clear cut between the two. The rules for segmental changes and for tonal behavior are largely the same for both domains. We will see presently that for suffixes there are not only four but five contrastive pitch profiles. I assume that the extra dimension for contrast in the suffix system is a result of the special status which suffixes have among the morphemes of the language; and it can be taken as a phonological evidence for the somewhat different status of the domain of suffixation. But apart from this feature compounding and suffixation have a lot in common on the phonological level. Semantically quite a number of suffixes are related to lexical stems, and the phonology seems to reflect the semantic relationship between the original stem and the suffixes.

2.5.1. Suffix categorization

The investigation of suffixation in LT has revealed that the tonal behavior of suffixes shows a basic dichotomy which divides them into two main categories: assimilating suffixes vs distinctive suffixes.

Assimilating suffixes. A good number of the suffixes belong to this category. I have called them assimilating because in the phonetic manifestation the pitch profile of such a suffix syllable is identical to the pitch profile of the second syllable of a disyllabic morpheme. In section 2.2.2. we have seen that the pitch level of the second syllable of a disyllabic morpheme is somewhat higher with pitch contour 3 and 4 than with pitch contour 1 and 2. This equally applies to the pitch profile of assimilating suffixes occurring after monosyllabic morphemes.

It is interesting to notice at this point that the structure of the language is such that assimilating suffixes occur most often after monosyllabic stems. In my data only the agentive and possessive suffixes -ki occur after disyllabic stems. But their phonetic realization in these positions is modified in such a way in these cases that they always become part of the second syllable of the stem as far as phonetic surface syllable structure is concerned (cf. appendix 2., section 2.2.). The fact that pitch profiles of assimilating suffixes cannot normally be observed on third syllables seems to be significant, but at

this point it is not transparent to me why this should be so.

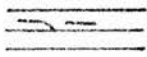
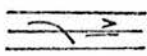
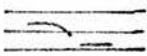
Comparing the pitch profile of assimilating suffixes with the ones of distinctive suffixes we find that it is different from all of the other four pitch profiles. This is illustrated in example sets (189) - (194) (cf. section 2.5.2.). In the phonological representation assimilating suffixes are marked with a double quote after the suffix in order to distinguish them from the unmarked pitch contour 4 suffixes and stems. (In the previous parts of this study I have not always separated assimilating suffixes by hyphen from the stems. In these cases I have not put any double quote after such a suffix. Leaving them unmarked results in the correct pitch profile since they assimilate to the stem. This however presupposes that pitch contour 4 suffixes are always separated by hyphens from stems. In a representation where *not* morpheme breaks are indicated pitch contour 4 suffixes would have to be marked.)

Distinctive suffixes. Distinctive suffixes do not show pitch assimilation to the stems to which they are suffixed. They have inherently distinctive pitch contours. We find four contrastive pitch patterns and the contrastive characteristics are in general the same as those of the four contrastive pitch contours of stems: A suffix may belong either to high or low register and have either a basically level or a moving pitch course. It is evident that

the same suprasegmental contrasts that occur with stem morphemes also occur with suffixes. In the case of pitch contours 1, 2, and 3 the phonetic manifestation is the same for stems and suffixes, except that the pitch profiles have reduced dimensions. We have seen that the same applies to stem morphemes in the second place of disyllabic compounds.

But pitch contour 4 has some special characteristics on suffixes, presumably in order to maintain distinction from assimilating suffixes. The initial pitch level of a pitch contour 4 suffix lies about midway between the one of assimilating and pitch contour 2 suffixes. In addition the pitch volume shows a very rapid decrescendo; as a result pitch contour 4 suffixes are less prominent than the other suffixes. Set (188) focusses on illustrating the contrast between assimilating suffixes and suffixes with pitch contour 2 or 4. The difference in pitch level between contour 2 and contour 4 suffixes may be very negligible; the rapid decrescendo of the pitch volume of contour 4 suffixes on the one hand, and the breathy voice quality of pitch contour 2 suffixes on the other hand, are probably the perceptually dominant features for the pitch identification of these suffixes.

(188)

assimilating:	/kɔʔ-pa"/	[kɔʔβa]		command, n
contour 4:	/kɔʔ-pa/	[kɔʔβa]		establish, install, p.p.
contour 2:	/kɔʔ-nɛh/	[kɔʔne]		having in- stalled

We have already seen that pitch contour 4 suffixes also have a special effect on preceding stems in that they allow a fuller development of the vowel length and pitch profile characteristics of these stems. The relevance of this for the length of secondary vowels has been discussed in section 1.2.3.1.--Length of secondary vowels...). The fuller development of the pitch contours on preceding stems, on the other hand, is exposed in section 2.3.3., and illustrated there in example sets (134) - (138).

2.5.2. Evidence for contrast among suffixes

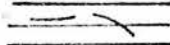
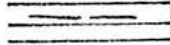
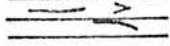

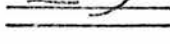
Example sets (189) - (194) illustrate the pitch contrasts among suffixes. The pitch profile sketches of the words are given as they occur in utterances, not in isolation. Some of the suffixes occur normally only utterance finally, and this has been signalled in the sets by a punctuation mark after the suffix such as a question mark or a full stop. Suffixes followed by comma occur normally at

the end of a phonological phrase. The pitch profiles of suffixes occurring in phrase or utterance final positions will exhibit modifications caused by overlaid intonation factors; since they rarely occur in other positions the modified contours are given in the following example sets. In set (189) - (192) we have the same set of five contrasting suffixes attached to four different verb stems, each stem representing a different pitch contour. In sets (193) and (194) we have a different set of five contrasting suffixes attached to contour 2 and contour 4 stems.

Suffixes:

Contour 1:	- 'tsahn	because
Contour 2:	-sohn	a past tense suffix
Contour 4:	-pa	a past tense interrogative (for content questions)
Contour 3:	- 'tan	way of doing an action
Assimilating:	-kaa"	purposive

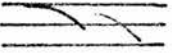
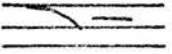
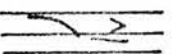
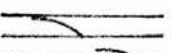
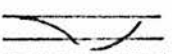
(189)

/paa- 'tan/	[pa·dã:]		way of lighting s. th.
/paa-kaa"/	[pa·ga.]		in order to light
/paa-pa ?/	[pa:βa]		(What) did (you) light?
/paa-sohn./	[pa·sõ:]		lit
/paa- 'tsahn,/	[pa·dzã:]		because (he) lights

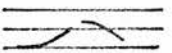
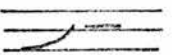
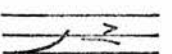
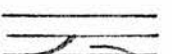

(190)

/tʃəh-'taŋ/	[^h dʒe·dã:]		way of paying a visit
/tʃəh-kaa"/	[^h dʒega·]		in order to pay a visit
/tʃəh-pa ?/	[^h dʒe:βa]		did (you) pay a visit?
/tʃəh-sohŋ./	[^h dʒe·sõ:]		payed a visit
/tʃəh-'tsahŋ./	[^h dʒe·dzã:]		because (he) payed a visit

(191)

/'jaa-'taŋ/	[ja·dã:]		way of lending
/'jaa-kaa"/	[ja·ga·]		in order to lend
/'jaa-pa ?/	[ja:βa]		did (you) lend?
/'jaa-sohŋ./	[ja·sõ:]		lent
/'jaa-'tsahŋ./	[ja·dzã:]		because (he) lends

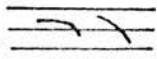
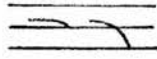
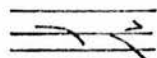
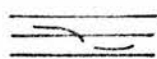
(192)

/'lahŋ-'taŋ/	[laŋdã:]		way of getting up
/'lahŋ-kaa"/	[laŋga·]		in order to get up
/'lahŋ-pa ?/	[laŋβa]		did (you) get up?
/'lahŋ-sohŋ./	[laŋsõ:]		got up
/'lahŋ-'tsahŋ./	[laŋdzã:]		because (he) gets up

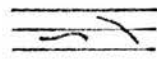
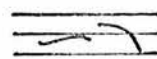
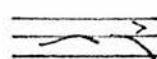
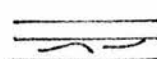
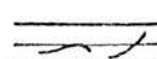
Suffixes:

Contour 1:	- 'tyh	when, while
Contour 2:	-neh	having done an action
Contour 4:	-pe?	a past tense interrogative (for yes/no questions)
Contour 3:	- 'tan	way of doing an action
Assimilating:	-ke?"	a present tense interrogative (definite intention, for yes/ no and content questions)

(193)

/pe?-'tan/	[pe. ?dã:]		way of telling
/pe?-ke?" ?/	[pe?ge.]		will (you) tell?
/pe?-pe? ?/	[pe: ?βe.]		did (you) tell?
/pe?-neh/	[pe. ?ne.]		having told
/pe?-'tyh/	[pe. ?dy.]		while telling

(194)

/tpeh?-'tan/	[ndpe. ?dã:]		way of measuring
/tpeh?-ke?" ?/	[ndpe?ge.]		will (you) measure?
/tpeh?-pe? ?/	[ndpe: ?βe.]		did (you) measure?
/tpeh?-neh/	[ndpe. ?ne.]		having measured
/tpeh?-'tyh/	[ndpe. ?dy.]		while measuring

In the preceding I have exposed the tonal contrasts among suffixes and illustrated them with a selected number of suffixes. A complete list of the suffixes classified in the course of this investigation appears in appendix 2, section 2.2., and an illustrative sentence for each suffix is given there.

In chapter 2 the features of the suprasegmental system of LT have been exposed, and we have seen that it exhibits four contrastive tone patterns for stem morphemes and five for suffix morphemes. In this chapter we will discuss various implications of the proposed tone classification, and compare the claims of this analysis with the claims of some previous descriptions of LT.

3.1. Phonological representation of tone

According to the theory of generative phonology as presented in The Sound Pattern of English (Chomsky and Halle, 1968) all phonological features are binary on the classificatory level of representation. Only on the phonetic level may these features be specified with more than two values. This theoretical position, however, has often been challenged since. The linguists who challenge it will generally admit that some of the features are clearly binary, but they claim that this principle does not necessarily apply to all the phonological features. Ladefoged (1971:91, 94), for example, claims that articulatory place features and vowel height features are nonbinary in nearly all languages. Gandour (1974a:147-59) also rejects binary classification





for the features of the larynx. Fromkin, in a discussion of the phonological representation of tone (1974:15), asserts: "Any viable feature set must at least account for the following: (1) contrasts between at least 4 level tones (2) indissoluble contour tones (3) the relation between phonation types and tones...". Tone systems of languages with more than two contrastive tone levels are frequently cited as evidence by the proponents of multivalued features on the classificatory level. In view of this it is interesting to note that the properties of the suprasegmental system of LT do not call for a multivalued parameter of distinctive features. Though we have four contrastive pitch contours, these clearly fall into two intersecting binary features, namely, high vs low register, and basically level vs moving contour.

Intersection of two binary features resulting in a fourfold pitch contrast is a common characteristic of the Bodic languages grouped around LT. As examples I would like to cite Tamang and Thakali from the Gurung Branch of the Bodish Section, and Sherpa and Kagate from the Bodish Branch of the Bodish Section, and Kham.¹ The contrastive features of the tone systems of these five languages are summarized in table 11 (a)-(e) below.

¹Kham is spoken in the Dhaulagiri and Rapti Zones of West Nepal. It is obviously Tibeto-Burman, but as far as any closer associations go yet unclassified. For the details of classification of the other languages mentioned see footnote 2 in the introduction, and footnotes 6, 7, and 9 to chapter 1.

(a) Tamang

(Hale and Pike, 1970, Part I: 94-117).

	sharply falling	basically level
tense (high)		
lax (low)		

(b) Thakali

(Hale and Pike, 1970, Part I: 128-142).








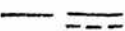
	contour	basically level
clear (high)		
breathy (low)		

Table 11: Continues next page.

(c) Sherpa

(Hale and Pike, 1970, Part I: 195-206).

	basically rising	basically falling
<u>tone 1</u> (high, tense)		
<u>tone 2</u> (low, lax)		

(d) Kagate

(Hoehlig and Hari, 1976: 41).





	moving contour	basically level
tense register (high)		
lax register (low)		

Table 11: Continues next page.

(e) Kham

(Watters, 1971a: 44).

The contours given for the Kham pitch patterns are the ones described for stem morphemes; on suffixes the same patterns are strongly modified. The interplay between stem and suffix pitch patterns in Kham shows a degree of complexity not yet observed in other Tibeto-Burman languages.

	pattern 1	pattern 2
tense register	—	—
lax register	—	—

Table 11: Schematic representation of the tone systems of five Tibeto-Burman languages of Nepal.

The tone systems of these five languages are strikingly similar: they all exhibit a fourfold pitch contrast which results from the intersection of two binary features. Feature 1 (which appears on the vertical axis in the schemata), I propose, can be identified with what I have called high vs low register in LT. The different investigators have used different labels, but the physiological observations reported do show common features as the following excerpts will show. For Tamang we find reported:

"The voice quality contrast results mainly from a change in the position of the Adam's apple. In the pronunciation of lax vowels, the Adam's apple remains lowered. This results in a larger resonance chamber at the back of the mouth and the vowel sounds lax and vibrating. In the pronunciation of tense vowels, the Adam's apple is raised slightly. This results in a smaller resonance chamber... and the vowel sounds tense and less vibrating." (Hale and Pike, 1970, Part I: 94).

In Thakali we find that for clear vowels the Adam's apple remains raised while for breathy ones it is lowered; with the lowering of the Adam's apple a tightening of the muscles of the front part of the neck can be observed externally. In normal speech low pitch and 'lax voice quality' are prominent in the low register, only in overdistant speech a breath is audible. (Hale and Pike, 1970, Part I: 129).

For Sherpa we find stated that parallel to the contrast which may be described in terms of tense and lax vowels "... the muscles involved in producing tense vowels are tightened and for lax vowels they are relaxed." (Schoettelndreyer, 1971: 23).

The investigators describing Kagate first give Ladefoged's definition of tense and lax register (1971:18), and then go on to say:

"We suspect that relaxation of the vocal cords is not the only physical mechanism involved in producing the lax voice quality, but at this stage of the investigation we are not in a position to determine this precisely. Externally we can observe that tense register vowels are signalled by a raising of the Adam's apple, and lax register vowels by a lowering of the Adam's apple." (Hoehlig and Hari, 1976 :39).

The features which are commonly observed in these languages are raising and lowering of the larynx and a different mode of vibration for the two registers. Some investigators have used abstract terms for the registers, (e.g. Sherpa: tone 1 and tone 2), others have chosen impressionistic labels for the voice qualities, such as clear and tense for high register, and breathy and lax for low register. The different labels are more likely to reflect the varying tastes in expression of the investigators than significant differences in the phonetic realization of the register contrast. I have had some first hand acquaintance with all the languages mentioned here, and my impression is, that the phonetic realization of register is very similar in these languages, and also very similar to the two registers of LT. The physiological mechanisms involved as described earlier in this study (cf. section 2.1.) seem to me the most plausible ones at this stage of the investigation. Where tense and lax are used as descriptive labels this refers to the mode of vibration, not to a tense setting of the supraglot-

tal musculature. According to Laver (1975) tense voice and lax voice "... stand for a high degree of tension generally through the system, and a low degree, respectively." (1975: 252). If these settings were relevant for the high and low registers of these Tibeto-Burman languages we could expect substantial differences in vowel quality between the vowels of the two registers, that is, we would expect the vowels of the high register to be tense and the ones of the low register lax, in the sense that these terms are used traditionally, e.g. by Chomsky and Halle (1968:324). Such differences in vowel quality have not been observed in these languages, and therefore the terms tense and lax voice quality should probably be abandoned in favor of modal voice (non-breathy, clear, perhaps with some tenseness in the larynx setting) and breathy voice (with the understanding that breathy does not mean whispery as well).

Feature 2 (which appears on the horizontal axis of the schemata) always involves the direction of the pitch movement. Generally we observe a contrast between more or less level pitch course and more or less drastically moving pitch contours. It seems reasonable to assume that the rapid changes in fundamental frequency that are necessary for the moving contours are achieved by adjustment of the tension in the vibrating parts of the vocal folds.

Looking at the physiological correlates of features 1 and 2, we cannot claim that they involve clearly distinct

physiological mechanisms. Why is it then, we may ask, that all the investigators have chosen to represent the tone systems of these languages by two intersecting parameters instead of one parameter with four values? (See table 12 below).²

contour 1
contour 2
contour 3
contour 4

contour 1	contour 2
contour 3	contour 4

Table 12: Representation of two binary features intersecting with each other vs a representation on one parameter.

Before giving a more theoretical justification for the intersecting representation I want to mention two easily observable factors which, I presume, have led the investigators to choose the four-box presentation. The first factor concerns the semantic significance of the contrasts. In all the languages discussed here we find that minimal pairs for high vs low register are abundant; thus the register contrast carries a heavy semantic load. For the other feature, where

²Credit for this representation is to be given to Austin Hale, who was at that time heading up the research team of the Summer Institute of Linguistics in Nepal.

pitch movement is involved, minimal pairs are rather scarce. This suggests that the semantic load carried by the contrast is less significant. The other factor concerns the awareness of native speakers. We find that the native speakers of these languages are usually aware of the register contrast and exploit it in jokes and puns. Further, they come to a sure judgement of the register identity of morphemes quickly. But this is not the case for the pitch movement contrast; they are generally not aware of it, and it is sometimes difficult to make them aware of it. Only especially gifted individuals come to a sure judgement quickly.

Beside these factors the morphology of some of these languages also shows a systematic pairing of the contours on the vertical axis. This can be illustrated particularly well with Kagate. To facilitate the discussion the schematic representation of the tone contrasts in Kagate is given again in table 13. The earlier terms tense and lax register are replaced by high and low register, since a closer examination of the phonetic literature has shown them to be more suitable for the features involved.


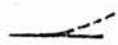


	moving contour	basically level contour
high register	 1	 2
low register	 3	 4

Table 13: Revised schematic representation of the Kagate tone system.

Pairing of the contours. For the schematic representation of the pitch contours of Kagate we can assume that at this point it is clear that contours 1 and 2 are to be grouped together: the relatively high pitch and clear voice quality give them a common denominator which we have termed 'high register'. Similarly, contour 3 and 4 have the common denominator of relatively low pitch and breathy voice which we have termed 'low register'. But we have no indication yet of how these contours should be paired on the vertical axis. The pairing arrived at in table 13 shows one possible pairing, and table 14 below illustrates the alternative.





	falling	rising
high register	 1	 2
low register	 4	 3

Table 14: Alternative pairing of Kagate pitch contours.

The dotted lines of contours 2 and 4 in table 13 indicate that contour 2 has a rising and contour 4 a falling tendency. If these tendencies were considered to be significant we could give contour 1 and 4 the common denominator 'falling', and contour 2 and 3 the common denominator 'rising'. This presentation seems in some way simpler than the one of table 13. We just have 'falling' vs 'rising' as common denominators instead of the somewhat cumbersome labels 'moving' vs 'basically level'. However, it is the pairing of table 13 which is the correct one, not the one of table 14. That this is not merely an arbitrary decision that has to be taken for the presentation becomes evident when we examine the pattern of pitch shifts for the transitivity shifts of certain verb stems. A large number of intransitive³ verb stems with low register have a transitive counterpart with the same segments but with high register. The examination of the contour identity of these pairs reveals that if the intransitive low register stem has contour 4, the transitive counterpart in the high register will have contour 2, and that if the low register stem has contour 3, the high

³The terms transitive and intransitive have to be understood in a somewhat wider sense here, than they are defined traditionally. We also find pairs like the following: 1 /'kehn/ 'to dress oneself' and 3 /'ken/ 'to dress someone else'. The feature simply involves a shift in transitivity.

register counterpart will have contour 1. This is illustrated in example set (195). (Low register is signalled with h after the vowel as in LT. Note however that the contour numbers 1 and 2 are used for high register in Kagate, while in LT they have been used for the low register contours).

(195)

3 /'juuh/	go for a walk
1 /'juu/	take someone for a walk
4 /rahl/	tear, v(itr)
2 /ral/	tear, v(tr)
3 /'nohŋ/	spoil, v(itr)
1 /'noŋ/	spoil, v(tr)
4 /t̥ahm/	be scattered
2 /t̥am/	scatter s. th.
3 /'rohɸ/	break, v(itr), (caused by knocking)
1 /'rop/	hit s. o. or s. th.
4 /siih/	become loose, undone, v(itr)
2 /sii/	untie, take off, v(tr)
3 /'tahɸ/	fall, v(itr)
1 /'tap/	sow
3 /'tohr/	lose, v(itr) and (tr)
1 /'tor/	sprinkle s. th.

Example set (195) is only a small sample of the large number of intransitive/transitive pairs that can be found in Kagate. Nevertheless it is representative for the regularity with which this semantic pairing of pitch contours operates in the verb morphology of Kagate, since so far no exceptions to this rule have been observed. This, then, is clear evidence that there is a systematic relationship between the two pairs of contours, and it proves that the schematic representation suggested in table 13 shows the correct pairing. Therefore the representation of the tone system of Kagate as an intersecting system with two binary features in a 'four-box' schema is not merely a device for presentation, but reflects significant properties of the phonological organization of the suprasegmental contrasts. For the other Bodic languages discussed in this section no similar pairings have been reported yet. Nevertheless, we can assume that the organization of the tone systems of these languages is also characterized by the intersection of two binary features.

Now--to return to the main topic of this study--we have already seen that the suprasegmental contrast system of LT also has the features of voice quality and pitch movement, and I have pointed out that though voice quality is intimately linked with pitch level, the physiological settings for the production of the two registers involve more than mere pitch control; further I have also suggested that the

different mode of phonation is more important for the perception of the contrast than it has traditionally been assumed to be. The physiological and perceptual criteria alone, however, may not be enough evidence for the intersection of two features. But additional support for an intersecting system is also found in the grammar of LT. It exhibits the same systematic pairing of pitch contours for transitivity shifts of verb stems as Kagate does. Some examples are given in set (196).

(196)

2 /lohk/	return, v(itr)
4 /lok/	give back, read
2 /riih/	fall over, v(itr)
4 /rii/	cause to fall over
2 /th ^h ɔ̃n/	come out, v(itr)
4 /tɔ̃n/	take out, pull out, v(tr)
2 /phahp/	descend, v(itr)
4 /pap/	take down, pull down, v(tr)
2 /rɛh/	tear, v(itr)
4 /rɛ/	tear, v(tr)
1 /'ɲjɛh/	lie down, v(itr)
3 /'ɲjɛ/	cause to lie down
1 /'lahp/	say
3 /'lap/	teach

The pattern of pitch shifts among cognates of related languages further points to the same systematic pairing of pitch contours. This can be illustrated with LT and Kagate. Cognates of these two closely related languages normally have the same pitch contour. (The same here means the phonetically most similar ones.) Occasionally, however, we observe a shift in register. In these cases we find that items will shift from basically level to basically level contours, and from moving to moving contours, but not from level to moving or vice versa. Some examples are given in set (197).

(197)

LT		Kagate	
/'makpa/	son-in-law, bridegroom	/'mahkpa/	dit.
/'thor/	spill, v(itr)	/'tohr/	lose, (itr and tr)
/'kjahn/	fill, v(tr)	/'kan/	dit.

These observations make it quite clear, then, that the four contrastive pitch contours of LT do not represent four values on a single parameter, but they naturally fall into two intersecting binary features.

With the evidence from the Bodic languages I do not want to suggest that the evidence for multivalued phonological features of tone systems given by other investigators might not be valid. I simply want to point out that, though LT has four contrastive pitch contours, these clearly fall

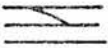
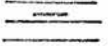
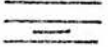

into two binary features on the classificatory level so that there is no need to postulate multivalued features for the tone system of this particular language.

In connection with the phonological representation of tone, two other issues need to be discussed. The first issue concerns the level of representation for pitch contrasts. Traditionally, linguists have assumed that tone contrasts need suprasegmental representation, but more recently some have claimed that the facts of tone languages call for segmental representation; they claim that tone specifications must be attached to certain segments and thus be included in the segmental matrices so that no suprasegmental matrix will be needed. This position has been strongly advocated by Woo(1969). According to her hypothesis tone features must be specified segmentally. She bases her argument on the observation that contour tones occur only with syllables that have at least two voiced segments, so that the pitch movement can be analysed as a sequence of two underlying level tones. The assumption is, that pitch specifications can occur only with voiced segments, and that one segment can have only one pitch specification. This seems reasonable if pitch is to be represented segmentally.

Woo's claim raises the second issue which needs to be discussed, namely the status of pitch movement in phonological representations. Are contour tones really always dissoluble into two underlying level tones? The answer to this

will be no if we can find a language which exhibits a pitch contrast between a level and a moving contour on one single voiced segment. This is exactly the situation in LT where we find that the four pitch contours are contrastive for CV and CVC morphemes with voiceless consonants. A good set for the illustration of this is example set (110), which is reproduced here for the convenience of the reader in set (198) below. (Further examples are found in sets 74, 77, 78, 108, 109, 112, in section 2.2.).

(198)

3 /'tap/	[tɔp ¹]		sow, v
4 /pap/	[pɔp ¹]		take down
2 /phahp/	[p ^h ɔp ¹]		descend
1 /'ɔahp/	[ɔɔp ¹]		leg, foot, h

Thus the facts of LT refute Woo's theory: it does exhibit a contrast between level and moving pitch on a single short vowel. To assume two underlying level tones in such a situation is altogether implausible, and therefore I conclude that the restriction on phonological theory suggested by Woo is too strong.⁴

⁴Woo's position has also been attacked on similar grounds by Elimelech (1974) in a paper entitled 'On the reality of underlying contour tones'. His evidence is taken from Kru, which is a West African tone language.

This is further supported by the fact that LT is a morpheme tone language. (The arguments for this are given in section 3.2.). If the pitch contour is a property of the morpheme as a whole and can spread over 1 - 2 syllables it seems much more natural to give the pitch specification in a suprasegmental matrix than to attach it arbitrarily to some of the voiced segments of the morpheme.

So far, then we have seen that the phonological representation of the tones of LT requires (1) suprasegmental representation, (2) indissoluble contour tone features, and (3) two binary features. The features needed have long been suggested by the schematic representation of the suprasegmental contrasts used so far in this study, and they are the following:

Feature 1: register--high vs low

Feature 2: pitch movement--basically level vs

moving pitch course.

This results in the simple feature specification given in table 15.

Features:	high (register)	level (pitch movement)
contour 1:	-	-
contour 2:	-	+
contour 3:	+	-
contour 4:	+	+

Each feature needs to be specified only once for each morpheme.⁵

Table 15: Phonological specifications for the tones of LT.

⁵This statement has an exception, in that for the category of assimilating suffixes no tone specification will be needed in a distinctive feature representation. A rule would state that syllables with no tone specification assimilate to the tone pattern of the preceding morpheme.

The fact that assimilating suffixes need no tone specification is not borne out in the phonological representation of this study, where they are marked with a double quote after the segments (e.g. -pu"), while pitch contour 4 suffixes are left unmarked. This is just a consequence of the abstract symbolization of the pitch contours chosen for stem morphemes, where pitch contour 4 is left unmarked, too.

From the phonetic realization of the two suffixes (see for example set 188) it is not immediately evident which of the two suffix contours should be equated with pitch contour 4 on stems. The pitch profile of an assimilating suffix is very much like the one of a contour 4 stem in the

3.2. The status of the morpheme in the suprasegmental system

The claim of this study is that LT is a morpheme tone language. In the following I want to contrast this hypothesis with other claims about the nature of the LT tone system and thus re-inforce the status of the morpheme in the suprasegmental system.

3.2.1. Syllable tone?

As far as I am aware LT has most often been described as a syllable tone language, that is, each syllable of the language has the basic potential for carrying a contrastive pitch feature. Analyses which can be cited in this context

Footnote 5 continued:

second position of a stem compound, while the pitch profile of contour 4 suffixes is quite different. This could lead us to equate assimilating suffixes with pitch contour 4 stem morphemes. However, the prominence relation between the two components are slightly different in the two strings; in the stem compound both syllables are about equally prominent, while in a derived disyllable the first syllable is more prominent (cf. section 2.4.--Prominence features, and footnote 3 in the same section). The evidence which has led me to choose the alternate equation is that the pitch profile and the prominence features of a derived disyllable are identical to the one of a monomorphemic disyllable. This entails that pitch contour 4 on suffixes needs special realization rules for the low level phonetic details.

are the following:

Roerich (1957) gives very little detail about the tonal features of Tibetan, but from the brief remark on tone (1972 edition: 23-24) we can gather that he assumes Tibetan to be a syllable tone language.

Sedláček (1961) clearly works with a syllable tone hypothesis. This is stated in the introduction to the paper in the following terms: "The object of this study is to examine the tones and their changes in all possible syllables.." (183).

Richter (1964: 44-53) does not explicitly state his position but from his exposition of the tones of the Lhasa Dialect it becomes evident that he too assumes syllable tone.

The last example I want to cite is the analysis which underlies Chang and Shefts' Manual of spoken Tibetan (1964). On page 1 they state the tonal possibilities for vowels. The use of the term 'vowel' suggests that they assume syllable tone. This is further confirmed by their transcription where each syllable carries a tone mark, except a few "stressless" suffix syllables and particles. The absence of tone marks on these syllables is explained by the stresslessness. According to the Chang and Shefts analysis then, some syllables are neutral as to pitch contrasts, but there is no suggestion of LT not being a syllable tone language in their work.

Morpheme tone. The exposition of the suprasegmental features of LT thus far has shown that the tone system of the language exhibits characteristics which do not fit the syllable tone description. To recapitulate the evidence here, the key argument in this issue is that disyllabic stem morphemes⁶ exhibit only one contrastive pitch contour, and not two, as one would expect in a syllable tone language. The phonetic details of pitch contours on disyllabic morphemes have been exposed and illustrated in section 2.2.2. (cf. example sets 125 - 137). Since on the systematic level the pitch contour is a property of the whole morpheme, the phonological representation must represent tone accordingly, that is, not for every syllable, but only once for every morpheme.

We can admit that a syllable tone description which states that some syllables are tonally neutral may reach observational adequacy. Observational adequacy might also be reached by stating tonal restrictions for disyllabic morphemes, though in this latter case I would find it difficult to know to which pitch contour the pitches of these second syllables should be assigned. Such statements, however, leave the tonal behavior of disyllabic morphemes unexplained. Only the morpheme tone hypothesis can give an

⁶I presume that this statement would apply to suffix morphemes as well. The reason I only mention stem morphemes here is that so far I have not observed any disyllabic suffixes.

adequate explanation for it. If the contrastive pitch pattern is a property of the morpheme as a whole then it follows from the definition of the system that independently contrastive pitch features on individual syllables of disyllabic morphemes are excluded.

Because of the relative rarity of disyllabic morphemes this property of the language is not very readily detected, and it was necessary to make a case for the disyllabic morpheme. As we have seen, good evidence for the disyllabic status of some nouns is found in the phonology of compounding (cf. section 2.4.5.--Cutting point for disyllabic components), and from this we were able to conclude that there are more disyllabic morphemes in the language than one might think at first.

I may add here that morpheme tone is much more readily recognized in some of the related Tibeto-Burman languages of Nepal. Thakali, Western Tamang, Kham, Sherpa, and Kagate can be cited as examples. In these languages the morpheme is more readily recognized as the relevant unit for the distribution of contrastive pitch contours because disyllabic stem morphemes are frequent, and disyllabic suffix morphemes and trisyllabic stem morphemes also occur occasionally. (More details about the tone systems of these languages can be found in the tone sections of the phonemic summaries for Thakali (Hari, 1969), Kham (Watters, 1971a), and Kagate (Hoehlig and Hari, 1976) and in the tone guides for Western Tamang (Hari, 1970) and Sherpa (Schoetelndreyer, 1971)).

Morpheme tone and syllable final /?/. The morpheme tone hypothesis has been used as evidence for the segmental interpretation of the laryngeal feature complex (i.e., abrupt pitch falls, glottal constriction and unreleased glottal stop), and allusion has been made to the complications a suprasegmental interpretation would introduce into the tone system. (Cf. section 1.1.4.--Phonological interpretation of the feature complex). Here I want to expose in some detail what the complications are that would result from a suprasegmental interpretation. We have seen that underlying /?/ is realized as glottal constriction which is accompanied with a slight dip in pitch word medially ([\sim ?]), except before suffixes with pitch contour 4 where we have glottal constriction preceded by quite a pronounced pitch fall ([\sim ?]), and as an unreleased glottal stop preceded by a sharp pitch fall phrase and utterance finally ([\sim ?]). We have also seen that glottal constriction does not only occur morpheme finally but also morpheme medially.

The arguments which support the segmental interpretation of syllable final glottal constriction and syllable final unreleased glottal stop have been given in section 1.1.4. To recapitulate briefly, the following evidence is available for the segmental interpretation:

(a) [\sim ?] and [$k^?$] frequently vary with each other in word final position.

(b) [ʔ] alternates with [p], [k], and [m] in derivations and compounding.

(c) Suprasegmental interpretation of the glottal features would destroy the morpheme tone hypothesis because glottal constriction occurs also morpheme medially.

The evidence of argument (c) is based on the morpheme tone analysis. If the pitch falls were considered to be the primary exponents of the phonetic phenomena and the whole feature complex were given a suprasegmental interpretation, the morpheme tone hypothesis would be destroyed because glottal constriction occurs also morpheme medially (cf. example sets (14) and (15), section 1.1.4.). As a result pitch would have to be stated for each syllable, and this would entail the following implausible consequences:

(i) The tonal behavior of disyllabic morphemes would remain unexplained.

(ii) The pitch contour contrasts would be doubled because the four pitch contours are contrastive before the glottal features.

(iii) The doubling of contrastive pitch contours would further create restrictive distribution of contours for second syllables of disyllabic morphemes. These second syllables would not exhibit the full range of contrasts, and on the observational level it would be difficult to decide to which contours the occurring pitch realizations should be assigned.

With the segmental interpretation of the glottal feature complex and with the morpheme tone analysis we can avoid all the complications listed above, and this seems to me a very desirable consequence.

3.2.2. Word tone?

We must now take the case further and see whether LT might perhaps be a word tone language. I might not have considered it necessary to discuss this further if it had not already been suggested in the literature (e.g. Sprigg, 1955, and 1968/69; Mazaudon, 1974:32-33).

Another reason to take the word tone hypothesis seriously is that a number of Tibeto-Burman languages of Nepal have been analyzed as word tone languages, as for example Sunwar (Bieri and Schulze, 1969; Khaling-Rai (Toba, 1972); and Eastern Tamang (Mazaudon, 1973).

The word tone hypothesis states that one word can exhibit only one contrastive pitch profile. Therefore LT would have to fulfill the following two conditions in order to be a word tone language:

(a) In compounding the second component of the compound loses its tonal identity; that is, its pitch profile is determined by the identity of the contour of the first component, or it takes some uniform tone.

(b) In the domain of suffixation, suffixes cannot have any distinctive tonal features; that is, their pitch profile is entirely determined by the pitch contour of the preceding stem, or all suffixes have some neutral and uniform pitch contour.

But neither of these two conditions are fulfilled in LT; in general just the opposite of what they suggest can be observed: in section 2.4. we have seen that in compounds each component retains its original pitch contour; and in section 2.5. I have shown that suffixes also exhibit distinctive pitch features. In fact, the category of assimilating suffixes gives rise to an additional contrast dimension among suffixes. In the light of these findings it is impossible to maintain the word tone hypothesis. For the syllable tone description I have admitted that it may reach observational adequacy. But I cannot make the same concession for the word tone hypothesis. Considering the phonetic phenomena contained in my data a word tone description would not reach observational adequacy.⁷

⁷Other western scholars (e.g. Shefts and Chang, 1967; Chang and Shefts, 1965; Kjellin 1974, 1975, and 1976a) have observed extensive tone changes in compounds, so that a word tone analysis may work. These tone changes, however, stand in sharp contrast to what I have reported in sections 2.4. and 2.5. The question arises whether this discrepancy in observation is due to different dialects or to an idiosyncrasy of my informant, or whether these contrasts have

3.3. Comparison with previous tone analyses of LT

In the preceding sections different claims about the domain for which tone is recognized to be relevant were weighed up against each other, and my conclusion was that LT is a morpheme tone language. In this section I want to compare the contrastive features of the proposed analysis with those of previous tone analyses and define the areas of agreement and disagreement in order to establish "the common ground in phonetic observation" (cf. introduction). At present I am aware of four analyses of the tonal features of LT that are sufficiently detailed to allow comparison. These are the following:

Footnote 7 continued:

been overlooked so far. We might want to assume one of the former two possibilities, but an article of Gandour (1974b) about Siamese has made me aware that the latter might be possible too. He reports that scholars have generally observed quite extensive tone changes in the first component of compounds. He refers to five different descriptions where the analysts have observed such changes in fluent speech. Against this he holds the observations of two native Thai scholars who claim that all contrastive tones are retained in these compounds. This led Gandour to careful experimental investigation of these pitch contours, and he reports that his experiments have confirmed the claims of the Thai scholars. This then shows that it is not unduly far fetched to suspect that certain contrasts might have been overlooked.

(a) R. K. Sprigg's analysis as presented in his thesis (1968/69) and various other articles (1954, 1955).

(b) Chang and Shefts' analysis as presented in their Manual of spoken Tibetan (1964).

(c) K. Sedláček's analysis as presented in his article 'The tonal system of Tibetan (Lhasa Dialect)' (1961).

(d) O. Kjellin's discussions of the Tibetan tones (1974, 1975, 1976a).

We will discuss these four analyses in some detail in the following paragraphs.

(a) Sprigg describes LT as having high tone words and low tone words, and I have already pointed out in section 2.1. that his high tone corresponds to my high register, and his low tone to my low register. Though he specifies the tone features for the word the comparison of his analysis with mine is quite straightforward because there are a lot of monomorphemic words. It becomes evident that Sprigg has not observed the distinction between the basically level and the moving pitch contours. But as far as the classification of morphemes for high and low register (or high and low tone in Sprigg's terms) is concerned there is as a rule no disagreement between the two analyses.

(b) As far as actual phonetic observation is concerned, Chang and Shefts' and my analysis come quite close. Though they present a syllable tone description while I maintain

that it is morpheme tone, comparison is not too difficult because of the large number of monosyllabic morphemes in Tibetan. For disyllabic morphemes we must remember that the salient contrastive features are phonetically primarily manifested on the first syllable of the morpheme. Thus, in comparing lexical items the first syllables of the morphemes are taken into consideration.

Chang and Shefts give the following details in their manual (p. 1):

Tones:

Single vowels: High, Low (e.g. ā, a)

Geminate vowels and single vowels followed by η or m :

High-High, High-Falling (e.g. āā or ām, āà or ām̃)

Low-Low, Low-Falling (e.g. aa or am, aà or am̃)

Comparing the two analyses the following discrepancies become apparent: while Chang and Shefts recognize only high and low tone for short single vowels I recognize four contrastive pitch contours also for morphemes with one short single vowel in open and in closed syllables. For syllables with geminate vowels or ending in a nasal consonant Chang and Shefts recognize for ^u_^ different pitch patterns. At a first glance it might seem that for the latter syllable types there is agreement in phonetic observation. But we will see shortly that this is really only the case for the syllables ending in nasals and for certain syllables with 'geminate' vowels.

First I want to comment on the syllables ending in nasals (morphemes ending in nasals in my terminology). In the high register the correspondence is fairly straightforward:

My pitch contour 3 corresponds to Chang and Shefts' High-Falling tone ($\bar{a}\bar{m}$), while pitch contour 4 corresponds to their High-High tone ($\bar{a}\bar{m}$). The correspondence in low register is less unambiguous. According to a minimal contrast Chang and Shefts give (1964:8), tsiŋ 'a pit dug in the ground for storing water' and tsiŋ̃ 'a raft', the correspondence is as follows:

My pitch contour 1 corresponds to Chang and Shefts' Low-Low tone (am), while contour 2 corresponds to their Low-Falling tone (aṁ). Comparing other lexical items, however, I find that there is a low rate of agreement in classification in the low register. This is somewhat disturbing; nevertheless, there is agreement on the systematic level in that there are four contrastive pitch patterns for this syllable type.

Syllables with long vowels. In my analysis I distinguish between CVV-syllables (morphemes in my terminology) and CV?-syllables, and the four contrastive pitch contours occur with each type. Chang and Shefts, however, have interpreted all my CV?-syllables as CVV-syllables, and they do not seem to distinguish between the different degrees of pitch fall at the end of syllables, nor between the

difference in the initial pitch level for certain syllables. As far as I can see there are the following correspondences:

My analysis:	Chang and Shefts' analysis:	
contour 1 CVV [ˆ]		
contour 2 CVV [—]		
contour 4 CVV [—]		
contour 3 CVV [˘]		
contour 1 CV? [ˆ ? ¹]		
contour 2 CV? [— ? ¹]		
contour 4 CV? [˘ ? ¹]		
contour 3 CV? [˘ ? ¹]		
		CVV <u>aa</u>
		CVV <u>aà</u>
	CVV <u>āā</u>	
	CVV <u>ā̄ā</u>	

Table 16: Pitch correspondences for syllables with "long" vowels.

Table 16 shows that for the syllables which I have interpreted as CVV-syllables we find the same correspondence as for CVN-syllables. Both analyses show four contrastive pitch contours for these two syllable types. But the four contrastive pitch contours of my CV?-syllables correspond to two contrastive pitch patterns in Chang and Shefts' analysis. This discrepancy in observation seems to be related to the other one we have already observed, namely, that they distinguish only between high and low tone for syllables with single short vowels. In my analysis CV?-syllables have a single short vowel in the phonological representation, and according to my observation it is necessary

to maintain that the following pitch patterns are phonetically different and phonologically contrastive:

contour 1	CVV	[ˆ]	vs	CV?	[ˆ?¹]
contour 2	CVV	[—]	vs	CV?	[—?¹]
contour 4	CVV	[—]	vs	CV?	[˘?¹]
contour 3	CVV	[˘]	vs	CV?	[˘?¹]

Table 17: Contrasting CVV- and CV?-morphemes.

Thus, apart from my different position regarding the relevant unit of distribution for contrastive pitch contours, I basically diverge from Chang and Shefts' analysis only at one point: For single vowels they recognize only high and low tone while I recognize four contrastive pitch contours for morphemes of this syllable shape. Any further discrepancies seem to be related to this basic one. A summary of the agreement and discrepancy in observation between Chang and Shefts' and my analysis is given in table 18.

Another area where there appears to be quite a large disagreement in phonetic observation is tonal behavior of stem compounds. From the data contained in the manual I conclude that Chang and Shefts observe the following: All contrastive tone patterns occur on first components but second components occur only with the following tones:

High, High-High, High-Falling. Low tones do not seem to occur on second components. Since I have already stated my position regarding this issue no further comments are needed here.

Hari	Chang and Shefts				
CV(C)	contour 1	} →	CV(C) Low	<u>a</u>	
	contour 2				
	contour 4	} →	CV(C) High	<u>ā</u>	
	contour 3				
CVV/	contour 1	→	Low-Low	<u>aa</u> , <u>am</u>	
CVN	contour 2	→	Low-Falling	<u>aà</u> , <u>am̄</u>	
	contour 4	→	High-High	<u>āā</u> , <u>ām</u>	
	contour 3	→	High-Falling	<u>āà</u> , <u>ām̄</u>	
CV?	contour 1	} →	CVV	Low-Falling	<u>aà</u>
	contour 2				
	contour 4	} →	CVV	High-Falling	<u>āà</u>
	contour 3				

Table 18: Comparison with Chang and Shefts' analysis.

(c) The main concern of Sedláček's paper is to relate the observed phonetic pitch of syllables to the orthography of the syllables of written Tibetan. Because of the basically enumerative character of the paper and the lack

of explicitness in the systematization of the material I found it quite difficult to interpret the material in a systematic way which would allow a comparison with my own analysis. Struggling through his lists of examples in an attempt to do this I discovered that his phonetic observations and mine are in agreement in some respects while in other respects there is a puzzling lack of agreement.

In the introduction to his paper Sedláček states: "Beyond these two cardinal categories [high and low tone categories in his terms, high and low register in mine] there exists, of course a further subdivision of tones in accordance with the depth of the tonal fall or the height of the tonal rise." (p. 182). In this statement Sedláček does not mention that the further subdivision of tones cannot occur on single short vowels and some of the examples he gives later in the paper confirm that he has in fact observed it on single short vowels. (See for example example set 202). At this point then, Sedláček's and my observation are in accordance. However, we do not seem to agree as to the number of subdivisions that may occur, but I find it difficult to see just how much we disagree.

Sedláček observes the following tones for each of his categories (p. 226-29):

High tone category: 7 55 √ 53 √ 51 √ 41

Low tone category: 7 13 7 14 7 35

The interpretation of the tones listed above presents a problem in relation to CV?-syllables. Sedláček does list a number of examples with final glottal stop and in general there is agreement between his and my data at this point. However, in other lists he frequently observes a long vowel where I have observed a final /?/, and in these cases I cannot decide whether this has affected the pitch recorded for these items.

The examples given in the paper are grouped according to the various syllable finals and looking through them it becomes apparent that Sedláček often comes up with two subdivisions for each tone category in a particular group. This is also the case for syllables ending in a glottal stop in his data. Example set (199) illustrates this for high category tones and set (200) for low category tones. (The page numbers given with these sets refer to Sedláček's paper. For some items my informant gave a slightly different meaning, in which case I have added a gloss with my data. A dash in my data means that the item in question was not known to my informant.)

(199)

Sedláček (p. 196)			Hari
rope, cord	t'a?	√ 41	4 /thak-pa"/
task, part	k'a?	√ 41	3 /'khak/ 'part'
hog, pig	p'a?	√ 41	3 /'phakpa/
but			

(199) cont.

to grind, weave	t'a?	∨ 53	4 /thak/
to cleave, split	tɕ'e?	∨ 53	3 /'ɕak/
to break, be broken	tɕ'a?	∨ 53	4 /tɕhak/

(200)

Sedláček (p. 196-97)

Hari

clean, pure	t'a?	∧ 13	1 /'thahk-pu"/
to lick	ta?	∧ 13	1 /'tahk/
but			
glowing embers	da?	∧ 14	1 /'meh-tah?/ 2
to conquer, worst	tu?	∧ 14	1 /'tuhk/ 'bad'
sin, moral evil	ti?	∧ 14	1 /'tihkpa/

Sets (199) and (200) show that Sedláček observes a contrast between tone ∨ 41 and ∨ 53 in the high tone category and between ∧ 13 and ∧ 14 in the low tone category for syllables ending with a glottal stop. For syllables ending in nasals set (201) gives a contrast between ∨ 41 and ∨ 53, and the same contrast is illustrated in set (202) for syllables ending in -p. For the three syllable types mentioned so far (CV?, CVN, CVC) there appears to be agreement on the systematic level between Sedláček's and my analysis; only it is disturbing to note the small rate of agreement in classification!

(201)

Sedláček (p. 206)

Hari

cooing, moaning	k'ỹ:	√ 41	4 /khyn/
but			
groan	k'ỹ:	√ 53	—

(202) (p. 208)

be able	t'up	√ 41	4 /thup/
but			
to cover	k'ep	√ 53	3 /'khep/ 'cover, n, 'cover, v (itr)

For syllables with long vowels Sedláček observes more than two tones in the high tone category. This is illustrated in set (203). His examples suggest a contrast between √ 41, √ 53, and √ 51. Here I note that where he has observed tone √ 51 I have frequently recorded a final glottal, but the correspondence is not consistent. Facing the variety of contrastive pitches for long vowels in the high tone category it is surprising to note that in the low tone category Sedláček seems to have observed only one pitch pattern, namely the rising pitch √ 13.

(203)

Sedláček (p. 204, 223-26)

Hari

a large sack of cotton cloth	p'ε:	√ 41	—
to sit (in Western Tibet)	k'ε:	√ 53	—
silver, money	ny:	√ 53	3 /'ny/

(203) cont.

Sedláček			Hari
to look	te:	√ 51	4 /tɛ?/
by the horse	te:	√ 51	4 /tɛ-k/ [te ₊ ?']
skilled, learned	k'ɛ:	√ 51	3 /'khe-pu"/
place, spot	nɛ:	√ 51	3 /'nɛ?/ 'holy place'

We have seen then, that apart from the treatment of syllables with long vowels there is substantial agreement on the systematic level between Sedláček's and my analyses. Considering this it is puzzling to see the extensive disagreement in classification of morphemes. This has already become apparent in the previous sets and is further illustrated in sets (204) and (205). The rate of disagreement in these two sets is typical for all the examples contained in Sedláček's paper.

(204)

Sedláček (p. 201-202)			Hari
price, value	k'õ:	∧ 13	2 /khohŋ/ 'rate'
with, and	t'ã:	∧ 13	1 /'thahŋ/
to beat, strike	tũ:	∧ 13	2 /'tohŋ/
yesterday evening	dã:	∧ 13	2 /tahŋ-'kohŋ/ 1
to be right, to suit	dã:	∧ 13	2 /tahŋ/ 'be enough'
green (light)	dɔʔahŋ	∧ 13	1 /'tɔʔahŋku/
to rise, get up	dã:	∧ 13	1 /'lahŋ/
trunk of a tree	tõ:	∧ 13	2 /tohŋ/ 'spear'
the interior, inside	nã:	∧ 13	2 /nahŋ/

Sedláček (p. 202-203)			Hari
purified, cleansed	sã:	∨ 53	4 /saŋ/
height	pã:	∨ 53	4 /paŋ/ 'flat ground'
to bind, tie up	tɕĩ:	∨ 53	4 /tɕin/ (of belt)
manner, style	tã:	∨ 53	3 /-'taŋ/
to be full	k'ẽ:	∨ 53	3 /'kheŋ/
to leap up, jump	tɕ'õ:	∨ 53	3 /'tɕhom/
to be out of breath	ŋã:	∨ 53	3 /'ŋam/ 'get a fright'
to give (resp.)	nã:	∨ 53	4 /naŋ/ ⁸

⁸My own experience during the investigation of the tones may shed some light on this lack of agreement in observation, for the rate of disagreement between Sedláček's and my classification is not unlike the one between my own initial classification and the present one. In the course of the analysis I discovered some principles with which the pitch contour identity of a given morpheme could be tested. They are the following: (1) The pitch contour of a morpheme, as a rule, remains constant throughout its derivations. (2) Some derivations involve a change in register, in which case contour 1 switches to contour 3, and 2 to 4 or vice versa. (Cf. section 3.1.--Pairing of the contours). (3) Cognates between LT and Kagate (for some details about this language see footnote 10 in chapter 1) display a regular pattern of correspondence for pitch contour identity. Since I investigated both these languages I was able to cross-check classifications. This last test not only helped me to correct some classifications in LT, but also vice versa, even though I had had a more prolonged acquaintance with Kagate.

To conclude the discussion of Sedláček's paper I want to comment briefly on the table "A comparison of some tones of list in some recent works on Tibetan" which Sedláček gives in his paper. Table 19 gives a full copy of his table with the addition of my own classifications. The table is interesting because it allows us a glimpse into the research of Chinese scholars in this field. From footnote 3 to the table I would be tempted to conclude that my findings correspond closely to those of Chin P'êng, but the list of examples included in the table does not really confirm this. Because of my lack of the knowledge of Chinese I have no access to these works, and therefore the question whether there is a substantial agreement or not has to be left open at this point.

Table 19: A comparison of some tones of list in some recent works on Tibetan (after Sedláček, 1961:228).

Tibetan Term	Meaning	G.N. de Roerich 1)		R.A. Miller 2)		Chin P'êng 3)		Wang Yao 4)		(Sedláček) Tone		A.M. Hari (added: 1977)
										Basic	Intersyllabic I → → II	
1 dmag	soldier	rising tone	high tone	high falling tone	1	high falling tone	41 51	high falling tone	53	→	55	3 / 'mak/
2 mar	butter	even tone	low tone	low rising tone	3	low rising tone	13	low rising tone	13	↗	55	1 / 'mahr/
3 ma	mother	falling tone	low tone	low rising tone	3	low rising tone	13	low rising tone	13	↗	55	2 / mah/
4 stag	tiger	rising tone	high tone	high falling tone	1	high falling tone	44	high even tone	53	→	55	4 / tak/
5 rtags	sign	even tone	high tone	high falling tone	1	high falling tone	44	high even tone	53	→	55	4 / ta?/
6 rta	horse	falling tone	high tone	high falling tone	1	high falling tone	44	high even tone	53	→	55	4 / te/
7 mngag	commission	rising tone	high tone	high falling tone	1	high falling tone	41 51	high falling tone	53	→	55	3 / 'na?/
8 sngags	mantra	even tone	high tone	high falling tone	1	high falling tone	41 51	high falling tone	53	→	55	4 / na?/
9 lnga	five	high falling tone	high tone	high falling tone	1	high falling tone	44	high even tone	53	→	55	3 / 'na/
10 nga	I, -ba, -pa	falling abrupt tone	low tone	low rising tone	3	low rising tone	13	low rising tone	13	↗	55	2 / nah/

- 1) G.N. de Roerich describes the Lhasa dialect as having 3 sorts of tones: rising ↗, even —, and falling ↘.
- 2) Roy Andrew Miller distinguishes two categories, namely, high tones (without any mark), and low tones (marked with ↘).
- 3) Chin P'êng distinguishes four kinds of tones, namely, ↘53, ↘41, ↗13, and ↗35, in his work cited supra.
- 4) Wang Yao uses 6 kinds of tones, i.e. the tone ↗44, ↘41, ↘51, ↗13, ↗35, and | or light tone.

(d) It is with some reservation that I approach the discussion of Kjellin's series of papers on Tibetan tones. The reason for this is that his writings contain several provocative assertions but language data which would support his claims are rather scarce. This made it difficult to relate his hypothesis to my own observations. Nevertheless, because his proposal is so trendy, I feel obliged to comment on it. Kjellin's claim is, that Tibetan is not a tone language at all, but that a closer look at the phonology of the language reveals that "...all of its pitch (fundamental frequency) contours are found to be the result of synchronic processes, and thus are predictable." (1975:37) (My emphasis).

In order to be able to understand his proposals we must look briefly at some aspects of his consonant analysis. Apart from some differences in minor details of interpretation Kjellin recognizes the same phonetic surface consonants as this analysis (cf. tables 1, 2, and 3). These surface consonants can be derived from the lexical consonants listed in table 20 below.

Note to table 20: Kjellin interprets as follows:

[tɕ] → /ty/

[tɕʰ] → /thy/

[ɕ] → /sy/

[ʈ] → /tr/

[ʈʰ] → /thr/

1.	p	t		ts			k	ʔ
2.	ph	th	s	tsh			kh	h
3a.	b	d	z	dz			g	
3b.	m	n					ng	
3c.	w	l			r	y		ɦ

Rows: 1, voiceless unaspirated nonsonorants;
 2, voiceless aspirated nonsonorants;
 3, voiced (a) obstruents, (b) nasals, (c) glides.

Table 20: Lexical initial consonants of Tibetan after Kjellin (1976a:138).

Kjellin suggests that underlying segments are either tense or lax, and tense segments have the 'high fundamental frequency target' assigned to them, while lax segments get the 'low fundamental frequency target'. Voiceless obstruents are tense, voiced obstruents and sonorants are lax; vowels are in principle all tense. High and low registers are to be derived from the lexical syllable initial consonants, and the rules are as follows:

Syllables with initials from rows 1 and 2 of table 20 have high register, while syllables with initials from row 3a (voiced obstruents) have low register. If a voiced stop is the only consonant in the syllable initial margin it becomes devoiced and aspirated on the phonetic surface. If on the other hand, voiced stops are preceded by another consonant (which never turns up word initially) it remains

unaspirated and more or less voiced. (Such pre-initial consonants are traditionally called prefixes; Kjellin also uses this term, and I will take it over from him here.) Since the sonorants (rows 3b and 3c) are intrinsically lax they condition low register if they are the only initial consonants. In order to derive high register syllables with initial sonorants--which of course do occur--sonorants need to be prefixed.

We see then, that there are two groups of morphemes (Kjellin: lexical forms) which must be prefixed in the lexical representation. The first group comprises the morphemes with an unaspirated stop initially and low register, the second the morphemes with an initial sonorant and high register on the phonetic surface. Word initially these clusters are always simplified. The only place where they can be observed is word medially in compounds if the first component ends phonetically in a short vowel. In this environment the prefix gets the opportunity to 'transmigrate' into the final margin of the first syllable of the compound and then it appears on the phonetic surface. Kjellin illustrates this process with a set of numbers which I reproduce here in table 21. The first column of this table gives the lexical forms, the second the phonetic surface realization with the focus on the fundamental frequency target. In Kjellin's transcription capital letters are used for the high fundamental frequency target and small letters

for the low one. The third column gives my phonetic transcription of the same items.

/btyu/	TYU	[tɕʌ]	ten
/gtyig/	TYIḡ	[tɕi·ʔ¹]	one
/btyu-gtyig/	TYUGTYII	[tɕʌḡtɕi·ʔ¹]	eleven
/bzyi/	syI	[ɕi·ʔ¹]	four
/btyu-bzyi/	TYUBSYI	[tɕʌbɕi·ʔ¹]	fourteen
/bzyi-btyu/	syibTYU	[ɕibɕʌ]	forty
/rgu/	ḡU	[ḡu]	nine
/btyu-rgu/	TYURGU	[tɕʌrḡu]	nineteen
/lŋa/	NGA	[ŋa]	five
/btyu-lŋa/	TYÖÖNGA	[tɕø·ŋa]	fifteen

Table 21: Derivation of fundamental frequency contours from lexical forms in a set of numerals after Kjellin (1976a:141).

Contours (in Kjellin's terms) are derived from the final lexical consonants. The set of final consonants is restricted to /b, d, g, m, n, ng, r, l, z/. (Kjellin, 1976a:140). Of these the obstruents /b, d, g, z/ get the lower pitch level assigned to them because they are lax. The sonorants, though they are intrinsically lax too, get the

higher pitch level assigned to them because they are not absolutely initial. In order to derive the falling contour which Kjellin observes on some syllables ending in a nasal, it is necessary to postulate a post-nasal suffix /z/. Such a cluster is always simplified but the nasal assimilates to the low pitch of /z/. To comment on the synchronic productivity of this last process right away, a quote from Kjellin himself may help: "The occurrence of the final z is purely hypothetical, though it finds support in the orthography." (1976a:140). Apart from this last feature his treatment of the lexical finals is synchronically transparent, and therefore no further comments will be made on it.

The finer details of Kjellin's proposal have to be omitted here in this short summary, but I trust that the information given is sufficient for the understanding of the objections I have to raise regarding this hypothesis.

First I want to point out that Kjellin's analysis accounts only for the register contrast but not for the pitch movement contrast in the terms of my analysis. As far as phonetic observation of pitch is concerned, Kjellin seems to be very close to Chang and Shefts (1964). Therefore the details of disagreement in phonetic observation can be looked up in table 18. My contention here then is, that before we can claim that LT is not a lexical tone language, we have to give some satisfactory synchronic explanation for the pitch movement contrasts.

As to the derivation of register, it is Kjellin's claim that this is a phonetically predictable process, that raises serious problems. If we look at the set of numerals with which Kjellin illustrates the process, we might think it works fine. But it seems to me that it is not accidental that the majority of Kjellin's scarce illustrations are taken from the numerals; compound numerals have preserved some historical clusters with much more consistency than other domains of compounding. As a consequence Tibetans generally admit that learning to count is an art which involves more than just learning the method of counting. If we examine other domains of compounding we find that the insertion of medial consonants is quite sporadic. Before taking this argument any further though, I must mention that the regular medial insertion of nasals in compounds before second components with pitch contour 2 (cf. section 2.4.2.) is of course excluded from the further considerations of the discussion. But this case can serve as an example for the regularity we can expect of a phonetically predictable feature; medial nasal insertion in compounds is not completely exceptionless but its irregularities concern a few cases where it occurs in unpredicted places; in the predicted places it does in fact occur regularly. The same claim cannot be made for the insertion of medial stops in the domain of compounding as a whole. We must realize that the chances for prefixed consonants to turn up on the phonetic surface are quite limited because relatively few

morphemes consist of a simple CV syllable. The minimum requirement for the claim that register is predictable from the prefixes seems to me to be that they surface with reasonable regularity in the predicted environments. We have seen that according to Kjellin's hypothesis all morphemes with an unaspirated initial stop and low register on the surface must have a prefixed voiced stop in the lexical representation. This prefix, then, is expected to surface if such a morpheme is preceded by a CV morpheme in a compound. But even in my admittedly limited amount of data on compounds counter-evidence can be found as example set (206) shows.

(206)

/ta-'kah/	[ta ^o g _u a]	saddle, n
/'keh-'kehr/	[_u je ^o je ^o ẽ:]	teacher
/khu-'toŋ/	[k ^h u ^o d ^o õ:]	pants, n

Further we have seen that all morphemes with an initial sonorant and high register on the phonetic surface need to be prefixed in the lexical representation. Example set (207) gives a number of compounds where this prefix fails to surface in the specified environment.

(207)

/'kha-'lak/	[k ^h ala.ʔ ¹]	food
/ku-'lo/	[kul _u o]	lungs, h
/tɕhu-'lap/	[tɕ ^h aləp ¹]	water wave
/ku-lon/	[kulõ:]	worry, n, h

(207) cont.

/tʃhu-lok/	[tʃ ^h ulo.ʔ ¹]	flood, n
/pa-'muk/	[pəmu.ʔ ¹]	frost, n
/ta-'mak/	[tama.ʔ ¹]	caval l ery
/ta-'ŋa/	[taŋa]	horse tail
/'ka-møn/	[kəmø:]	conversation, h
/tsah-'nɔʔ/	[ⁿ dzənɔ.ʔ ¹]	earthen pot
/tʃha-'ju/	[tʃ ^h əjʉ]	turquoise stone

Problems also arise with Kjellin's treatment of the sibilants /s/ and /z/, for which the register derivation parallels the one of the stops. There would actually be no need to postulate prefixes for low register morphemes with initial sibilant because the aspirated vs. unaspirated opposition does not occur for sibilants. As a consequence the voiceless vs. voiced opposition postulated by Kjellin would take care of the register contrast. Something seems to be amiss with his parallel treatment of stops and sibilant fricatives; but since he doesn't mention this problem specifically, I conclude that /z/ would have to be prefixed too. Example set (208) gives some examples of compounds in which prefixes fail to surface.

(208)

/ku-'suhk/	[kusu.ʔ ¹]	figure, body, h
/tʃhu-ɸahŋ/	[tʃ ^h uɸã:]	water width
/'lu-ɸeh/	[luɸe:]	song
/tʃhu-'ɸih?	[tʃ ^h uɸi.ʔ ¹]	name of an armed group (four waters and six ranges)
'kahŋ-'tʃuhk/	[^o gãŋdu.ʔ ¹]	

In the previous paragraphs I have attempted to show that the surfacing of prefixes is not nearly as widespread and regular as some of Kjellin's assertions and examples suggest. Obviously he is aware of that himself. This becomes evident from some more careful formulations, such as the following two: "There is evidence that two consonants can combine and form clusters in the same syllable." (1976a: 140), and "...this is quite strong evidence for the hypothesis that cluster-making 'prefixes' do exist..." (1976a: 141). And when the synchronic evidence is weak or fails completely, Kjellin doesn't hesitate to appeal to Tibetan orthography for support. (1976a: 138, 140).

This state of affairs brings up the issue of abstractness of phonological representations. Several attempts have been made in the more or less recent linguistic literature to constrain implausible abstractness. Kiparsky (1968), for example, proposes that forms more abstract than the phonemic level are justified only on the basis of morpheme alternations. Natural phonologists further argue that the underlying representation of a morpheme must be identical with one of the surface allomorphs (Vennemann, 1973; Hooper, 1973). Schane (1974) discusses this issue in a lucid way, and I agree with his conclusion that the above mentioned constraints are too strong in some cases. As Schane puts it:

"My own feeling on the "abstract" versus "concrete"

issue is that phonological systems cannot always be likened to a clear-running stream. The deep parts are not always transparent from the surface and there will be cases where one will have to posit underlying segments which do not necessarily have a surface manifestation." (1974:302).

Nevertheless, Schane does stress the need to constrain abstractness in some way. Looking at Kjellin's proposal in the light of his discussion will help us to see the real nature of it. Kjellin's derivation of register from underlying segments seems to be based on what Schane calls the weak version of the "free ride" principle. Schane defines this principle as follows: "So as not to proliferate the underlying inventory of segments, the weak version of the "free ride" principle takes advantage of already existing underlying segments and phonological rules." (1974:298). As an example, where the use of this principle seems justified he gives the derivation of nasalized vowels in French. French has numerous morphophonemic alternations between nasalized vowels and sequences of oral vowel plus nasal consonant. This makes it plausible to derive all nasalized vowels from a sequence of oral vowel plus nasal consonant, even for cases where a morpheme never exhibits alternation.

Though Kjellin seems to make use of the same principle in the register derivation, I want to show that in this case the result is implausible abstractness, and therefore

the use of the principle unjustified. First we can observe that in French nasalized vowels and sequences of oral vowel plus nasal consonant show great phonetic similarity, and the correspondence among the features is completely straightforward. In Tibetan, though we can also claim that voiced initial and low register have some phonetic similarity, this seems to be less obvious, and there are several complications in correspondence among the features; some underlying voiced stops become devoiced and aspirated on the phonetic surface; all sonorants need to be prefixed in order to derive high register; but the prefixes are all from the voiced underlying series; if anything, this should result in low register; the same prefixes before voiced stops do not in fact change the register. Further we need to see that there is a difference in the frequency of observed alternations. In French the $\tilde{V} \sim VN$ alternations are frequent, but the same claim cannot be made for Tibetan. Consistent alternations are, as far as I can see, extremely rare, and further, there seems to be a good deal of inconsistent 'alternation', and this does not contribute to transparency for the derivation of register. It is of course possible to postulate initial clusters by analogy to the rare consistent cases, as Kjellin has shown, but the question is whether speakers really go--unconsciously, of course--through such rules of derivation. I have not had the opportunity to test this specifically, but several ob-

servations suggest that medial insertion of consonants (mainly p) is a feature which is learned with the compound, and therefore true insertion. These observations are the following:

(a) Disagreement among speakers as to whether a given compound has a medial p or not is quite frequent. (b) Traditional (long established) compounds are more likely to show insertion; I have not observed it in innovating compounds; my main informant, for example, uses /ta-p-'la/ 'payment for hiring a horse', and /'kha-p-'la/ 'rental, but /'tσα-'la/ 'hay price'. For her the last example seems to be an innovating compound. (c) A good number of compounds with medial insertions are listed in Chang and Shefts (1965) and Shefts and Chang (1967); these authors show that inserted p in compounds historically sometimes derives from a final b of the first component, and sometimes from a b-prefix of the second component. But in either case compounds show lack of consistency as far as particular morphemes are concerned. For example, Chang and Shefts (1967:524-5) can list only fifteen morphemes which regularly surface a b-prefix in the expected environment in compounds. Out of these fifteen examples ten have a stop or fricative initial and high pitch; this means that for the purpose of register derivation they would not need to be prefixed, and one example is the morpheme /'tʃah/ 'bird' which has an aspirated initial and low register, which means that for the

purpose of register derivation it should not occur with a prefix at all. From the remaining four examples two are numbers, which are, as we have already seen, somewhat special cases anyway. All this seems to be reason enough to suspect that in the few cases where the 'b-prefix' appears consistently with a given morpheme, speakers analyse it as an insertion by analogy to all the other cases. It seems very unlikely that they would postulate an extra set of prefix rules for these rare cases. Consequently, if the speakers do not in fact have the rules, there can't be any "free rides" either.

Synchronically, then, there is little or no evidence for the claim that register is derived from voiced consonants. I have mentioned elsewhere (section 2.1.) that the register contrast alone would not necessarily make LT a tone language. Voice quality could be regarded as a feature of the vowels. But before we can discard LT as a tone language we must have an explanation for the pitch movement contrasts.

3.4. Pitch movement contrasts in the light of Tibetan orthography

The historical origin of the register contrast in Tibetan can easily be recovered from the orthography, which reveals that it derives from the voicing status and cluster compositions of the morpheme initial consonant margins. The correspondences are summarized in table 22. Written Tibetan consonants seem to fall into three classes in this respect: stops (including the affricates), fricatives, and sonorants; this is shown by the three headings in the table. The relevant features of the initial consonant margin of Written Tibetan (WT) are given on the left hand side of the table and the corresponding reflexes in Modern Lhasa Tibetan (MLT) on the right hand side. (Morphemes with an initial vowel are not taken into consideration here. They do not alter or complicate the situation).

The motivation for the development of register for morphemes with initial stops or fricatives is obviously a phonetic one: low register derives from the voiced series, but for morphemes with initial sonorants this development is less obvious; it seems to be motivated rather by systematic symmetry than by phonetic characteristics of the sounds.

Features of the initial consonant margin of WT morphemes	Register and features of the initials of MLT morphemes
<p>1. <u>Stops</u></p> <p>vl. aspirated (with and without prefix, number of prefixes limited)</p> <p>vl. unaspirated (frequently prefixed)</p> <p>voiced, without prefix</p> <p>voiced, with prefix</p>	<p>vl. aspirated, high register</p> <p>vl. unaspirated, high register</p> <p>vl. aspirated, low register</p> <p>vl. unaspirated low register</p>
<p>2. <u>Fricatives</u></p> <p>voiceless (with or without prefix)</p> <p>voiced (with or without prefix)</p>	<p>voiceless, high register</p> <p>voiceless, low register</p>
<p>3. <u>Sonorants</u></p> <p>prefixed sonorant</p> <p>unprefixed sonorant</p>	<p>high register</p> <p>low register</p>

Table 22: MLT register contrast and Tibetan orthography.

Since the register contrast can be traced back so clearly to the composition of the morpheme initial consonant margin of an older form of Tibetan, we may raise the

question of whether these initial clusters or some historical final consonant clusters do not also provide clues for the development of pitch movement contrasts. The examination of a number of WT morphemes in the light of my contour classification has given the following results:

(a) Morpheme final clusters do not provide an answer.

(b) No contour indications are contained in clusters of the initial margin of morphemes with fricatives, sonorants, and aspirated stops.

(c) As for the unaspirated stops, we find certain regularities in correspondence, especially for morphemes with unaspirated initials and low register, but there are no non-overlapping splits.

The observed regularities are summarized in table 23. (A capital C in this table stands for the initial core stop, which is the last one before the vowel, except when it is followed by j or r, and small letters stand for the various prefixes).

Features of the initial margin of WT morphemes	Register and contour features of MLT morphemes
<p>1. C = <u>voiced stop</u> → <u>low register</u></p> <p>mC → contour 2</p> <p>gC } dC } → contour 1 bC } sC }</p> <p>lC } rC } (split up) → contour 2 ʀC } and contour 1</p>	
<p>2. C = <u>voiceless stop</u> → <u>high register</u></p> <p>c } lc } → contour 4 brC } bsC }</p> <p>gC } dC } (split up) → contour 4 bC } and sC } contour 3 rC }</p>	

Table 23: Unaspirated stop initials of WT compared with contour identity of MLT.

At this stage of the investigation then, I have to conclude that initial clustering of WT does not provide much unambiguous indication for the contours. But the fact that there are some regularities in correspondence may indicate that the pitch movement contrast is historically older than the register contrast.

3.5. Simpler solutions

In the introduction to this study I have claimed that the failure to recognize certain contrasts in the tone system of LT has led to unnecessary complications in other parts of the phonological descriptions of this language. In this section I want to give some justification for this claim by exposing the areas where I find that a proper recognition of the tone contrasts solves some intricate problems on the segmental level. The areas which have come to my attention in this context are the following:

The nonphonemic status of the voiced stops; prenasalized stops and nasal insertion in compounds; deaspiration of underlying /kh/ in compounds; and irrelevance of length for secondary vowels. Each area is discussed separately in the following paragraphs under the corresponding heading.

The nonphonemic status of the voiced stops. Looking at various analyses of Tibetan we notice that there is disagreement and uncertainty about the contrastive status of voiced stops. While there is general agreement that there is no contrast between voiceless and voiced stops word-medially the contrastive status of these stops in word initial position is disputed. The following investigators do recognize a contrast word-initially: Roerich and Lhalungpa (1957, 1972 edition: 15-19), Sedláček (1961), Richter (1964: 22-24), and Miller (1955b:47-48). In regard to Miller's

statement I must mention that he describes Central Tibetan, and specifically claims that this dialect is distinct from the Lhasa dialect. The position of the other authors in this respect is as follows: Roerich and Lhalungba do not seem to make a difference between Central Tibetan and Lhasa Tibetan, but Sedláček and Richter both specify that their studies concern the Lhasa dialect.

Sprigg's position (1968:69:290-95) is somewhat different. He states that initially voiceless stops (and affricates) occur only with high tone and voiced ones only with low tone words, and he concludes that "...the word initial letters may be regarded, in addition to their other functions, as a tone mark." This observation allows us to state complementary distribution word-initially. However, Sprigg seems to observe contrast for these sounds medially. Discussing the 'interverbal junction' he mentions that voiceless unaspirated stops are initially tense (e.g. [p]) and medially lax (e.g. [p̚]), and he remarks further that medially it is sometimes difficult to distinguish lax articulation from voice (e.g. [p̚] from [b]). From this I conclude that he does observe voicing contrast for medial stops, but perhaps not for initial ones. This of course presents no problem, especially not in the prosodic framework; only it seems unnatural, particularly for a Tibeto-Burman language.

The investigators I am aware of who do not recognize a contrast between voiceless and voiced stops are Chang and Shefts (1964:1). At this point I have come to the same conclusion as they have (cf. table 1). I have also mentioned that initial stops are generally more or less voiced with low register morphemes. But the stops which occur initially with contour 2 morphemes are quite consistently more fully voiced than those which occur with contour 1 morphemes; and the feature of prenasalization occurs only with contour 2 morphemes (cf. table 2, section 1.1.). I have observed a good number of minimal pairs between contour 1 and contour 2 with initial stops, and it is plausible that earlier investigators have taken the greater degree of voicing in the initial as the exponent of the contrast. Native speakers are likely to offer this explanation too when they are confronted with such minimal pairs. Some evidence for the correctness of my assumption can be found among the examples in Sedláček's paper (1961). We have seen that he has given voiced initial stops a contrastive status. In the paper I find that for low category morphemes he frequently records a voiced initial stop where I have observed pitch contour 2, and a voiceless one where I have observed pitch contour 1. Examples of this are given in set (209).

(209)

Sedláček				Hari
to lick	ta?	∧ 13	(p. 199)	1 /'tahk/
tongue (resp.)	dʒa?	∧ 13	(p. 199)	2 /tʒahk/
tone, music, melody	tã:	∧ 13	(p. 203)	1 /'tahŋ/
healthy complexion	dã:	∧ 13	(p. 203)	2 /tahŋ/
to think, meditate	kõ:	∧ 13	(p. 203)	1 /'kohm/
to beat	tũ:	∧ 13	(p. 203)	1 /'tohŋ/
to grind, rub, polish	tar	∧ 13	(p. 220)	1 /'tahr/
quaking, shivering	dar	∧ 13	(p. 220)	2 /tahr/
rainbow	dʒa'	∧ 35	(p. 218)	2 /tʒah/
an arrow	da'	∧ 35	(p. 218)	2 /tah/

The examples of set (209) seem to indicate that in some instances Sedláček has captured the contrast between contour 1 and contour 2 morphemes with the voicing distinction in the initial, and it is likely that other investigators have taken the same course. Though the voicing differentiation might be considered a convenient means of representing the pitch contrast for the low tone category morphemes, we must notice that it will only take care of morphemes with initial stops; the same contrast will be completely neglected in all the morphemes with other initials. Since the pitch contrast is not limited to morphemes with initial stops, but does affect all the morphemes re-

of
^
ardless their initial, the proper recognition of it allows us to reduce the phoneme inventory of LT by the whole series of voiced stops. This involves six phonemes according to my analysis.

Prenasalized stops and nasal insertion in compounds.

Looking through the various analyses of Tibetan mentioned in this study I have not found much explicit reference to prenasalized stops. Nevertheless, it seems that other investigators have come across them as well. This becomes apparent, for example, in Sedláček's paper, where we find that he observed them in utterances (1961: 238, 242, 243). In these examples he has simply represented the prenasalization as a nasal segment preceding the stop, and he gives no further explanation.

A check through Richter's phonetic data (1964) reveals that he also has occasionally observed prenasalized stops. (e.g. p. 40, 43, 130, 134, 151-152). Since he is not attempting to present a phonemic analysis in this work he can afford to leave the question of the phonemic status of these sounds open, too.

Because of the 'sporadic' appearance of the feature, I presume, most investigators have recognized it as non-distinctive, and since no explanation was readily available for it they have deemed it to be insignificant free variation and not commented on it. If pitch contours 1 and 2 in the low register are not distinguished, it is indeed

completely sporadic; but the recognition of this pitch contour contrast allows us to give a plausible explanation for it.

A further point for simpler solutions can be scored by looking at some phonological features of compounds. This aspect of the phonology of LT has been discussed in detail in section 2.4.2., where I have shown that the recognition of the source of prenasalization allows us to give a simple explanation for the majority of the cases of nasal insertion in compounds. As a consequence the morphological segmentation of words is a good deal less complex.

Deaspiration of underlying /kh/ in compounds. The behavior of underlying /kh/ as initial of second components in compounds is a further instance where proper tonal classification allows us to state phonological regularity instead of irregularity. We have seen that underlying voiceless aspirated initial stops of the second component of a stem compound lose aspiration and become more or less voiced (cf. section 2.4.--Voicing and deaspiration of medial stops). Example set (210) illustrates the "normal" behavior of aspirated initial stops of second components.

(210)

4	/tʃhu-'khaŋ/ 3	[tʃ ^h u ^h ã:]	bath house
3	/'phak-'khaŋ/ 3	[p ^h a·ʔã:]	pig house
1	/'maah-khoŋ/ 2	[m ^h ã·ʔã:]	butter price

Example set (210) should be compared with set (173). In the light of these examples with "normal" behavior, the examples of set (173) would represent very disturbing exceptions if we failed to distinguish between pitch contour 4 and pitch contour 3 morphemes in the high register. The recognition of this contrast, however, makes it possible to state a phonological regularity; as we have already seen, underlying /kh/ retains aspiration in this position on pitch contour 4 components, while with other pitch contours it behaves like other aspirated stops.

Irrelevance of length for secondary vowels. In section 1.2.3.1. I claimed that no length contrast can be established for secondary vowels. In the same section I also mentioned that the scope of the relevance of vowel length is not easily detected in LT, and I pointed out that, at a superficial level, there are pairs which do exhibit length contrasts for secondary vowels. Such pairs are given in example set (51). However, I argued that the basic contrast is not a feature of the stem of these words but of the suffixes. In the exposition of the tonal behavior of suffixes I have shown that the fourfold pitch contrast is also displayed in the suffix system and that assimilating suffixes create an additional dimension of contrast in the suffix system (cf. section 2.5.). In the resulting contrast system each of the suffixes involved in the words of set (51) falls into its proper slot, and we are able to recog-

nize the influence they exercise on preceding stem vowels;
and as a consequence the basic irrelevance of length for
secondary vowels becomes evident.

3.6. Conclusion

The comparison of this tone analysis with other tone analyses of LT has shown that earlier investigators have generally come up with fewer pitch contrasts. Sedláček's paper represents to some extent an exception to this. We have seen that he does recognize the possibility of further tone splits in the high and low tone categories, and that he exemplifies them with a few pairs (cf. example sets 200-202). But I have also pointed out the lack of agreement in classification. Though he has in principle recognized the existence of further tone splits, it seems as if he had not drawn the consequences systematically enough for all syllables. This all points to the subtlety of the pitch movement contrasts, and it might lead us to question their reality. Even I myself have questioned it occasionally; but apart from my phonetic discrimination, the reality of the fourfold pitch contour contrast (plus the final glottals with their pitch exponents) has been confirmed to me in the course of this study by several additional sources.

First I want to draw attention once again to the confirmation which comes from the aspects of the phonology of LT discussed in the preceding section on simpler solutions. The areas mentioned there seem to represent strong language internal evidence for the reality of the fourfold pitch contour contrast.

Further confirmation comes from the traces of the contrasts that can be detected in earlier analyses. With this I refer to Sedláček's description which I mentioned above, and also to the nasal syllables of Chang and Shefts' analysis; we have seen that for syllables ending in a nasal they too recognize four contrastive pitch patterns, and this is the same number of contrasts that I recognize for morphemes of any syllable shape.

Finally I also want to mention the confirmation which comes from the study of the tone systems of related Tibeto-Burman languages in Nepal, notably Gurung (cf. Glover, Warren and Jessie, 1972), Sherpa (cf. Gordon, 1969, and Schoettelndreyer, 1971), Tamang (cf. Mazaudon, 1973, and Hari, 1970), and Thakali (cf. Hari, 1971). Investigation in these four languages has taken place about at the same time, and regarding their tone systems the investigators have come to similar conclusions quite independently. Later it was found that Kham (cf. Watters, 1971b), Jirel (cf. Strahm and Maibaum, 1971), and Kagate (cf. Hoehlig and Hari, 1976) also exhibit the same fourfold pitch contour contrast. The discovery and the similarity of the tone systems of these languages, then, represent substantial confirmation for the reality of the contrasts in Lhasa Tibetan as described in this study.

Introduction

The process of vowel height approximation is a striking and interesting feature of LT. It has always attracted the attention of Tibetan scholars who were concerned with the spoken language, and it has also been described to some extent, generally under the term 'vowel harmony'. Sprigg (1961) has exposed it in the verbal phrase in the prosodic framework, and Chang and Shefts' account (1964: 46) represents a classical phonemic approach. Miller (1966) refers to both of these analyses and shows that the process is not a recent innovation in LT; from the traces that can be found in old manuscripts he concludes that it is at least as old as these manuscripts.

In the following account of 'vowel harmony' I propose to look at it from a generative angle. This approach has led me to drop the term 'vowel harmony' in favor of 'vowel height approximation'. It seems to me that this latter term more accurately captures the phenomenon of changing vowel qualities in LT. I will abbreviate vowel height approximation henceforth with v. h. appr..

The general principle which underlies v. h. appr. in LT can be stated as follows: In a disyllabic word the phonetic realization of the underlying vowels must not be too distant in height but within a reasonable proximity. This 'reasonable proximity' is achieved by the process of v. h. appr.. The basic rules of it are the following:

(a) V. h. appr. applies to any disyllabic word.¹

¹The description of vowel height approximation is limited to disyllabic words here because longer ones are rare in LT (if there are any at all). Word division can of course be a subject of controversy. But as far as my observation goes, for any potentially longer noun string good phonological criteria can be found to establish a word boundary within the string. (Cf. section 2.4.5.--Longer noun strings). Modal verb strings represent further potential for longer words. But here again similar phonological criteria (e.g. retaining of aspiration on initial consonants) can be applied to establish word boundaries, e.g.:

/tɔh tɕhok-tɕhok 'jihŋ/	[tɔ _u tɕ _u h o _u tɕ _u dɕ _u o _u tɕ _u j i _u :]	'ready to go'
/tɔh thup-sohŋ/	[tɔ _u t h u p s o _u :]	'could go'
/sɔh [?] tshaa/	[sɔ _u . t s h a :]	'finished making'
/'thoŋ tɕhok-ki" rəh [?] /	[t h o _u : tɕ _u h u _u tɕ _u g u i e _u ?]	'is allowed to drink'

Other modal verbs with initials where this criterion cannot be applied are considered to be separate words by analogy.

Nevertheless I do not strictly exclude the possibility of verbal words with more than two syllables; a possible candidate is a string like /tɔh-'koh-ki" 'jihŋ/ which I have recorded as [tɔ_u u_u g u g i j i_u :] 'needed to go'. This string

(b) Higher vowels trigger height approximation in a lower partner of the disyllabic word; that is to say that, in principle, any higher vowel may trigger approximation in a lower counterpart. However, the aim of the process is not complete assimilation of heights, but only a certain proximity; so if two underlying vowels are already close in height v. h. appr. will have no effect upon the lower vowel; if they are fairly close the effect upon the lower vowel will be trivial; only when the two underlying vowels are distant in height will the quality of the lower undergo a striking change. In this note I will concentrate on describing in some detail the more striking cases of v. h. appr. .

The 'reasonable' or 'certain' degree of proximity of heights that has to be reached cannot be defined in absolute terms. On the one hand it depends on what vowels are involved, and on the other hand also on the style of speech; the degree of v. h. appr. is quite flexible according to the style of speech; slow and very explicit speech will show less approximation, fast speech will show more. The following rules and examples are representative for ^afairly fast but clear style of speech.

Footnote 1 continued:

suggests that v. h. appr. may also operate for trisyllabic words. Since systematic investigation of similar verbal strings is lacking in my data I am limiting the account of v. h. appr. to disyllabic words in this study.

The more striking cases of v. h. appr. involve:

(1) The high vowels /i, y, u/ triggering approximation in /a/. These combinations effect the most striking changes in the susceptible vowel. I will therefore refer to it as 'first degree approximation' in the following.

(2) The half-close vowels /e, ø, o/ triggering approximation in /a/, ^{and the high vowels /i, y, u/ triggering approximation in /e/.} These combinations effect less striking changes, and I will therefore call it 'second degree approximation' in the following.

Though only the more striking cases will be exposed here, it is important to keep in mind that the process of v. h. appr. in principle applies to any lower vowel; in order to understand the phonetic surface behavior of vowels in disyllabic words the effects of this principle have to be watched constantly.

The observation of v. h. appr. in the various word categories has shown that it is necessary to give two statements for the process. First we can make a general statement which applies to all disyllabic words (nonverbal and verbal), except to verbal strings formed with a high vowel suffix. (Adjectives, though often derived from a verb stem, are nonverbal words with regard to v. h. appr.). Approximation in verbal words formed with a high vowel suffix exhibit some special features that make it necessary to give an extra statement for them.

1. General statement

1.1. First degree approximation: The high vowels /i, y, u/ triggering approximation in the low vowel /a/.

Approximating to /i/ and /y/, /a/ → [ə̥].

Approximating to /u/, /a/ → [ə̥].

So far I have only mentioned height approximation; but in fact, for /a/, we observe also a slight approximation in backness to the triggering vowel.

Examples for first degree approximation are given in set (1).

(1)

/'tari/	[tə̥ɾi]	axe
/ani?/	[ʔə̥ni?]	nun
/nam-'thyh/	[nə̥mɾy̥]	season, n
/'kyhn-kha/	[k̥y̥hnk̥ə̥]	winter
/lahpu/	[lə̥βu]	radish
/'mahku/	[mə̥gɾu]	boiled butter

Factors enhancing or blocking v. h. approximation.

Observing v. h. appr. in various environments we notice several factors which either partially or completely block the approximation, and also some factors which accentuate it. These factors are stated below under (a)-(f). The state-

ments apply generally to any vowel undergoing approximation and are stated as such, but for the sake of clarity only first degree approximation of /a/ will be illustrated in the first run through.

(a) Position in the word: The susceptible vowel approximates in both positions (first or second syllable). However, the effect of v. h. appr. is generally much more noticeable in the first syllable. This is because vowels in second syllables of disyllabic words have a general tendency to move away from the periphery towards the center; this tendency can be observed in nonapproximating environments as well, and it has the effect of deaccentuating approximation of susceptible vowels. This is illustrated in set (2) where nonapproximated /a/ is contrasted with approximated /a/ in second syllables.

(2)

/lahkpa/	[lakp ₁]	hand, n
/kuk-pa"/	[kukp ₁]	deaf person, m
/'nama/	[nama ₁]	bride, daughter-in-law
/'nuhma/	[num ₁]	breast
/sak-pa/	[sa.ʔβ ₁]	store, save, v
/pi?-pa/	[pi.ʔβ ₁]	take out

(b) Syllables with long vowels: A sequence of two identical vowels blocks v. h. appr.:

(3)

/kaa-mu"/	[ka:m _̣ / ka·m _̣]	white
/naa-mu"/	[ŋa:m _̣ / ŋa·m _̣]	before
/naah-pu"/	[na·β _̣ u]	painful
/'kaah-pu"/	[g _̣ a·β _̣ u]	happy
/ku-paa/	[kuḅa:/kuḅa·]	picture, h, n
/'ɕuh-'maah/	[ɕ _̣ ma _̣ :/ɕ _̣ ma _̣ ·]	light, n

(Note: [a·] represents a slight degree of length. For the significance of vowel quality in this environment see section 1.2.3.2.--Elusiveness of vowel length, and especially example set 67).

(c) Syllables ending in nasals: If /VN/ (in the syllable with the susceptible vowel) is realized as [Ṽ] approximation is blocked. If the nasal of a /VN/ syllable is realized as a segment, we observe that a final /-ŋ/ partially blocks approximation, but final /-n/ and /-m/ do not have this effect. (In the style of speech illustrated here syllable-final nasals are most often pronounced as segments in first syllables, and as vowel nasalization in second syllables of the word).

(4)

/ku-pan/	[kubã:]	lap, n, h
/tøhu-'khan/	[tø'kxã:]	bath house
/'kan-'thii/	[kɔŋdi·]	sole of foot
/'tsan-tøhu/	[tsɔŋdøt]	river water
/'mahŋ-pu"/	[mɔŋbu]	many, much
/nam-'øi/	[nəmøi]	soul

(d) Syllable final glottal: A syllable final glottal in the first syllable of a word partially blocks v. h. appr., and in the second syllable it blocks it completely.

(5) First syllable--partial blocking

/'kahpu/	[gøβu]	crawling, n
/'kahk-'tɪh/	[gø'ʔdi]	belch, n
/təp-pu"/	[tə'βu]	thin, adj.

Second syllable--complete blocking

/tsihŋ-rah?/	[nɔxihɔa·ʔ']	fort, n
/kii-ma?/	[ci·ma·ʔ']	main person
/tsihma?/	[tsihma·ʔ']	rib
/tøhima?/	[tø'iima·ʔ']	saliva

(e) Other syllable final consonants: Syllable final /-p/ generally causes some raising of /a/ (cf. 1st example of set 6); v. h. appr. and consonantal conditioning work together in this case, so that a syllable final /-p/ in an approximating environment accentuates v. h. appr. (cf. set 6, examples 2 and 3). Syllable final /-k/ and /-r/, on the other hand, de-accentuate v. h. appr. if they are pronounced as segments. Syllable final /-k/ may in many cases be realized as glottal constriction or glottal stop, and we have seen that an underlying final /-?/ also causes partial blocking of v. h. appr.; this means that the two rules are in accordance (cf. set 6, examples 4 - 10). Syllable final /-r/ may in many cases be realized as ^along vowel, in which case the blocking rule for long vowels applies. Long vowels, however, regularly² turn into [V·?] before stops in stem compounds, and in this case partial blocking applies. (Cf. section 2.4.5.--Long vowels in first components). This means that here again, partial blocking through final /-r/ and final [-?] are in accordance (cf. set 6, examples 10 - 12).

(6.1)

/ˈlap-ˈtəh/ [lɜpɪa] school

²As far as I have observed the rule regularly applies in normal fluent speech, but it may be deleted in distinct speech.

(6.2 -3)

/tʃhu-'lap/ [tʃ^hʷlɛp¹] water wave

/'kyh?-khap/ [k^hɣ^hʔk^hɛp¹] needle, h

(6.4 - 10)

/'tʃahk-rih?/ [tʃ^hʷɣ^hɪi^hʔ¹] rocky mountains

/'tʃahk-pu"/ [tʃ^hʷɣ^hb^hu] clean, adj.

/'sahr-pu"/ [sɜ^hɣ^hb^hu] steep

/'mahr-'rihn/ [mɜ^hɣ^hɪi^h:/mɜ^hɣ^hɪi^h:] butter price

/'mak-mih/ [mɜ^hɣ^hm^hi^h/mɜ^hʔ^hm^hi^h] soldier

/'mahr-tʃhuu/ [mɜ^hɣ^hdʒ^hʷt^h/mɜ^hʔ^hdʒ^hʷt^h] butter and cheese

(6.11 - 12)

/'mar-'tsi/ [mɜ^hɣ^hdʒ^hi^h/mɜ^hʔ^hdʒ^hi^h] red coloring

/'kar-pu"/ [kɜ^hɣ^hb^hu/kɜ^hɣ^hβ^hu] white

(f) Interference of syllable initial consonants: Syllable initial /tʃ, tʃh, ʃ/ and /j/ generally cause fronting of following back vowels, and fronting and raising of a following low vowel. Such consonantal conditioning interferes somewhat with v. h. appr. . We observe that for a low vowel approximating to /u/ the backing required by v. h. appr. is cancelled and the vowel stays pretty much in the center, while for a low vowel approximating to /i/ a notice-

able degree of fronting takes place (as required by the segmental conditioning of the preceding consonant). But the raising of vowel height is not accentuated by a double raising effect. Syllable initial /tɕ/ and /tɕh/, on the contrary, have a tendency to keep the susceptible vowel at a lower height than required by v. h. appr. rules. After /ɕ/ and /j/ normal raising takes place.

A syllable initial /w/ generally causes backing of the following vowel (only /a/ can be observed after /w/), and in an approximating environment it further enhances backing in approximation to /u/. Examples for approximation to /i/ in this position are lacking in my data.

(7)

/'tɕhah-pu"/	[tɕ ^h 'ɜ̄ _u β _u]	cock
/tɕhah-m-tuh?/	[tɕ ^h 'ɜ̄mdu.ʔ ¹]	tea with roasted barley flour
/'tɕhak-tsuhk/	[tɕ ^h 'ɜ̄ndz _u .ʔ ¹]	finger, n, h
/'kyhn-'tɕham/	[g̊y _u ndɕ _u z _m]	cold (illness), n
/'tɕhak-'ny/	[tɕ ^h 'ɜ̄.ʔ _u ŋy.]	money, h
/'tɕhanku/	[tɕ ^h 'ɜ̄ŋg _u]	armpit
/jahk-pu"/	[jɜ̄g̊ _u]	nice, good

(7) cont.

/ku-ʁa/	[kuʁᵻ]	flesh, h
/'ʁahmu/	[ʁᵻmᵻ]	hat
/ʁa-'tʰih/	[ʁᵻdᵻ]	meat knife
/ʁa-tsihn/	[ʁᵻndzᵻ:]	meat fork
/'wahmu/	[wᵻmᵻ]	fox

1.2. Second degree approximation: (1) the half-close vowels /e, ø, o/ triggering approximation in the low vowel /a/; (2) the high vowels /i, y, u/ triggering approximation in the half-open vowel /ɛ/.

(1) Approximating to /e/ and /ø/, /a/ → [ɜ].

Approximating to /o/, /a/ → [ɜ̄].

(8)

/ta-tohn/	[tᵻndᵻ:]	spear carried on horse back
/'koh-'rah/	[kᵻrᵻ]	courtyard
/phᵻh?-n-'tah/	[phᵻndᵻ]	Tibetan month
/'ka-mᵻn/	[kᵻmᵻ:]	conversation, h
/'meh-tah/	[mᵻndᵻ]	gun

The six factors enhancing or blocking v. h. appr. given for first degree approximation similarly apply to second degree approximation. Illustrations for this are given in example set (9) below with the appropriate letters and headings referring back to the full statements given in section 1.1.

(9) (a) Position in the word.

/lahma/	[l am a]	lama
/lohma/	[l om ɜ]	leaf
/panpa/	[pamb a]	lap, n
/mɔ̃n-pa"/	[mɔ̃mbɜ]	plough, n
/la-'sa/	[l asa]	Lhasa
/khesa/	[ch esɜ]	yesterday

(b) Syllables with long vowels.

/kaa-'jɔ̃/	[ka·jɔ̃]	china bowl
/'t̃hohmtaa/	[t̃'omda·]	spider

(c) Syllables ending in nasals.

/nen-pan/	[nembã:]	marriage witness
/t̃ahm-so/	[n d̃ mso]	molar tooth

(9) (d) Syllable final glottal.

/'kentʂa?/	[<u>ç</u> endʂa·ʔ']	ladder
/keʔ-rahʔ/	[<u>ç</u> e·ʔ <u>ɹ</u> a·ʔ']	belt, n
/'tʰ-ŋaʔ/	[tʰ·ŋa·ʔ']	praise, n

A word final ^lgottal considerably lowers /o/, and v. h. appr. in the susceptible vowel is sensitive to the lowering of the trigger vowel, e. g.:

/ahmto/	[^h <u>ʒ</u> mdo]	Amdo
/'am-tʂoʔ/	[ʔ <u>ʒ</u> mdʂo·ʔ']	ear

(e) Other syllable final consonants.

/tak-keʔ/	[t <u>ʒ</u> g·e·ʔ']	nape
/'mahr-khohŋ/	[<u>m</u> <u>ʒ</u> ɹ <u>ɔ̃</u> :/ <u>m</u> <u>ʒ</u> ·ʔ <u>ɹ</u> <u>ɔ̃</u> :]	butter price

(f) Interference of syllable initial consonants.

/ʂa-kho/	[<u>ʂ</u> <u>ʒ</u> k ^x o]	meat soup
/'tʂhak-sem/	[tʂ ^h <u>ʒ</u> xsem]	finger nail, h
/'kjah?-see/	[<u>ʒ</u> <u>ʒ</u> <u>ʒ</u> ·ʔ <u>ʒ</u> e·]	brocade

(2) The high vowels /i, y, u/ triggering approximation
in the half-open vowel /ɛ/:

Approximating to /i, y, u/, /ɛ/ → [e].

(10)

/'thɛpu/	[t ^h e _ω β _τ u]	thumb
/phɛh-pu"/	[p ^h e _ω β _τ u]	Nepalese
/khɛh-ŋik/	[k ^h e _ω ·ŋi·ʔ]	litter, n
/phɛh-'jyh/	[p ^h e _ω ·jy _τ ·]	Nepal

From the six factors enhancing or blocking v. h. appr. only four can be applied to approximating /ɛ/. (b) 'Syllables with long vowels' does not apply because length is not contrastive for this vowel. (e) 'Other syllable final consonants' does not apply because /ɛ/ does not occur in syllables closed with these consonants. The four remaining factors, which do apply, are illustrated and discussed where necessary in example sets (11) - (14) under the appropriate headings.

(11) (a) Position in the word.

Nonapproximating environments:

/'kak-nɛh/	[ka·ʔne _τ ·]	having stopped
/rɛ-nɛh/	[ɹɛ·ne _τ ·]	having torn, tr

(11) cont.

Approximating environments:

/tʃhi-nəh/	[tʃ ^h ine _u]	having wiped
/'lyh-nəh/	[ly _u ne _u]	having boiled over
/khi-nəh/	[<u>ch</u> ine _u]	from the dog

(c) Syllables ending in nasals. This factor can apply to [ɛ], but only in a limited sense. We have seen that there is no contrast between /ɛ/ and /e/ in nasalized syllables (cf. section 1.2.4.); but some /en/ sequences appear to be low enough after certain initial consonants to undergo v. h. appr.; this is illustrated by the first pair of set (12), and the remaining examples of this set illustrate the blocking of v. h. appr. when /en/ is realized as a nasalized vowel.

(12)

/see-toh?/	[se _u ndo _u ? ^h]	golden color
/sen-'kjuuh/	[se _u njju _u]	news
/ruhm-'tehn/	[ɹ _u md _u ẽ:]	rug
/pan-'tehn/	[pand _u ẽ:]	apron
/'ki?-'men/	[ci? _u mẽ:]	woman

(13) (d) Syllable final glottal.

Partial blocking in the first syllable:

/pɛmu/	[pɛm _τ u]	knee
/tɛ?-mu"/	[tɛ _τ ?m _τ u]	entertainment, show
/tɛh?-ʔsik/	[² de _τ ?ʔsi.ʔ ¹]	bed bug
/'kɛh?-mih/	[⁰ jje _τ ?mi _τ]	Chinese

Complete blocking in the second syllable:

/ku-tɕhɛ?/	[kudɕe.ʔ ¹]	belongings
/sihm-tɕhɛ?/	[simdɕe.ʔ ¹]	bed cover
/sihŋ-'lɛh?/	[siŋ ¹ le.ʔ ¹]	field work

(14) (f) Interference of syllable initial consonants.

/ɕehlum/	[ɕel _τ um]	round basket
/'ɕɛh-ɕu/	[ɕe.ɕ _τ u]	apple, h
/'lu-ɕɛh/	[luɕe.]	song
/ɕɛ?-mu"/	[ɕe _τ ?m _τ u]	fat, well kept animal

In exposing the general rules of v. h. appr. I have so far mainly illustrated with nonverbal words. But, as stated in the introduction, the general statement applies also to those verbal words which do not involve a high vowel suffix. Example sets (15) - (16) give some examples

of verbal words, and thus further illustrate the general statement.

(15) The suffix /-neh/ 'having done s. th.' undergoes some approximation after stems with high vowels, but for the other suffixes of this set final glottal, long vowel, or nasalization block the approximation.

/paa-nəh/	[pa·ne·] _‡	having lit
/sy?-neh/	[sy·?ne·] _‡	having churned
/khi-nəh/	[chine·] _‡	having brought
/'thih?-pe?/	[tʰi·?βε·?] _‡ _‡	did (he) write?
/phy-pe?/	[pʰy·βε·?] _‡ _‡	did (he) offer?
/pi?-ke?"/	[pi·?ge·?] _‡ _‡	will (you) take out?
/'kjuhr-ke?"/	[ʔj·?ge·?] _‡ _‡	will (you) change?
/'thih-ja?"/	[tʰi·ja·?] _‡	something to ask
/rii-kaa"/	[ɽi·ga·] _‡	in order to throw over
/ky?-'tan/	[kʰy·dã·] _‡	way of stealing
/riih-'tsahn/	[ɽi·dza·] _‡	because (he) falls over

(15) The suffix /'koh/ 'must, want' has an interesting feature in that its vowel triggers approximation in stems with low vowels, and the suffix vowel itself undergoes slight approximation after stems with high vowels.

/'lap-'koh rəh?/ [lɔ̃bɔ̃õ ɹ̃.ɛ̃.ʔ¹] must teach
 /'lak-'koh rəh?/ [lɔ̃.ʔɔ̃õ ɹ̃.ɛ̃.ʔ¹] must lose
 /tʰhi-'koh rəh?/ [tʰĩĩɔ̃ũ ɹ̃.ɛ̃.ʔ¹] must wipe
 /'tʰy-'koh rəh?/ [tʰỹ.ɔ̃ũ ɹ̃.ɛ̃.ʔ¹] must wash
 /phuhp-'koh rəh?/ [pʰũbɔ̃ɔ̃ũ ɹ̃.ɛ̃.ʔ¹] must pitch (a tent)

Finally, to conclude the general statement of v. h. appr., I must point out that its implementation for word final /a/ is flexible (e.g. in the suffixes /-na"/, /-pa/, etc.); the quality of final /a/ in disyllables is rather unstable; it may also approximate to initial segments of following words, and besides that it is one of the first things to be deleted in faster speech.

2. Exceptions to the general statement

In the number of compounds I have examined I have found three words which show a greater degree of approximation than stated by the general rules. They are the following:

- | | |
|--|----------------|
| i. [ʔ _ɪ du.ʔʼ] | thick soup, h |
| ii. [ʔ _u ʔ _{lu} .ʔʼ] | pot with curds |
| iii. [ʔ _ɛ ʔ _ɔ ʔ _ɔ ʔ _ɔ .ʔʼ] | interpreter |

Presumably they are compounds with the following morphemes:

- | | |
|----------------|---|
| i. /'ʔɛh/ | mouth, h |
| /'thukpa/ | thick soup |
| ii. /'ʔohʔ/ | curds |
| /'luk/ | pour, v |
| iii. /'kɛʔ/ | voice, n |
| /'kjur, 'kjuu/ | ? (not used by my informant, 'throw away' in related languages, e.g. Kagate). |

The question arises whether these items should have underlying forms as given in the first column of example set (17) below and be marked with exception features for v. h. approximation, or whether their underlying forms should be adjusted so that they fit the general rules for v. h. appr., as shown in the second column of the set.

(17)

- i. /'ɤsh-'thuk/ /'ɤeh-'thuk/ [ɤ_ɪ^hid_ɪu.ʔ^ɪ] thick soup, h
ii. /'ɤoh?-'luk/ /'ɤuh?-'luk/ [ɤ_ɪ^hʔlu.ʔ] pot with curds
iii. /'kɛ?-'kjuu/ /'ke?-'kjuu/ [ɤ_ɪ^hʔ^ɪʃjə.] interpreter

In the vocabulary appendix to this study I have chosen the second option; but as far as the linguistic competence of speakers is concerned I would claim that both may be true. The underlying representation of these items may vary from speaker to speaker, depending on how analytical a mind a given speaker has.

3. Special features of verbal words with high vowel

suffixes

For nonhigh vowels of verb stems approximating to high vowels of suffixes the general rules of v. h. appr. apply, except that three of the factors that block v. h. appr. in other environments are cancelled here. These special features are stated and illustrated in the following under (a) - (c).

(a) Approximation of half-close vowels is quite noticeable (not trivial as in nonverbal words).

Approximating to high vowels of verbal suffixes,

/e/ → [i_ɪ]

/ø/ → [y_ɪ]

/o/ → [u_ɪ].

(18)

/tʃhe-ki"/	[tʃ ^h igi]	opening (imperfect aspect)
/nehn-ki"/	[niŋgi]	listening, obeying
/'khoh-'tyh/	[k ^h u ^h dy]	while understanding (concurrent action)
/mɔ̄-ki"/	[mygi]	admiring
/'thɔ̄-ki"/	[t ^h ygi] ³	hearing

(b) A sequence of two identical vowels in the verb stem does not block v. h. approximation.

Approximating to high vowels of verbal suffixes,

/aa/ → [ɔ̄:] (cf. example set 19)

/ee/ → [i:] (cf. example set 20)

³The verbal suffix /-ki"/ has another interesting feature in that it may exhibit approximation in rounding and backness to vowels of preceding and following syllables. The vowel quality of this suffix is rather unstable and can take just about any quality in the non-peripheral region of the upper half of the vowel diagram, depending on what vowels precede and follow; but the implementation of such approximation is flexible, and for this reason I have always given [i] in the examples here. The following phrases illustrate some of the alternative possibilities:

/mɔ̄-ki" tuhk/	[my.gadu.ʔ ^h]	'is admiring'
/tsɔ̄-ki" tuhk/	[tsy.ʔgadu.ʔ ^h]	'is cooking'
/kooh-ki" tuhk/	[ŋgu.gudu.ʔ ^h]	'is being late'
/rahk-ki" tuhk/	[rɔ̄ʔgadu.ʔ ^h]	'is getting'

/oo/ → [u:] (cf. example set 21).

(19)

/tɕaa-'tyh/ [tɕə:_τdy:_τ] while visiting

/'jaa-'tyh/ [jə:_τdy:_τ] while lending

/tɕaa-'kjuh/ [tɕə:_τʃjɬ:_τ] is to visit

/'jaa-'kjuh/ [jə:_τʃjɬ:_τ] is to lend

(20)

/'ɕeeh-'ki"/ [ɕi:_τgi:_τ/ɕi:_τgi:_τ] taking, h

/'tɕeeh-'ki"/ [dɕi:_τgi:_τ/dɕi:_τgi:_τ] exchanging

/seeh-'tyh/ [si:_τdy:_τ/si:_τdy:_τ] while saying

/'reeh-'tyh/ [ɹe:_τdy:_τ/ɹe:_τdy:_τ] while depending on

(21)

/kooh-'ki"/ [ŋgu:_τgi:_τ/ŋgu:_τgi:_τ] being late

/kooh-'tyh/ [ŋgu:_τdy:_τ/ŋgu:_τdy:_τ] while being late

/kooh-'kjuh/ [ŋgu:_τʃjɬ:_τ/ŋgu:_τʃjɬ:_τ] is to be late

(c) A final glottal in the first syllable of the word does not cause partial blocking of v. h. appr. .

(22)

/'kahk-'ki"/ [kə:_τʔgi:_τ] choking

/'rahk-'ki"/ [ɹə:_τʔgi:_τ] getting

(22) cont.

/təp-ki"/	[tə _τ ʔgi _τ]	getting thinner
/'nəʔ-ki"/	[ne _τ ʔgi _τ]	costing
/tseʔ-ki"/	[tse _τ ʔgi _τ]	playing
/ŋəʔ-ki"/	[ŋu _τ ʔgi _τ] ⁴	frying
/kyʔ-ki"/	[ku _τ ʔgi _τ]	stealing

The three special features of verbal words with high vowel suffixes concern the cancelling of three of the factors which partially or completely block v. h. appr. in other word categories. The other features of the general statement exposed under 'factors enhancing or blocking v. h. appr.' also apply to verbal words with high vowel suffixes.

The underlying principle of v. h. appr. is the same for all word categories, but in verbal words the process is applied more rigorously. It is interesting to see that it is the grammatical category which defines the areas of application for this phonological process.

⁴Some verbs with /ə/ or /y/ as stem vowels show a switch from front to back before suffixes with high vowels or half-close vowels. The limited amount of tested data that I have for this particular feature suggests that the switch takes place in stems with a final glottal, but not in the ones which end in the vowel; but this hypothesis needs further testing.

4. Vowel height approximation and identification of

front vowels

V. h. appr. presents a special problem for the identification of front vowels. In the domain of the general rules identification of /e/ and /ɛ/ is particularly difficult because approximated /ɛ/ comes phonetically very close to /e/. /e/ itself is higher than [e] in most environments (cf. table 5, section 1.2.) and though approximation of /e/ to high vowels as such is trivial, it may move up a little in approximating environments, perhaps in order to move away from /ɛ/; as a consequence /e/ comes very close to /i/ in such environments. But in comparable environments contrast between /i/ and /e/ on the one hand, and /e/ and /ɛ/ on the other, is maintained on the phonetic surface as example set (23) illustrates.

(23)

/'thihpu/	[t ^h i _u β _u]	bell
/'khe-pu"/	[ch _e β _u]	cheap, skillful
/'thəpu"/	[t ^h eβ _u]	thumb
/'kip-pu"/	[ci [?] β _u]	prosperous
/tse?-mu"/	[tse [?] mu]	game, play, n
/tseh?-pu"/	[^h dze [?] β _u]	beautiful

(23) cont.

/ɕihm-pu"/ [ɕ_ɪimbu] tasty

/tɕhem-pu"/ [tɕ^h_ɪimbu_ɾ] big

Example set (23) shows that phonetic contrast between /ɛ/, /e/, and /i/ is maintained also in approximating environments. Nevertheless, there is a good deal of phonetic overlap between these vowels because of the raising and lowering effect that preceding consonants have on /e/ and /ɛ/. (This aspect of vowel variation is described in section 1.2.2., and summarized in table 5). The result of the intersection of these two vowel height affecting factors is that /e/ and /ɛ/ in particular, can only be identified correctly in very similar environments. (In dissimilar environments too many abstractions have to be made.) The overlap of /e/ and /ɛ/ is exemplified in set (24). In the first four pairs the allophones of the two phonemes are identical, and in the last three pairs the difference is only minimal.

(24)

/'seka/ [se_ɪqa_ɪ] crack, n

/ɕehlum/ [ɕe_ɪlum_ɾ] round basket

/se?-pu"/ [se_ɪβ_ɪu_ɾ] yellow

/ɕe?-mu"/ [ɕe_ɪmu_ɾ] fat, well kept animal

(24) cont.

/'kjah?-see/	[ʃjæʔse]	brocade
/'lu-ʃeh/	[luʃe]	song
/'rehpa/	[reβa]	hope, n
/phɛh-pu"/	[pʰeβu]	Nepalese
/'kehpa/	[kʰeβa]	virtue
/'keh-pu"/	[kʰeβu]	old man
/'seka/	[seka]	crack, n
/'thɛpu"/	[tʰeβu]	thumb
/neʔma/	[neʔma]	wrinkle, n
/'neʔ-mu"/	[neʔmu]	innkeeper, f

Identical allophones of /e/ and /ɛ/ occur only in mutually exclusive environments; we have thus the situation of partial overlap of phonemes, and the phonological vowel qualities can be identified unambiguously. But for the establishment of the environment both vowel height approximation and consonantal vowel height conditioning must be taken into accountⁿ, and this complicates the identification. We may raise the question whether an analysis sticking

closer to the phonetic surface contrasts might not reflect the linguistic competence of speakers more accurately. According to my observation this is not the case; speakers seem to be quite well aware of the underlying qualities of vowels in approximating environments and may produce them in overdistant speech.

Because of the more rigorous application of v. h. appr. in the domain of verbal words with high vowel suffixes phonetic overlap between half-close and high vowels becomes an even more acute problem. One might be tempted to state that half-close vowels are replaced by high vowels before high vowel suffixes. According to my observation, however, it is not a case of complete overlap. Approximated half-close vowels are slightly lower than high vowels in similar environments, but here again, conditioning interference of initial consonants does create phonetic overlap. Example set (25) exemplifies this for /e/ and /i/ before /-ki"/, and in order to complete the picture some examples with /ε/ stems are also added.⁵

⁵Only front vowels are illustrated here. The situation is basically the same for the back vowels /u/ and /o/. But in practice distinguishing between these two vowels has not been too much of a problem; this is probably due to the fact that verb stems of open syllable shape with these two vowels are rare. Syllable final consonants seem to accentuate the phonetic differences of vowels in this position. This ties together with the fact that some final consonants partially block vowel height approximation.

(25)

/tphi-ki"/	[t ^h igi] + _T	wiping
/khi-ki"/	[c ^h igi] + _T	bringing
/tphi-ki"/	[t ^h igi] + _T + _T	opening
/seeh-ki"/	[si·gi] + _T + _T	saying
/riih-ki"/	[ɹi·gi] + _T + _T	falling over
/'reeh-ki"/	[ɹe·gi] + _T + _T	depending on
/'reh-ki"/	[ɹe·gi] + _T + _T	tearing, v(itr)
/'seeh-ki"/	[sɛ·gi] + _T + _T	taking, h
/'si-ki"/	[sigi] + _T	dying
/tshik-ki"/	[tshiqi] + _T	burning
/tse?-ki"/	[tsiqi] + _T + _T	playing
/'phe?-ki"/	[phe?gi] + _T	coming here, h

5. Concluding remarks

The phenomenon of LT described in this appendix has been called vowel harmony by other investigators (e. g. Sprigg, 1961; Chang and Shefts Chang, June 1968). In the accounts known to me of vowel harmony in other languages the situation is such that one series of phonemes is replaced by another series in certain environments. But, as I have shown, this is not the situation in LT. I have claimed that no phoneme replacement takes place, and if there is any in spite of my claim, it is certainly only in a very limited area. Therefore I have dropped the term vowel harmony in favor of vowel height approximation.⁶

Miller, in his historical accountⁿ (1966) also uses the term 'assimilation' which conveys a concept similar to approximation. The concept of assimilation has been attacked by Sprigg in that he finds: "Difficulties arise when both Syllables of the assimilation are of the same assimilation type: assimilee - assimilee, e.g. bsdad-pas, dɛ:be:, 'did you stay'; or assimilator - assimilator, e.g. zin-gyi-red, sɔŋt-, 'he will catch'. Where both Syllables are assimilators, which is assimilated to which?" (1961:137). In this

⁶With the number of vowel phonemes Chang and Shefts have established the designation 'vowel harmony' may be justified in their terms (e.g. Chang and Shefts Chang, June 1968, Shefts Chang 1968c).

account of v. h. approximation I have freely used the terms trigger and undergoer (vowels). I suppose these and the term approximation could be attacked in the same way: what approximates to what? Or, how do we know which vowel triggers and which one undergoes? But these questions can only arise in a model which denies that morphemes have a basic underlying form. If we assume that each morpheme has a basic underlying form the issue is self evident: If in the process of chaining monosyllabic morphemes together we find that the vowel of one morpheme stays roughly the same, while the vowel of the other one undergoes a more or less drastic phonetic change, it is self evident which vowel undergoes the change. And if we observe further that such an undergoer vowel paired with another phonological vowel quality does not undergo any change, we must deduc^e that the first vowel partner has triggered the change. Further, if we realize that v. h. appr. is a process which aims at bringing vowel heights within a certain proximity, then we do not expect any approximation if the underlying vowels are already within the limits of this proximity.

The determination of underlying vowel qualities of morphemes in LT is quite straightforward because most morphemes

are monosyllabic, and in monosyllabic occurrences (in isolation or within the utterance) the underlying vowel appears.⁷ Only for a few disyllabic morphemes the underlying vowel quality of the first syllable has to be established by deduction. LT speakers seem to be fully aware of the phonological vowel qualities and may give unapproximated disyllabic forms if they think that it will help the understanding, or if they want to draw attention to some semantic relations.

⁷With this I am not claiming that monosyllabic occurrences generally represent the underlying forms, but just that this is the case for monosyllabic morphemes in LT as far as vowel quality is concerned.

Appendix 2: Classified vocabulary

The entries of this vocabulary appendix are alphabetized according to the sequence generally used in Tibetan script. Though the vocabulary is given in phonological representation with Roman letters, it seems appropriate to use the Tibetan sequence because it is based on phonetic insights, and it is therefore easily memorized. It is organized according to the following principles:

Consonants are listed first, then vowels; the consonants fall into the following four groups: stops (oral and nasal), semi-vowels, liquids, and fricatives. Within each group the places of articulation that are furthest back in the mouth are listed first, except that /ts/, /tsh/, and /ʔ/ are not integrated. The full list of the sequence is given in the table below; each line is to be followed through from left to right.

Consonants:	k	kh	ŋ
	tʃ	tʃh	
	t̥	t̥h	
	t	th	n
	p	ph	m
	ts	tsh	ʔ
	j	w	
	r	l	l̥
	ʃ	s	h

Vowels: a i u y
 e ε o ø

The transcription conventions used for the symbolization of tone are summarized in figure 3 (cf. section 2.2). In the sequence of listing entries, the apostrophe used for signalling moving pitch contours follows the unmarked level pitch contour entries. In addition, the pitch contour of each morpheme is redundantly signalled by the pitch contour reference number which appears before the morpheme. In compound entries (stem compounds) the pitch contour reference number of the second component appears after the morpheme; for suffixes the pitch contour reference number is omitted. For stem compounds with regular nasal insertion the phonological form is followed by a broad phonetic transcription in square brackets; it shows the medial prenasalization, but apart from that not a great deal of phonetic detail. This transcription has no theoretical significance, it is merely meant to relieve the reader of having to remember the rules. For this reason, some other compounds are also accompanied by broad phonetic transcriptions.

Phonological /np/ sequences are realized as [mb].
(This rule has not been mentioned earlier in this study.)

The grammatical categories given with the English glosses are not meant to represent a grammatical analysis of LT; they are mainly used to disambiguate the English meanings. This is especially relevant for 'verb' and 'noun', since in English these two categories are so often homophonous. Therefore, n after 'lock', for example, means that the meaning of the Tibetan entry corresponds to the English noun 'lock' and not to the verb 'to lock'.

For the meanings of the abbreviations used with the glosses see 'transcription conventions and abbreviations'; these are placed after the table of contents.

2.1. Stem morphemes

k

- 3 'ka ... command, speech, n
 3 'ka-mɔn 4 ... conversation, n, h
 3 'kak ... stop, v
 4 kaŋ ... quality, n
 3 'kaŋpa ... leg, foot, n
 3 'kaŋ-'tʃhen ʒ ... barefoot
 3 'kaŋ-'thii ʒ ... sole of foot, n
 3 'kaŋ-'maah l ... marrow, n
 3 'kapli ... scull, n
 4 kam ... dry, v
 4 kar-tʃa ... brightness, n (with cont. 4 suffix)
 4 kar-/kaa-pu" ... white, adj.
 4 kar-/kaa-ma" ... star, n
 4 kar-a ... white wash, n (with cont. 4 suffix)
 4 kawa/kaa ... pillar, n
 1 'kah ... saddle, n
 1 'kahk ... choke, v(itr)
 1 'kahk-'tʃih l ... belch, n
 --- 'kjahp ... belch, v
 1 'kahŋ(-la) ... on, l n
 1 'kahpu ... crawling, n
 --- 'kjahp ... crawl, v
 1 'kahm ... 1. box, chest, n, 2. peas with pods
 2 kahrpa ... blacksmith, n
 4 kaa-'jɔ ʒ ... china bowl, n
 1 'kah ... rejoice, v
 1 'kaah-pu" ... happy, lovable, adj.
 3 'kip ... be happy, prosperous, v
 3 'kip-pu" ... happy, prosperous, adj.
 3 'ki?-'men ʒ ... woman, n
 1 'kihkoŋ ... window, n
 4 kii ... middle, n
 4 kii-ma? 4 ... main person, n
 3 'kii ... loud shout, n
 4 ku ... statue, n
 4 ku-tʃohk 2 [kunduɔ?] ... Lord
 4 ku-tʃe? 4 ... belongings, n, h
 4 ku-tʃah 2 [kuŋdʌ] ... image, n, h
 4 ku-tʃohn 2 [kunduɔ:] ... guest, n, h
 4 ku-tah 2 [kunda] ... spouse, n, h
 4 ku-thaŋ 4 ... colored picture, n, h
 4 ku-pan 4 ... lap, n, h
 4 ku-m-tʃeh? 2 ... sibling (near relative), n, h
 4 ku-'tsha ʒ ... relative, n, h
 4 ku-tshe 4 ... life, n, h
 4 ku-rahk 2 ... belt, n, h
 4 ku-'lo ʒ ... worry, anger, n, h
 --- ɔahŋ ... become angry, v, h
 4 ku-ɔa 4 ... flesh, n, h

4 ku-gu 4 ... apple, n
 4 ku-'suhk 1 ... figure, body, n, h
 4 kuk-pa" ... deaf person, m
 4 kuk-ma" ... deaf person, f
 4 kup ... bottom (body part), n
 4 kup-kjak 4 ... chair, n
 4 kup-'tek 3 ... chair, n, h
 3 'kupa/'kypa ... thread, n
 1 'kuh ... nine, nu
 1 'kuhk ... wait, v
 2 kuhr/kuuh ... bend, v
 3 'kypa/'kupa ... thread, n
 4 ky? ... steal, v
 2 kyh ... move, v(itr)
 1 'kyhn-kha 4 [gyŋk^ha] ... winter, n
 1 'kyhn-'təham 3 ... cold (illness), n, h
 1 'kyh? ... courtesy, bow, n
 1 'kyh?-khap 4 [gy^hk^hap] ... needle, n, h
 1 'kyh?-'ju 3 ... turquoise, n, h
 3 'kentəa? ... ladder, n
 4 ke? ... neck, n
 4 ke?-rahk 2 ... belt, n
 3 'ke? ... bear, sprout, v
 3 'ke?-'kjuu 3 ... interpreter, n
 3 'ke?-təa ... conversation, n (with cont. 4 suffix)
 3 'ke?-pa" ... birth, n
 4 ke?-pa" ... waist, n
 1 'keh ... virtue, n
 1 'keh-'kehn 1 ... teacher, n
 1 'keh-ʈhuk 4 ... pupil, n
 1 'keh-pa" ... virtue, n
 2 kehn ... 1. responsibility, n, 2. bet, n
 1 'kehn ... senior, senior monk
 1 'kehn-'tyhn-pa" 1 ... monk with a certain rank
 1 'kehr/'keeh ... private
 3 'ke? ... voice, n
 2 keh ... bathe, wade through water, v
 1 'keh-pu" ... old man, n
 1 'keh-mu" ... old woman, n
 1 'keh? ... become weak, v
 1 'keh?-mu" ... laughter, n
 3 'kok ... 1. pluck, v, 2. bark, n
 4 kom ... be thirsty, v
 4 kor/koo ... turn, v(tr)
 4 kor ... about, concerning
 4 kor-a ... round, n (with cont. 4 suffix)
 4 kowa/koo ... leather, animals skin, n
 2 koh ... head, n
 1 'koh ... door, n
 1 'koh-ʈahk 2 [gəŋda?] ... doorway, n
 1 'koh-'rah 1 ... courtyard, n
 1 'kohŋpa ... thought, n
 1 'kohŋmu ... evening time

1 'kohna ... egg, n
 1 'kohntsa? .. lock, n
 --- 'kjahp ... lock, v
 1 'kohnta? ... evening, n
 1 'kohmpa/'køhmpa ... buddhist monastery, n
 1 'koh?/'køh? ... need, want, must, v
 1 'koh?-ja?" ... need, n
 2 kohr/kooh ... be late, v
 1 'køhmpa/'kohmpa ... buddhist monastery, n
 4 kø ... boil, v(tr)
 4 kø? ... install, establish (e.g. leader, servant), v
 4 kø?-pa" ... command, n
 2 køh? ... catch, v
 1 'køh? ... vulture, n
 1 'køh?/'koh? ... want, need, must, v
 1 'køh?-pu" ... wild, adj.
 4 kjak ... lift up, v
 4 kjaŋ ... stretch v(tr)
 4 kjaŋ-'mahr 1 ... fresh butter, n
 1 'kjah ... 1. beard, n, 2. hundred, nu
 1 'kjah-kaa 4 ... India
 1 'kjah-nah? 2 ... China
 1 'kjahkpa ... fat person, n
 1 'kjahkpa? ... stick, n
 1 'kjahŋ ... fill v (tr)
 1 'kjahp ... 1. back, n 2. apply, do s.th., v
 1 'kjahp-'tshik 3 ... spine, n
 1 'kjah?-tøk 4 ... high table, n
 1 'kjah?-see 4 ... brocade, n
 4 kjur-/kjuu-mu" ... sour, adj.
 1 'kjuh ... property, n
 1 'kjuhk ... run, v
 1 'kjuhppa ... descendant, n
 1 'kjuh-'maah 1 ... intestine, n
 1 'kjuhr/'kjuuh ... change, v
 2 kjuhn-tuh 2 ... usually
 2 kjuhn-nah 2 ... ever
 1 'kjuh? ... 1. slip on, pull over, v, 2. knowledge, n
 3. through
 1 'kjuh?-pa" ... tantric
 4 kje ... 1. load, pack, hang up, v
 (tøhu) kje 'kjahp ... swim, v
 1 'kjuh-pu" ... king, n
 1 'kjuh-mu" ... queen,
 1 'kjuh-'sa 3 ... capital, n
 1 'kjuh ... become advanced, v
 1 'kjuh? ... eight, nu
 1 'kjuh?-pa" ... 1. upper back, n, 2. eighth, no. 8, nu
 1 'kjuh?-mih 2 ... Chinese, n
 4 kjok ... limp, v
 4 kjo?pu ... poor thing, n, poor, adj.
 4 kjon ... help mount, v (honorific for 'kjahp)
 4 kjø? ... escort, v

kh

- 3 'kha ... mouth, n
3 'kha-kaa 4 ... mule's white spot around the mouth
3 'kha-'lak 3 ... food, n
3 'kha-ʕɛ? 4 ... a few, some
3 'khak ... part, n
3 'khak-pu" ... difficult, adj.
3 'khakaa ... silence, silent
3 'khaŋ/'kheŋ ... fill, v(tr)
3 'khaŋ-'mik 3 ... room, n
3 'khaŋpa ... house, n
3 'khatu? ... straight, adj.
4 khap ... needle, n
4 khap-tʂok 4 ... direction, n
4 kham ... mood, n
4 khampu ... peach, n
3 'kha?-tak 4 ... a white thin scarf used for ceremonial
purposes
1 'khah-'thyh 1 ... when, qw
1 'khah-tʂh? 2 [khaŋqɛ?] ... how, qw
1 'khahki ... which, qw
1 'khahŋ ... 1. snow, n, 2. be full, v(itr)
1 'khahŋka ... all (used to form plural of nouns)
1 'khahpaa ... where, qw
1 'khahre ... what, qw
1 'khahre 'tʂhəh?-neh ... why, qw
4 khi ... 1. bring, v, 2. dog, n
4 khi-'tshaŋ 3 ... dog house
4 khukma ... bag, n
2 khuh-'toŋ 1 ... pants, n
2 khuhr/khuuh ... tent, n
2 khuhr-/khuuh-thak 4 ... tent rope, n
3 'khe ... 1. hit, v(itr), 2. profit, n
3 'khe-kjak 4 ... guarantee, n
3 'khe-p-sahŋ 2 ... profit, n
3 'khe-pu" ... 1. cheap, adj., 2. skilled, adj.
3 'kheŋ/'khaŋ ... fill, v(tr)
3 'khep ... 1. cover, n (e.g. horse blanket) 2. be covered
v(itr)
3 'khen ... know, v, h
4 kher/khee ... bring (lit.) v
4 kheraŋ ... you, sg, pr
4 kheraŋ-tsoh 2 ... you, pl, pr
4 khesa ... yesterday
4 khe ... load, n
3 'khe ... spin, v
2 khəh ... 1. crack, v(itr), 2. sweepings, n
2 khəh-ŋik 4 ... litter, n
4 kho ... he, pr
4 kho-tsoh 2 [khondzɔ] ... they, pr
4 khoŋ ... 1. he, she, pr, h, 2. section, n
4 khowa/khoo ... liquid, soup, n

- 4 khohr/khoo ... turn, v(itr)
 4 khorlo ... wheel, n
 1 'khoh ... hear, understand, v
 2 khohŋ ... rate, price, n
 2 khohmpa 'kjahp ... step on, v
 2 khohr / khohr-mu" ... rupee
 4 khø ... 1. boil, v(itr), 2. his, poss. pr
 4 khø? ... he, agentive pr
 2 khøhn ... wear, v
 4 khjak ... be cold, freeze, v
 4 khjak-pa? 4 ... ice, n
 4 khja? ... difference, n
 4 khjoka ... husband, n
 4 khjor ... tumble (like a drunk person), v
 3 'khjø ... you, sg, pr (used for inferiors)
 3 'khjøra ... you, sg, pr (dit.)

η

- 4 ηa ... 1. drum, n, 2. be early, v
 3 'ηa ... five, nu
 3 'ηam ... be frightened suddenly, v(itr)
 3 'ηama ... tail, n
 4 ηa? ... mantra, n
 3 'ηa? ... ask for, v
 3 'ηar-/'ηaa-mu" /'ηar-/'ηaa-pu" ... sweet, adj.
 3 'ηar-a / 1 'ηahr-a ... sweets, n (with cont. 4 suffix)
 2 ηah I, pr
 2 ηah-tsoh 2 [ηandzø] ... we, pr
 2 ηahr ... be furious, v
 2 ηahr-a ... rage, n (with cont. 4 suffix)
 1 'ηahr-a / 3 'ηar-a ... sweets, n (with cont. 4 suffix)
 4 ηaa-pu"/-mu" ... before, early, adj.
 4 ηik ... sediments in water, n
 3 'ηiŋ ... heart, n
 4 ηi? ... sleep, n
 1 'ηihn ... day, n (used when counting days)
 1 'ηihma ... sun, day, n
 3 'ηii ... two, nu
 3 'ηii-təa? 4 [ηi?dəa?] ... both of them
 4 ηur-/ηuu-'t̥ih 1 [ηu?d̥i] ... snore, n
 --- 'kjahp ... snore, v
 3 'ηy ... silver, n
 3 'ηy-'khaŋ 3 ... money house, bank, n
 2 ηyh ... cry, weep, v
 4 ηen-təok 4 ... ear, n, h
 4 ηen-pu" / 2 ηehn-pu" ... obedient, adj.
 4 ηen-paŋ 4 ... marriage witness, n
 4 ηempa ... snack, n
 4 ηe? ... find, v
 4 ηe?-pu" ... fond of, adj., h
 3 'ηe? ... 1. cushion, n, 2. lean against, v, 3. tan leather, v

- 3 'ne?-koh 2 [nengo] ... pillow, n
 3 'ne?-'tshaŋ 3 ... store room, n
 3 'nerpa/'neepa [ne?ba] ... store keeper, n
 4 ne?ma ... wrinkle, n
 2 neh-pu" ... 1. close friend, n, near, adj., 2. ugly, adj.
 2 nehn ... listen, obey, v
 2 nehn-pu" / 4 nen-pu" ... obedient, adj.
 1 'nehn ... be bad, wicked, v(itr)
 1 'nehn-pu" ... bad, adj.
 2 neh? ... beat, v
 2 neh?-pa" ... punishment, n
 3 'ne?ma? ... before
 3 'ne?(-la) ... before
 2 nehso ... rest, n
 4 nompu" ... blue, adj.
 1 'noh ... face, n (used only in certain contexts)
 3 'noŋ(-la) ... before, t
 4 no? ... fry, v
 2 njah ... fish, n
 1 'njahka ... Tibetan style scales, a weight used with
 these scales
 2 njahm ... grace, n
 3 'njuku ... pen, n
 3 'nje ... put to sleep, make lie down, v(tr)
 1 'njeh ... lie down, v(itr)
 3 'njo? ... become mad, v
 3 'njo?-pu" ... mad, adj.
 3 'njon-pa" / 'njon-pa" ... mad person, n
 1 'njoh ... buy, v

ts

- 4 tsa-'la? 3 ... belongings, n
 4 tsak ... iron, n
 4 tsak-tah 2 [tsaŋda] ... knitting needle, n
 4 tsar/tsaa ... visit, v
 2 tsah ... rainbow, n
 2 tsahk ... tongue, n, h
 1 'tsahŋ ... learn, v
 1 'tsahŋku ... green, adj.
 2 tsahk-'tsha 3 ... salt, n, h
 1 'tsah?ma? / 'tsah?ma? ... spade, n
 1 'tsahr/'tsaah ... stick, v
 4 tsik ... one, nu
 2 tsihn ... catch, v
 1 'tsihnta? ... master, sponsor, n
 1 'tsih? ... be heavy, v
 1 'tsih?-pu" ... heavy, adj.
 4 tpu ... ten, nu
 4 tsuk ... allow, let, v
 3 'tsuk ... put, v (e.g. into a bag)
 4 tsy? ... nutritious, tasty
 2 tsyh / tsuh ... hold, v

- 4 tʃen ... eye, n, h
 4 tʃen-ʒee 4 ... spectacles, n, h
 4 tʃe? ... tongue, n
 1 'tʃeh? ... forget, v
 1 'tʃeeh ... exchange, v
 3 'tʃe? ... cut, v
 2 tʃeh ... pay a visit, v
 2 tʃeh-tak 4 ... white scarf used for ceremonial purposes,
 h
 2 tʃeh? ... measure, v
 4 tʃokse ... low table, n
 3 'tʃotʃo? ... term of address for elder brother
 3 'tʃom ... rob, v
 4 tʃo?wa/tʃoo? ... dung, n
 1 'tʃoh?ma?/'tʃah?ma? ... spade, n
 1 'tʃoh?wa/'tʃoo? ... flea, n
 4 tʃɒ? ... keep, v
 3 'tʃɒ?/'tʃe? ... cut, v, imp.

tʃh

- 4 tʃhak ... break, v
 3 'tʃhak ... hand, n, h
 3 'tʃhak-'kyp 3 [tʃha?ky?] ... thread, n, h
 3 'tʃhak-'kɟyh? 1 ... bracelet, n, h
 3 'tʃhak-'ŋy 3 ... money, n, h
 3 'tʃhak-'ŋjuk 3 ... pen, n, h
 3 'tʃhak-ʃhohk 2 ... friend, n, h
 3 'tʃhak-'toh 1 ... stone, n, h
 3 'tʃhak-thoh 2 ... load, n, h
 3 'tʃhak-tsuḥk 2 [tʃhandzɿ?] ... finger, n, h
 3 'tʃhak-raḥ? 2 ... material, n, h
 3 'tʃhak-sem 4 ... fingernail, n, h
 4 tʃhaŋ ... beer, n
 4 tʃhaŋ-'sa 3 ... wedding, n
 3 'tʃhaŋ ... bark, v
 3 'tʃhanku ... armpit, n
 4 tʃhap ... water, n, h
 3 'tʃham ... religious dance, n
 3 'tʃhampa ... cold (illness), n
 2 tʃhah ... tea, n
 2 tʃhah-kaa 4 ... tea bowl
 2 tʃhah-tam 4 ... thermos, n
 2 tʃhah-'nahk 1 ... black tea
 2 tʃhah-m-tuh? 2 ... tea with roasted barley flour
 2 tʃhah-tsak 4 ... tea strainer
 1 'tʃhah ... bird, n
 1 'tʃhah-te 4 ... chicken, n
 1 'tʃhah-pu" ... cock, n
 1 'tʃhah-mu" ... hen, n
 1 'tʃhahŋ ... north, n
 1 'tʃhahm ... kindness, compassion, n
 4 tʃhi ... 1. be late, v, 2. wipe, v

- 4 t̤hi-pu" ... late, adj.
 4 t̤hin ... go, v
 4 t̤hin-'tah 1 ... western month
 4 t̤hip ... ride, v, h
 4 t̤himpa ... liver, n
 4 t̤hi?-'keeh 1 ... Westerner, n
 2 t̤hihma? ... saliva, n
 4 t̤hu ... water, n
 4 t̤hu-koh 2 [t̤hũŋgõ] ... source of river
 4 t̤hu-'khaŋ 3 ... bath house
 4 t̤hu-t̤ahm 2 [t̤hũŋd̤am] ... shore, n
 4 t̤hu-'too 3 ... goose pimples
 4 t̤hu-thi? 4 ... water drop
 4 t̤hu-n-tsihŋ 1 ... pond, n
 4 t̤hu-n-tsham 4 ... water boundary
 4 t̤hu-tsa 4 ... source of river
 4 t̤hu-'lap 3 ... water wave
 4 t̤hu-pahŋ 2 ... width of water
 4 t̤huk-pu" ... rich, adj.
 4 [t̤hũŋkoo] ... water mill / 4 t̤hu-ŋ-khor 4 /
 4 t̤hupa ... Tibetan dress
 4 t̤hura ... cheese, n
 4 t̤hu-lok ... flood, n
 1 't̤hyh? ... idea, n
 4 t̤he ... open, v(tr)
 4 t̤hem-pu" ... big, adj.
 1 't̤hehma ... sand, n
 1 't̤hehma kar-a ... sugar, n
 4 t̤he? ... clothing, n
 1 't̤heh? ... do, v
 4 t̤hok ... be allowed, v
 4 t̤hoŋ-t̤hoŋ 4 ... small, adj.
 3 't̤hoto ... lip, n
 3 't̤hom ... jump, v
 2 t̤hohŋ ... happen, v
 3 't̤hɔ? ... 1. eat, v, h, 2. religion, n
 3 't̤hɔ?-'meh 1 ... lamp used for worship

t

- 4 t̤a ... head hair
 4 t̤a-'t̤hih 1 ... shaving knife
 4 t̤a-n-tsham 4 ... hair parting
 4 t̤a-p-'cuhk 1 ... hair tassel
 4 t̤aŋ ... swell, v
 4 t̤ap-pu" ... thin, adj.
 2 t̤ah ... image, n
 1 't̤ah ... enemy, n
 2 t̤ahm ... near
 2 t̤ahm-so 4 ... molar tooth
 2 t̤ahmpa ... cheek, n
 4 t̤impa ... cloud, n

2 tih ... female yak
 1 'tikh ... adjust, v
 1 'tihn ... medium
 1 tih? ... wrap, pack, v
 4 tuk ... stir, shake, v
 4 tuku / thuku ... child, n
 2 tuh ... grain, n
 2 tuhk ... Bhutan
 2 tuhk-pa" ... Bhutanese
 2 tuhku ... pit (of fruit), n
 1 'tuhm ... story, n
 1 'tyh ... snake, n
 2 teh ... ghost, n
 2 teh?ta? ... slipping, n
 --- 'pə? ... slip, v
~~4 te ... naval, n~~
 4 te? ... give, v
 4 te? / tə? ... give, v, imp.
 4 te?-mu" / sə?-mu" ... princess, n
 4 te?ma ... peas, n
 2 təh? ... rice, n
 2 təh?-'sɪk ʒ ... bed bug
 4 toma? ... louse nest
 3 'to?-pu" ... happy, adj., h
 2 toh ... go, walk, v
 1 'toh / 'toh? ... feather, n
 2 tohk ... nomad's region
 2 tohk-pa" ... nomadic herdsman
 2 tohŋ ... wild yak (a big and dangerous animal)
 1 'tohm ... frame, n
 2 tohn-pu" / tōhn-pu" ... feast, guest, n
 4 tə? / te? ... give, v, imp.
 2 tōhn-pu" / tohn-pu" ... feast, guest, n

th

4 tha ... gem, n
 4 tha-'ju ʒ ... turquoise stone, n
 3 'thak ... blood, n
 4 thakto? ... envy, n
 1 'thahk ... rock, n
 1 'thahk-'phuhk l ... cave, n
 1 'thahk-rih? 2 ... rocky mountains
 2 thahn ... be cold, v
 1 'thahpa ... monk, n
 3 'thi ... throne, n
 4 thim ... law, n
 4 thi? ... 1. take along (animate beings), v
 2. ten thousand, nu
 4 thi?(-la) ... nearby, l n
 1 'thih ... 1. ask, v, 2. knife, n
 1 'thih-ja?" ... question, n

1 'tʰihku ... knife handle
 1 'tʰihpu ... bell, n
 1 'tʰihma ... odour, n
 1 'tʰih? ... write, v
 4 tʰu ... cubit, n
 4 tʰukpa ... fight, quarrel, n
 --- 'kjaɰp ... fight quarrel, v
 4 tʰuku / tʰuku ... child, n
 1 'tʰuh ... boat, n
 1 'tʰuhk ... six, nu
 3 'tʰy ... wash, v
 1 'tʰehn ... remember, v
 1 'tʰeh ... mule, n
 3 'tʰo ... a kind of brass, n
 3 'tʰoŋ-'sa ... 1. birth place, 2. marriage, n, h
 4 tʰom ... bazaar, n
 4 tʰo? ... roof, n
 2 tʰohk-pu" ... friend, n, m
 2 tʰohk-mu" / tʰohŋ-mu" ... friend, n, f
 1 'tʰohŋ ... hamlet, n
 1 'tʰohŋ-'keeh 1 ... city, n
 1 'tʰohŋ-sihp 2 ... village, n
 1 'tʰohŋ-pa" ... neighbor, n
 1 'tʰohpa ... taste, n
 2 tʰoh ... wheat, n
 1 'tʰoh?-pu" ... warm, adj.
 2 tʰp? ... be upset, v
 2 tʰpʰ ... run away, v

t

4 ta ... horse, n
 4 ta-kaa 4 ... white horse
 4 ta-'kah 1 ... saddle, n
 4 ta-'ŋa 3 ... horse tail, n
 4 ta-tohŋ 2 [tandŋ:] ... spear carried when riding
 4 ta-pa" ... horse man
 4 ta-m-'pʰh? 1 ... saddle cushion
 4 ta-'mak 3 ... cavalry, n
 4 ta-'rah 1 ... horse shed
 4 ta-ɣa 4 ... horse meat
 4 tak ... 1. tiger, n, 2. mark, sign, n, 3. bind, v
 4 tak-ke? 4 ... nape (body part), n
 4 tak-tʰɛh? 2 ... examination, n
 4 takta? ... just enough
 4 takpaa ... always
 3 'takma ... rhododendron, n
 3 'taŋ ... send, v
 3 'tap ... sow, v
 3 'tari ... axe, n
 2 tah ... bow and arrow, n
 2 tah-n-'tʰoh 1 ... feathers on arrow

1 'tah ... message, n
 1 'tahk ... lick, v
 1 'tahk-pa" ... mud, n
 2 tahŋ ... 1. be enough, v(itr) 2. yesterday
 2 tahŋ-'kohŋ 1 ... yesterday evening
 1 'tahŋ ... melody, n
 2 tah-pa" ... archer, n
 2 tahpu ... spouse, n
 1 'tahm ... 1. choose, v, 2. tie, v
 1 'tahwa / 'taah ... month, n
 2 tahr ... tremble, v
 1 'tahr ... grate, sharpen, v
 3 'tiŋ ... spread out, v(tr)
 2 tih ... here, this
 1 'tiŋkpa ... sin, n
 1 'tiŋ ... deep, adj.
 1 'tihmi? ... key, n
 3 'tup ... cut, v
 4 tum ... cover up, v
 2 tuhk ... be, auxiliary v
 1 'tuhk ... 1. pick up, v, 2. burn incense, v,
 3. umbrella, n
 1 'tuhk-pu" ... hardship, n, sad, bad, adj.
 1 'tyhn ... seven, nu
 1 'tyh? ... collect, v
 4 ten ... show, v
 2 teh / theh ... there, that
 1 'tehn ... under cover, n
 1 'tehp / 'thehp ... book, n
 1 'tehrma / 'teehma ... big plate, n₄te... navel, n
 4 te? ... look, v
 4 te?-mu" ... entertainment, show, n
 1 'teh? / 'təh? ... stay, live, v
 1 'teh?-pu" ... comfortable, adj.
 1 'teh?-'sa 3 / 'təh?-'sa 3 ... living place, dwelling, n
 4 tok ... be hungry, v
 4 tok-pa" ... hungry, adj.
 4 toŋ ... thousand, nu
 4 tom ... depth, n
 4 to? ... round thing, n
 3 'tor/'too ... sprinkle, v(tr)
 1 'toh ... stone, n
 1 'tohk ... fasten, attach, v
 2 tohŋ ... spear, n
 2 tohŋ-mu" ... tea churn
 1 'tohŋ ... 1. face, n, 2. beat (e.g. drum), v
 2 toh? ... colour, n
 3 'tə-'ŋa? 3 ... praise, n
 4 tən ... take out, v(tr)
 4 tə? / tə? ... look, imp. v
 3 'tə? ... bore, pierce, v
 2 təh? ... desire, v
 1 'təh? / 'teh? ... stay, live, v

th

- 4 tha ... edge, hem of clothes, n
4 tha-ma" ... limit, end, n
4 thak ... 1. weave, v, 2. distance, n
4 thak-sahm 2 ... rope bridge
4 thak-pa" ... rope, n
4 thaŋ ... flat ground
4 thaŋ-kha 4 [thak^ha] ... coloured painting
4 thaŋ-ŋiŋ 4 ... pine tree, n
3 'thap ... fire place
3 'thap-'tshaŋ 3 ... cooking place, kitchen, n
4 thama? ... cigarette, n
2 thah / tah ... now
2 thah-tah 2 [thanda] ... now
1 'thak-pu" ... clean, adj.
2 thahŋ ... soup, liquid, n
2 thahr-tʂok 4 ... prayerflag, n
2 thih / tih ... this, here
1 'thihriŋ ... today
3 'thii ... sole, bottom of things, n
3 'thii-'tʂhen 3 ... thing with bottom
4 thu ... curse, n
4 thuk ... mind, n, h
3 'thuk-pa" ... a rich soup (with farinaceous products,
vegetables, meat)
3 'thuk-pu" ... thick, adj.
4 thup ... be able, v
4 thumaa ... spoon, n
4 thuk-kehn 2 [thunḡē:] ... responsibility, n, h
4 thuk-'kohn 1 ... thought, n, h
4 thur/thuu ... slope, n
2 thuk ... poison, n
2 thuklo? ... clothes, n
2 thyh ... run away, v
1 'thyh? ... time, n
4 then ... pull, v
2 theh / teh ... there, that
2 theh-tah 2 [thenda] ... and then
2 theh-teh 2 [thende] ... the like, etc.
1 'thehp / 'tehp" ... book, n
4 thepa? ... plate, n
3 'thepu ... thumb, n
3 'the? ... go out, v, h
3 'tho ... list, n
4 thoŋ ... see, v
3 'thoŋ ... 1. drink, v, 2. plough, n
3 'thoŋ-'thoŋ ... short, adj.
3 'thoŋ-ŋiŋ 4 ... plough, n
3 'thoŋ-ŋoo 4 ... plough, n
4 tho?-thohk 2 ... party, n
3 'tho? ... be high, v
3 'tho?-pu" ... high, adj.

3 'thowa / 'thoo ... hammer, n
 3 'thor / 'thoo ... spill, v(itr)
 2 thohkpa ... doubt, n
 2 thohŋ ... well, n
 2 thohpu" ... load, n
 1 'thohm ... bear, n
 1 'thohmtaa ... spider, n
 2 thohwa/thooh ... smoke, n
 4 thø ... be extra, left over, v(itr)
 3 'thø ... hear, v
 3 'thø(-la) ... on top, l n
 4 thøpa ... forehead, n
 4 thø-pa" ... extra, surplus, n
 3 'thøn ... leave, v (when going far away)
 2 thøhn ... come out, v(itr)
 1 'thøhn ... meaning, n

n

3 'na-'thak 3 ... blood from nose, n
 3 'na-tham 4 [nada?] ... snuff, n
 3 'naku ... nose, n
 3 'naktsa ... ink, n
 4 naŋ ... do, v, h
 3 'naŋ-'ŋihŋ 1 ... day after tomorrow
 4 nam ... sky, n
 4 nam-'thuh 1 ... aeroplane, n
 4 nam-'pei 3 ... soul, n
 4 nam-ŋik 4 ... weather, n
 3 'nam ... all, lit. (used fo form plural with nouns)
 3 'nama ... bride, daughter-in-law
 3 'na? ... pus, n
 2 nah ... be ill, become ill, v
 1 'nahk-pu" ... black, adj.
 2 nahŋ(-la) ... inside, l n
 2 nahm-'thyh? 1 ... season, n
 2 nah? ... forest (lit.), n
 2 nahr ... stretch, v(itr)
 2 naah-pu" ... painful, adj.
 3 'num ... 1. oil, n, 2. sniff, v
 1 'nuhp ... west, n
 1 'nuhma ... breasts, n
 1 'nyh? ... dare, v
 3 'nem ... press, v
 3 'nee-ŋen 4 ... white scarf used to cover up statues
 3 'ne? ... 1. cost, v, 2. holy place, n
 3 'ne?-'tshaŋ 3 ... lodgings, inn, n
 3 'ne?-pu" ... innkeeper, n, m
 3 'ne?-mu" ... innkeeper, n, f
 3 'ne?-pa" ... cost, n
 2 neh ... barley, n
 1 'nehtso ... parrot, n
 2 neh? ... illness, n

- 3 'no ... tip, n
 2 nohr/nooh ... 1. mistake, n, 2. wealth, n
 2 nohr-/nooh-pu" ... j^ɛwel, n
 3 'nø? ... container, n

p

- 4 pa-'muk 3 ... frost, n
 4 pakpa ... skin, n
 4 paŋ ... flat ground, n
 4 pan-'tehn 1 ... apron, n
 4 pap ... take down, v(tr)
 4 panpa ... lap, n
 4 pa? ... barley flour dough
 4 par/paa .. 1. picture, n, 2. light, v(tr)
 1 'pahŋkok ... chest (body part), n
 2 pahr/paah ... burn, v(itr)
 4 pi? ... take out, v
 3 'piŋ-kja? ... sibling, n
 1 'pihpa ... bellows, n
 3 'pu ... hair, fur, n
 4 puku ... baby, n
 2 puh ... insect, n
 4 pe ... proverb, n
 4 pemu ... knee, n
 4 pɛ?ko? ... forehead, n
 4 ponpa ... shoulder, n
 4 popa ... pride, n
 3 'ponpu ... leader, n
 2 poh? ... a cloth used to pack things with, n
 2 pohwa/pooh ... a grain measure, n
 3 'pø ... move around (nomadic), v
 3 'pøn ... leader, n
 4 pø? ... incense, n
 2 pøh? ... call, v
 1 'pøh? ... swell, v
 1 'pøh?-pu" ... soft, adj.

ph

- 3 'pha ... father (lit.), n
 3 'phak / 'phak-pa" ... pig, n
 3 'phak-'tshaŋ 3 ... pig den, n
 3 'phak-'khaŋ 3 ... pig house, n
 4 phalam ... diamond, n
 2 phah ... cattle, n
 4 phah-tøhu 4 ... cow, n
 1 'phahklip ... bread, n
 2 phahp ... descend, v(itr)
 3 'phu ... blowing, n
 2 phuhp ... 1. roll of cloth, n, 2. pitch a tent, v
 2 puh ... son, boy, n
 2 puh-mu" ... daughter, girl, n

- 2 phuhmpa ... vase, n
 4 phy ... offer, v
 4 phy? ... a small food offering presented to the gods before eating oneself
 4 phako? ... bag, n
 3 'phe? ... come here, v, h
 2 pheh ... wool, n
 2 phah-pu" ... Nepalese, n, adj.
 2 pheh-'jyh 1 ... Nepal
 3 'pho ... man, n
 3 'phopa ... wooden cup, n
 3 'pho?wa/'phoo? ... a certain spot above the stomach, (body part)
 2 phohŋku ... donkey, n
 2 phoh? ... 1. Tibet, 2. run away, flee, v
 2 phoh?-pa" ... Tibetan, n, adj.
 2 phoh?-n-'tah 1 ... Tibetan month

m

- 4 ma ... wound, n
 3 'mak ... war, n
 3 'mak-mih 2 ... army, soldier, n
 3 'makpa ... son-in-law, bridegroom
 3 'mar-/'maa-pu" ... low, adj.
 3 'mar-/'maa-pu" /'mar-/'maa-mu" ... red, adj.
 3 'mar-'tsi 3 ... red colour of a plant used for food colouring
 2 mah ... mother (lit.), n
 3 'mahku ... boiled butter, n
 3 'mahŋ-pu" ... many, adj.
 1 'mahr/'maah ... 1. butter, n, 2. downwards
 1 'maah-khohŋ 2 [ma?gõ:] ... butter price
 1 'maah-tshuu 4 ... [ma?dpu] ... butter and cheese
 1 'maah-'tahŋ 1 [ma?dã:] ... butter in skin bag
 1 'maah-pa? 4 ... [ma?ba?] ... butter and roasted flour
 1 'maah-'rihn 1 ... butter price
 3 'mik ... eye, n
 3 'mik-tshu 4 ... tears, n
 3 'mik-'pu 3 ... eye brow, n
 3 'mik-'tsum 3 ... eye blinking, n
 3 'mik-see 4 ... spectacles, n
 2 mih ... man, person, n
 2 mih-koh 2 [mĩŋgõ] ... human head
 2 mih-'kõh? 1 ... yeti (snow man), n
 2 mih-pohr 2 [mĩmbõr] ... population, n
 2 mih-'tshaŋ 3 ... family, n
 2 mih-tshe 4 ... life, n
 1 'mihkpa ... throat, n
 2 mihŋ ... name, n
 3 'mukpa ... cloud, n
 3 'men ... medicine, n
 3 'mem ... be low, v(itr)

3 'mem-pa" ... low, adj. (socially)
 1 'meh ... fire, n
 1 'meh-tah 2 [mɛnda] ... gun, n
 1 'meh-tah? 2 [mɛnda?] ... embers, n
 4 me? ... get injured, v
 2 mah?to? ... flower, n
 2 mah?to? 'kjah?-see ... rose, n
 1 'mähle ... chin, n
 4 moŋ ... be depressed, disillusioned, v(itr)
 4 moo ... grandmother
 2 moh ... she, pr
 2 mohmo? ... Tibetan dish (small meat balls wrapped into pieces of dough and steamed)
 4 mɔ ... admire, v(tr)
 2 mɔh-pu" / 4 mɔ-pu" ... popular, attractive, adj.
 4 mɔn-pa" ... plough, n
 4 mɔ? ... plough, v
 2 mɔh ... hers, poss. pr
 2 mɔh? ... she, agentive pr

ts

3 'tsa ... 1. grass, fodder, n, 2. blood vessel, n,
 3. rɔst, n (on iron)
 3 'tsa 'kjahp ... rɔst, v (of iron)
 4 tsak ... 1. sift, v, 2. pile up, v
 4 tsak-tsi? 4 ... small things
 3 'tsaŋpu ... river, n
 3 'tsaŋ-tɕhu 4 ... river water
 4 tsampa ... roasted barley flour
 4 tsawa /tsaa ... root, n
 2 tsah ... location, l n
 2 tsah-nah ... from
 2 tsah-la ... at, to
 2 tsahk ... climb, v
 2 tsahko? ... clay, n
 2 tsahma ... clay pot
 2 tsah-'nɔ? 3 ... clay pot
 2 tsahmpu-liŋ 4 / tsahm-liŋ ... world, n
 3 'tsi ... paint, n
 3 'tsikpa ... wall, n
 3 'tsik-'tehn 1 ... foundation, n
 2 tsihŋ / tsihn ... raft, n
 2 tsihn-rah? 2 ... fort, n
 1 'tsihŋ ... water pit, n
 4 tsuk ... 1. plant, v, 2. put on stove, v, 3. prick, v
 (with needle)
 2 tsuhku ... finger, n
 2 tsyh? ... enter, v
 3 'tse ... peak, n
 4 tse? ... play, v
 4 tse?-mu" ... play, game, n
 2 tseh ... leprosy, n

- 2 tseh? ... be beautiful, v
 2 tsəh?-təa ... beauty, n (with cont. 4 suffix)
 2 tsəh?-pu" ... beautiful, adj.
 3 'tsokma ... grasshopper, n
 4 tsoŋ ... sell, v
 3 'tsoŋ ... onion, n
 3 'tsom ... poem, n
 2 tsoh ... hybrid animal(yak and cow)
 1 'tsohŋ ... district, province, n
 4 tsɔʔ? ... cook, v
 3 'tsɔʔ? ... argue, v
 3 'tsɔʔ?-pa" ... argument, n

tsh

- 3 'tsha ... salt, n
 3 'tsha-pu" ... nephew, n
 3 'tsha-mu" ... niece, n
 4 tshapa ... fever, heat, n
 3 'tshaŋ ... nest, n
 3 'tshaŋma ... all (used for forming plural with nouns)
 4 tsham ... pause, break, n
 3 'tsham ... meditation, n
 4 tshar/tshaa ... finish, v
 4 tshaa-pu" ... hot, adj.
 4 tshik ... burn, v
 3 'tshik ... 1. joint, n, 2. word, n
 3 'tshik-'kok 3 ... fingerring, n
 3 'tshilu? / 'tshilu ... white fat on meat
 3 'tshii ... fat, n
 3 'tshu ... vinegar, n
 3 'tshy ... be admitted, v
 4 tshe ... life, n
 4 tshe? / tshe ... date, n
 4 tshen ... 1. night, n, 2. name, n, h
 3 'tshem ... 1. tooth, n, h, 2. sew, v
 3 'tshem-po? 4 ... tailor, n
 3 'tshə ... 1. search, v, 2. vegetable, n
 4 tshə? ... 1. measure, v, 2. limit, n
 4 tshok ... gather, v(itr)
 4 tshom-'tshen 3 ... sitting room
 4 tsho?-tuh 2 [tshondy] ... meeting, n
 4 tshor/tshoo ... feel (by touch), v
 4 tshɔn ... colour, n

j

- 3 'jak ... yak, n
 3 'jaŋ ... vowel, n
 2 jahk-pu" ... nice, good, adj.
 1 'jahŋ ... again
 1 'jahŋ-pu" ... light, adj.
 1 'jahma ... temple (body part), n
 3 'jar/'jaa ... lend, v

1 'jah^r/^r'jaah ... upwards, 1 n
 3 'jaa-'la 3 ... rental, n
 4 'jihkon ... hole, n
 1 'jihki ... letter, n
 1 'jihn ... be, auxiliary v
 3 'ju ... turquoise stone
 4 juk ... 1. swing, v, 2. stick, n
 4 juk-pa" ... stick, n
 3 'juk ... throw, v
 2 juhm ... mother, n, h
 1 'juh?-pu" ... gutter, n
 1 'jyh ... country, n
 3 'jɛ? right, (op. of left)
 1 'jɛhka ... branch of a tree, n
 4 jok-pu"
 4 jok-mu" ... servant, n, f
 1 'johŋ ... come, v
 2 joh?wa / joo? ... handle of tools
 4 jɔn ... left (op. of right)
 2 jɔh? ... 1. be, have, auxiliary v, 2. parched grains, n

w

3 'wan ... power, n
 1 'wahmu ... fox, n

r

1 'rah ... 1. goat, n, 2. fence, n
 1 'rah 'sih? ... get drunk, v
 2 rahk ... get, v
 1 'rahp ... best (lit.), adj.
 2 rihkpa ... idea, n
 1 'rihŋ-pu" ... long, adj.
 1 'rihn ... price, n
 2 rihm ... epidemic, n
 1 'rihmu ... drawing, n
 2 rih? ... mountain, n
 2 rih?-'tse 3 ... mountain peak, n
 2 rih?pon ... rabbit, n
 4 rii ... cause to fall over, v(tr)
 2 rihih ... fall over, v(itr)
 4 ru^{ko}? ... bone, n
 2 ruhm ... carpet, n
 2 ruhm-'tehn 1 ... rug, n
 2 ruh? ... line, n
 2 ryh ... rot, v
 1 'rehpa ... hope, n
 1 'reeh ... depend on, v
 4 re ... tear, v(tr)
 2 reh ... tear, v(itr)
 2 reh? ... 1. material, cloth, n, 2. be, have, auxiliary v
 2 reh?-tɕa ... all kinds of cloth (with cont. 4 suffix)

2 roh ... corpse, n
2 rohk ... help, n
2 rohk-pa" ... companion, helper, n
2 rohk-rahm 2 ... assistance, help, n

1

3 'la ... payment, wages, n
3 'lak ... lose, v
3 'laŋ ... bull, ox, n
3 'laŋko? ... ox, n
3 'laŋpa ... steam, n
3 'lap ... 1. wave, n, 2. teach, v
3 'lap-'təh 1 ... school, n
4 lama / 2 lahma ... lama (buddhist priest)
2 lah ... mountain pass, n
2 lah-tsham 2 ... end point of pass
2 lahk-'thii 3 ... palm of hand, n
2 lahkpa ... hand, n
1 'lahŋ ... get up, v(itr)
2 lahp-'taah 1 ... grater, n
2 lahp-çə? 4 ... grater, n
1 'lahp ... say, v
2 lahpu ... radish, n
1 'lahmka? / 'lahŋka? ... road, n
2 lahma / 4 lama ... lama (buddhist priest)
4 liŋka ... picnic, park, n
1 'lih ... naspatti (a pear like fruit), n
3 'lu ... 1. song, n, 2. dwarf, n
3 'lu-çəh 2 ... song, n
3 'luk ... pour, v
2 luhk ... sheep, n
2 lyh ... body, n
1 'lyh ... boil over, v
2 lyh? ... fertilizer, n
4 len / 2 lehn ... take, v
2 lehn ... answer, n
3 'lepa ... brain, n
4 læ? ... arrive, v
3 'ləpa ... thigh, n
1 'ləh? ... karma, n
1 'ləh?-'çə? 3 ... working quarters, n
1 'ləhka ... work, n
3 'lo ... 1. cough, n, 2. happy mind, n
4 lok ... 1. return, v(tr) 2. read, v, 3. electricity, n
3 'lop-'pən 3 ... religious teacher, n
3 'lowa / 'loo ... lungs, n
2 loh ... age, year, n
2 loh-koh 2 [lɔŋgo] ... beginning of year
2 lohk ... return, v(itr)
2 lohŋ ... 1. grow, v, 2. become blind, v
2 lohŋ-pa" ... blind person
1 'lohŋpa ... country, n

- 2 lohma ... leaf, n
2 lohr ... Tibetan paper money

l

- 4 l̥a ... god, n
3 'l̥am ... shoe, n
4 l̥a-'sa / l̥e-'sa ... Lhasa
3 l̥o ... south, n

p

- 4 pa ... meat, n
4 pa-t̥eh? 2 [paŋd̥e?] / pa-m-t̥eh? [pamd̥e?] ... fried rice with meat
4 pa-'t̥hih ... meat knife
4 pa-tak 4 ... birth mark
4 pa-toh? 2 [paŋd̥o?] ... flesh colored
4 pa-n-khjak 4 [paŋkʰja?] ... frozen meat
4 pa-kho 4 [pakʰo] ... meat soup
4 pa-pa? 4 ... meat and parched flour
4 pa-tsihn 2 [paŋdz̥i:] ... meat fork
3 'pak ... 1. split, v(tr) 2. die, v, h
3 'paŋ ... nose, n, h
3 'pam(-la) ... lowest place in rank, l n
3 'pa? ... living quarters, monk's quarters
4 pawa/paa ... deer, n
4 par ... east, n
1 'pah ... hat, n
1 'pahk ... 1. split, v(itr) 2 put, v
2 pahk-'sa 3 ... overnight place
2 pahkpo ... hight (used when counting nights)
2 pahŋ ... build, v, h
2 pahŋka ... width, n
1 'pahp ... leg, n, h
1 'pahp-'t̥chen 3 ... barefoot, h
1 'pah-mu" ... hat, n
1 'pah? ... fat film on liquids
2 pahla ... floor, n
3 'pei ... die, v
3 'peik ... louse, n
4 pika ... habit, n
4 piŋ ... wood, n
4 piŋ-'kok 3 ... bark, n
4 piŋ-to? 4 ... fruit, n
4 piŋ-tohŋ 2 ... tree, n
4 piŋ-nah? 2 ... deep forest
4 piŋ-tse? 4 ... wooden scaffold for playing
4 piŋ-soh 2 ... carpentry, n
4 piŋ-soh? 2 ... carpenter, n
4 pin / pen ... know, v
2 pih ... bow (for shooting), n
1 'peh-'thuk 3 ... thick soup, n, h
2 piŋ / piŋka ... field, n

- 2 ʃihŋ-pa" ... field worker, n
 2 ʃihŋ-'ləhk 1 ... field work, n
 2 ʃihŋ-'sa 1 ... place for a field
 2 ʃihm-pu" ... good, tasty (of food), adj.
 1 'ʃihmi ... cat, n
 1 'ʃih? ... four, nu
 4 ʃuku ... paper, n
 3 'ʃup ... sheath, n
 3 'ʃuk ... strength, power, n
 1 'ʃuh-'maah 1 ... light, n
 2 ʃuhk ... sit, stay, v, h
 2 ʃuhk-'ŋe? 3 ... pillow, n, h
 2 ʃuhk-ʃihŋ 4 ... wood, n, h
 2 ʃuhk-ʃihŋ 2 ... field, n, h
 1 'ʃuhku ... tail, n
 1 'ʃəŋŋ ... government, n
 1 'ʃuh?-'luk 3 ... pot with curds, n
 1 'ʃuhr/'ʃuuh ... melt, v
 4 ʃy? ... ~~hit~~, v peel, v < 1 'ʃyh?... hit, v
 4 ʃen / ʃin ... know, v
 4 ʃeeko [ʃe?go] ... mirror, n
 4 ʃer/ʃee ... glass, n
 4 ʃee-tam 4 [ʃe?tam] ... bottle, n
 1 'ʃehp-thum 4 [ʃəptu?] ... spoon, n, h
 1 'ʃeh? ... be afraid, v
 1 'ʃeeh ... take, v, h
 4 ʃe? ... 1. tell, v, 2. grate, v, 3. fat, well kept
 (of animals)
 4 ʃe?-mu" ... fat, well kept animal
 2 ʃeh ... song, n
 1 'ʃeh ... mouth, n, h
 1 'ʃeh-'kahm 1 ... peas, n, h
 1 'ʃeh-'kohn 1 ... egg, n, h
 1 'ʃeh-kham 4 [ʃek^ham] ... peach, n, h
 1 'ʃeh-tʃok 4 ... towel, n, h
 1 'ʃeh-tʃeh? 2 [ʃeŋde?] ... rice, n, h
 1 'ʃeh-tahn 2 [ʃeŋdʌŋ] ... complexion, n, h
 1 'ʃeh-tham 4 [ʃeda?] ... cigarette, n, h
 1 'ʃeh-'phahk 1 ... bread, n, h
 1 'ʃeh-mohm 2 [ʃemɔ?] ... kind of food, h (cf. mohmo?)
 1 'ʃeh-tsam 4 ... barley flour, n, h
 1 'ʃeh-'tson 3 ... onion, n, h
 1 'ʃeh-'tshe 3 ... vegetables, n, h
 1 'ʃeh-jʃh? 2 ... parched grains, n, h
 1 'ʃeh-rch? 2 ... face, n, h
 1 'ʃeh-'la? 3 ... food, n, h
 1 'ʃeh-lahp 2 ... radish, n, h
 1 'ʃeh-ʃu 4 ... apple, n, h
 1 'ʃeh-'ʃoh? 1 ... 1. potato, n, h, 2. curds, n, h
 1 'ʃeh-'ohm 1 [ʃeo?] ... milk, n, h
 2 ʃehlum ... round, closely woven basket, n
 1 'ʃeh-'sa 3 ... honorific

4 ɸo ... dice, n
 4 ɸoŋ ... cry, v, h
 4 ɸoʔ ... come, imp. v
 4 ɸor/ɸoo ... escape, get loose, v(itr)
 2 ɸohke? ... morning, n
 1 'ɸohko? ... potato, n
 2 ɸoh?-'ŋa 3 ... coin of five units
 2 ɸoh?-'ŋihm 1 [ɸoʔ'ŋiʔ] ... sun, n, h
 2 ɸoh?-tchah 2 ... morning tea, n
 2 ɸoh?-'meh 1 ... fire, n, h
 1 'ɸoh? ... curds, n
 4 ɸɸ?(-la) ... below, l n
 3 'ɸɸ? ... throw out (e.g. water, dust), v
 2 ɸɸhn ... 1. ride, v 2. young, adj.
 1 'ɸɸh? ... milk, v

s

3 'sa ... earth, n
 3 'sa-tɸa ... place, n (with cont. 4 suffix)
 3 'sa-toh? 2 [sandɸʔ] ... earth coloured
 3 'sa-n-tsham 4 ... boundary of a territory
 4 sak ... store, save, v
 4 saŋ ... evergreen leaves (used as incense)
 4 saŋ-'ŋihn 1 ... tomorrow
 4 sar-/saa-pa" ... new, adj.
 1 'sahk ... drop, v
 2 sahŋ ... copper, n
 2 sahŋ-pu" ... kind, adj., good person, n
 2 sahmpa ... bridge, n
 1 'sahr-pu" ... steep, adj.
 4 si? ... politics, n
 2 sihŋ-tuh? 2 ... fighting, n
 2 sihpa ... dew, n
 2 sihm ... 1. catch, v, 2. sleep, v, h
 2 sihm-tɸe? 4 ... bed covers, n
 2 sihm-'tʃhi 3 ... bed, n, h
 2 sihm-pɸ? 4 ... incense stick, h
 2 sihm-'sa 3 ... sleeping place, n
 2 sih? ... 1. look, v, h 2. buy, v, h 3. leopard, n
 1 'sih? ('rah 'sih?) ... get drunk, v
 3 'su ... who, qw
 4 sum ... three, nu
 1 'suhk ... 1. body, n, 2. pain, n
 1 'suhk-pu" ... body, figure, n
 2 suhr/suuh ... edge of table, corner, n
 2 suhr-ŋehn 2 ... observer, n
 2 suhr-sum 4 ... triangle, n
 2 suhr-'ɸih? 1 ... rectangle, n
 3 'syn ... be a nuisance, v
 4 sy? ... churn, v
 3 'seka ... crack, n
 4 seŋ-'kjuuh 1 ... news, n

4 sem ... mind, n
 4 sem-'tphen 3 ... animal, n
 4 ser/see ... gold, n
 1 'seh? ... hold out to receive, v
 2 sehr/seeh ... 1. nail, n, 2. ray, n
 2 seeh ... say, v
 4 see-'njuk 3 ... golden pen
 4 see-'thi 3 [se?di] ... golden throne
 4 see-toh? 2 [sendo?] ... golden colour
 4 see-pu" [se?bü] ... yellow, adj.
 4 se? ... 1. kill, v, 2. son, h, n
 4 se?-mu" / ' ?-mu" ... princess, n
 4 se?mu ... fingernail, n
 2 seh? ... eat, v
 4 so' ... tooth, n
 4 soŋ ... 1. voice, n, h, 2. say, v, h
 4 somu ... aunt, n
 4 so? ... all these, etc.
 2 soh-ra 4 ... sickle, n
 2 soh? ... eat, imp. v
 4 sɔ-tɔk 4 ... table, n, h
 4 sɔ-tɔhah 2 ... tea, n, h
 4 sɔ-'maah 1 ... butter, n, h
 4 sɔ-rə? 4 ... honorific expression for giving
 4 sɔn ... seed, n
 3 'sɔ? ... 1. feed, v, 2. worship, v
 3 'sɔ?-pa" ... 1. worship, n, 2. fresh, adj.
 2 sɔh? ... build, v

h

3 'ha-'khoh 1 ... know, understand, v
 4 ham-'kok 3 ... shoe, n
 3 'hampa ... lie, n

a

4 aku ... paternal uncle
 3 'atpa? ... elder sister
 4 atpo? ... towel, n
 4 ani ... and then
 4 ani? ... nun, n
 3 'am-tɔk 4 ... ear, n
 4 ama ... mother, n
 4 amon ... camel, n
 4 a?ton ... yawn, n
 --- 'kjahp ... yawn, v
 4 a?pa ... child, n, h
 4 a?ra / ɛ?ra ... mustache, n
 3 'ara? ... whisky, liquor, n
 4 a?lon ... earring, n
 4 apan ... maternal uncle, n

u

4 u? ... head, n, h
4 u?-ʈa 4 ... hair, n, h
4 u?-'ʕah l ... hat, n, h
3 'u? ... breath, n

ε

4 ε?ra / a?ra ... mustache, n

o

l 'ohma ... milk, n
l 'oh?(-la) ... beneath, l n

φ

l 'φh? ... light, brightness, n

2.2. Suffix morphemes

This section lists all the suffixes whose tonal behaviour has been examined for the purpose of this study. Other features which are relevant for the understanding of the tonal behaviour are briefly mentioned as well. The number on the right hand side of the page refers to the examples given at the end of this section. These illustrate the use of the particular suffix.

Distinctive suffixes.

Contour 1

- | | | |
|----------|--|-----|
| - 'tyh | suffixed to verb stems: time duration
participle | 26a |
| - 'kjuh | suffixed to verb stems: a nominalizing
suffix | 26b |
| - 'koh | suffixed to verb stems: expresses obligation
or wish, depending on which auxiliaries are used | 26c |
| - 'tsahŋ | suffixed to verb stems: reason participle | 26d |

Contour 2

- | | | |
|-------|--|-----|
| -neh | nominal postposition: 'from'
verbal postposition: sequence action participle. | 27a |
| -sohŋ | suffixed to verb stems: past tense; may also
be an auxiliary verb stem | 27b |
| -tsoh | a plural suffix; in the speech of my main
informant only used with pronouns and de-
monstratives; shows prenasalization which
is a regular feature of compounding occurring
before contour 2 components with an initial
stop (cf. section 2.4.2.) | 27c |

Contour 3

- 'taŋ suffixed to verb stems: the way of per- 28a
forming an action

Contour 4

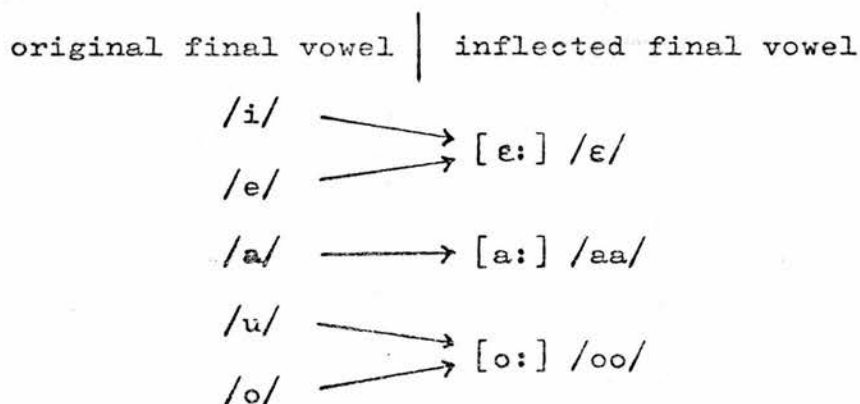
- pa verbal: perfect participle, affirmative or 29a
interrogative (past tense, used for content
questions)

- pe? verbal: interrogative suffix (past tense, 29b
used for yes/no questions)

- la nominal postposition: goal or location. 29c

With stems ending in one of the primary vowels
goal or location may alternatively be indicated
by umlaut, or by lengthening of the final vowel.

Umlaut and lengthening have the following rule
schema:



Umlaut and lengthening do not change the pitch
profile of the stems. (My informant uses umlaut
and lengthening only with the more common lexical
items. Occasionally umlaut may also occur with
stems ending in V?. The vowel changes are the
same and the glottal feature is retained.)

Contour 4, cont.

-le	nominal: comparative	29d
-a	nominalizer (for derived nouns formed with stems ending in /r/(?))	29e
-tʃa	nominal; used to form certain derived nouns from various bases	29f
-ts(a)	nominal: 'about'; vowel and consequently pitch features are frequently deleted	29g
-r(u)	verbal; a kind of causative (?); preceding stem vowel modifies vowel quality of suffix in various ways; alternatively vowel and pitch features may be deleted	29h

Assimilating suffixes.

-pa"	suffixed to verb stems: nominalizing or adjectivizing; suffixed to noun stems: secondary noun forming	30
-ma"	suffixed to various stems: secondary noun forming	31
-pu"	suffixed to various stems: secondary noun forming, nouns thus derived usually have the semantic components male and animate	32
-mu"	suffixed to various stems: secondary noun forming, nouns thus derived usually have the semantic components female and animate	33
-pu"	suffixed to certain verb and noun stems: adjectivizing	34
-mu"	alternative adjectivizing suffix for certain adjectives	35

Assimilating suffixes, cont.

-pʰʔ"	suffixed to adjective bases for superlative	36
-na"	suffixed to verb stems: conditional participle	37
-kaa"	verbal; suffixed to verb stems: purposive	38
-kɛʔ"	verbal: interrogative suffix, yes/no and content questions (present, definite intention)	39
-jaʔ"	suffixed to verb stems: nominalizing	40
-ki"	verbal: imperfective aspect participle	41
-ki"	nominal: genitive postposition; with bases ending in one of the primary vowels the genitive is indicated by umlaut or vowel lengthening; umlaut and lengthening have the following rule schema:	42

ending in one of the primary vowels the genitive is indicated by umlaut or vowel lengthening; umlaut and lengthening have the following rule schema:

original final vowel	inflected final vowel
/i/	→ [i:] /ii/
/e/	→ [e:] /ee/
/a/	→ [ɛ:] /ɛ/
/u/	→ [y:] /y/
/o/	→ [ɔ:] /ɔ/

After stems ending in V? the suffix is most often realized as -k or -ki", but it may alternatively be realized as umlaut if the vowel is /a/, /u/, or /o/. The glottal element is retained with umlaut. The pitch profile of stems which undergo umlaut remains unaffected.

Elsewhere the suffix is realized as -ki".

-k(i)" nominal: agentive postposition; after bases 43

ending in one of the primary vowels the agent is indicated by /-k/ [-?], and non-front primary vowels undergo umlaut:

original final vowel inflected for agentive

/i/ → /ik/ [i?]

/e/ → /ek/ [e?]

/a/ → /ɛk/ [ɛ?]

/o/ → /øk/ [ø?]

/u/ → /yk/ [y?]

Elsewhere the suffix is realized as -ki".

Example sets (26) -(43) give illustrative sentences for the suffixes listed above. The suffix which a particular sentence is intended to illustrate is underlined. The examples are given in phonological representation and the hyphens indicate morpheme breaks. The glosses used for the suffixes are ad hoc terms, and the following abbreviations occur:

- ag. agentive
- aux. auxiliary verb stem
- comp. comparative
- gen. genitive
- imp. a. imperfect aspect
- loc. locative
- neg. negative
- nom. s. nominalizing suffix

p.p.	past perfect
pl	plural
s.a.	sequential action
q	interrogative suffix

(26)

a. /'tshe ɳəʔ-'tyh 'num nahŋ-la ɳəʔ ./
vegetables fry-when oil in fry

'When one fries vegetables one fries them in oil.'

b. /kho lohŋ-'kjuh tuhk ./
he grow-suffix aux.

'He has still to grow.'

/kho-la seŋ-'kjuuh 'taŋ-'kjuh tuhk ./
he-to news send-suffix aux.

'He has news to send.'

c. /phəʔ-tʃah səh?-naŋ-'tyh 'khahnʃes 'tʃah?-'koh rəh? ?/
Tibetan-tea make-give-when how do-must aux.

'When you make Tibetan tea how must you do it?'

d. /puku-tih 'kjuh-k-'tsehŋ riih-pa rəh? ./
child-focus run-because fall over-p.p. aux.

'The child fell over because it ran.'

(27)

a. /phəʔ-neh ləʔ-neh loh 'khahtse tʃhin-pa rəh? ?/
Tibet-from arrive-s.a. year how many go-p.p. aux.

'How many years is it since you arrived from Tibet?'

b. /ani 'ɳihma 'tʃuhk-rəh?-tʃaik 'kak-sohŋ ./
and day six-aux.-one stop-past

'And (we) were held up for about six days.'

c. /ɳah-tsho 'thəŋ-'john-'tʃeh-'tyh kho-tsoh ləʔ-sohŋ ./
I-pl leave-come-do-when he-pl arrive-past

'When we left they arrived.'

(28)

a. /khon-ki" nan-'tan tih rah? ./
he-gen. give-suffix this aux.

'This is his way of giving.'

(29)

a. /thah kho loh_n-pa rah? ./
now he become blind-p.p. aux.

'Now he has become blind.'

/'khahre 'tshah?-neh nah-pa ? /
what do-s.a. become ill-p.p.

'Why did he become ill?'

b. /ani khesa nah-pe? ?/
and yesterday become ill-q

'And did (he) become ill yesterday?'

c. /theh-la tsih_n-'rah? tuhk-ka" , tse?-^htan 'kah_n-la./
that-loc. fort be-suffix name top-loc.

'There was a fort above Tsetang.'

d. /neh 'khanpa-le kh_o 'khanpa tche?-ki" rah? ./
my house-comp. his house big-imp.a. aux.

'His house is bigger than mine.'

e. /kar-a/
white-nom.s. 'whitewash'

/'nar-a / 'nahr-a/
sweet-nom.s. 'sweets'

f. /tseh?-t_{sa}/
beautiful-nom.s. 'beauty'

/kar-t_{sa}/
white-nom.s. 'brightness'

(29) cont.

g. /nah-tsoh 'tʰohŋ-pa" mih sum-ts jøh?-pa rəh? ./
I-pl neighbor person three-about be-p.p. aux.

'We were about three neighboring families together.'

h. /ani 'rihŋ-r(u) 'taŋ-ki" 'jihn./
and long-causative send-imp.a. aux.

'And (I) am going to make it longer.'

(30)

/'sɔʔ-pa" /

to worship-nom.s. 'worship, n'

/'ŋoh ɕen-pa" /

face know-nom. s. 'acquainted person'

/ta-pa" /

horse-suffix 'footman'

(31)

/tha-ma" /

edge-suffix 'end, limit'

/kar-ma" /

white-suffix 'star'

(32)

/'tɕhah-pu" /

bird-suffix 'cock'
~~'cook'~~

(33)

/'tɕhah-mu" /

bird-suffix 'hen'

(34)

/'pøh?-pu" /

swell up-suffix 'soft'

/'khe-pu" /

profit-suffix 'cheap'

(35)

/'nar-pu" , 'nar-mu" /
sweet-suffix sweet-suffix 'sweet'

(36)

/'khe-só?" /
cheap-superlative 'cheapest'

/'póh?-só?" /
soft-superlative 'softest'

/'kóh?-só?" /
wild-superlative 'wildest'

(37)

/sen-'kjuuh 'taŋ-na" jahk-ko" jóh?-pa reh? ./
news send-if good-suffix be-p.p. aux.

'It would be good if (he) sent news.'

(38)

/ŋah 'tshe 'ŋjóh-kaa" tchin-pa 'jihh./
I vegetables buy-purposive go-p.p. aux.

'I ^{Went} ~~am going~~ to buy vegetables.'

(39)

/thahnta par pap-ké?" ?/
now picture take down-q

'So are you going to take the picture down now?'

(40)

/'khahre 'ke?-tɕa 'tʰih-'koh reh? , 'tʰih-ja?" mi-tuhk./
what conversation ask-must aux. ask-nom.s. neg.-be

'What shall we talk about now, there is nothing to ask!'

(41)

/kheraŋ só-tɕhah sóh?-naŋ-ki" jóh?-pe? ?/
you tea, h make-give-imp.a. aux.-q

'Are you making tea?'

/khesa khon-ki" san jøh?-pa rəh? ./
 yesterday he-gen. evergreens have-p.p. aux.

'Yesterday he had evergreen leaves.'

/'tjy/ /tih 'tjy-k(i)" pakpa rəh? ./
 snake this snake-gen. skin be

'This is the snake's skin.'

/khi/ /tih khi_i 'tshan rəh? ./
 dog this dog-gen. nest be

'This is the dog's house.'

/mehle/ /tih 'məhle_ə pakpa rəh? ./
 chin this chin-gen. skin be

'This is the chin's skin.'

/lama/ /tih lamə san rəh? ./
 lama this lama-gen. evergreens be

'These are the lama's evergreen leaves.'

/puku/ /tih puky khi rəh? ./
 baby this baby-gen. dog be

'This is the baby's dog.'

/'nehtso/ /tih 'nehtsə 'tshan rəh? ./
 parrot this parrot-gen. nest be

'This is the parrot's nest.'

(43)

/khesa khon-ki" 'kahm 'juk-naŋ-sohŋ. /
yesterday he-ag. box throw-give-past

'Yesterday he threw the box away.'

/tih 'tjɥh-k(i)" 'tɕom-sohŋ. / [dʲy? / dʲy.gi]
this snake-ag. rob-past

'The snake robbed this.'

/tih khi-k 'tɕom-sohŋ. / [khi?]
this dog-ag. rob-past

'The dog robbed this.'

/tih 'meh-k 'tɕhəh?-sohŋ. / [mɛ?]
this fire-ag. do-past

'The fire did this.'

/tih lamɛ-k naŋ-sohŋ. / [lamɛ?]
this lama-ag. give-past

'The lama gave this.'

/tih puky-k 'tɕhəh?-sohŋ. / [pugy?]
this baby-ag. do-past

'The baby did this.'

/tih 'nɛhtsɔ-k 'tɕom-sohŋ. / [nɛdzɔ?]
this parrot-ag. rob-past

'The parrot robbed this.'

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Abbreviations:

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 Studies
- JAOS Journal of the American Oriental Society
- Mim. Mimeographed publication
- S.I.L. Summer Institute of Linguistics

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