CHAPTER 4

BAKEO SUPRASEGMENTAL PHONOLOGY

4.1 Stress

Stress is a suprasegmental feature of an utterance which applies to individual syllables. Stress is produced by the use of greater muscular energy with certain syllables resulting in an increase in airflow which affects pitch and loudness (Wannemacher 1996:44, review of Ladefoged 1993:249-50).

Wannemacher (1996) also states that "Tone in Tibeto-Burman languages can change due to differing stress on syllables. The effect can be small and not great enough to create contrastive tone changes, or large, causing tonal variance".

Stress in Lahu Bakeo does not have a great enough effect to create contrastive tone changes. Stress in this language is predictable. It can be divided into four types.

Type 1: If a word is monosyllabic, the primary stress occurs on that syllable. For example:

[ˈjɔ^{121}]	'sheep'
[ˈmvɯ^{343}]	'horse'
[ˈn̥vu^{343}]	'cattle'
[ˈmɔ^{121}ʔ]	'monkey'
[ˈp^{h}i^{43}]	'dog'

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[ˈŋa^{343}]	'fish'

Type 2: If a word consists of more than one syllable, the primary stress occurs on the highest tone syllable, which can be either syllable. For example:

[ˈfa^{43}ʔ.tʃa^{21}ʔ]	'rat'
[ˈja^{343}.pa^{21}]	'son'
[mə^{232}.ˈnæ^{343}ʔ]	'cat'
[pa^{3}.ˈtæ^{43}]	'rabbit'
[ˈɣa^{343}ʔ.pfɯ^{3}.qo^{24}ʔ]	'rooster'
[tʃa^{21}.ˈqu^{3}.pa^{21}ʔ]	'leopard cat'
[ʔa^{3}.ka^{43}ʔ.ˈku^{24}ʔ]	'crab'
[tʃa^{21}.ˈmæ^{232}.qa^{21}.la^{121}ʔ]	'leopard'

Type 3: If a word consists of more than one syllable and there are two syllables with equally high tones, then the one with a glottal final carries the primary stress if such a syllable occurs. For example:

[ˈfa^{43}ʔ.q^{h}a^{43}]	'brushtailed rat'
[to^{3}.n̪vu^{343}.to^{3}.ˈʃa^{43}ʔ]	'cattle'
[ʔa^{3}.ˈka^{43}ʔ.dz̪i^{343}.tʃ^{h}e^{3}]	'waterfall'

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Type 4: If a word has more than one syllable of equal tone height and both syllables are open or closed by a glottal stop, the primary stress occurs on the second occurrence of the tone. For example:

[ʔɔ^{21}.ˈʃa^{21}]	'muscle'
[la^{121}ʔ.ˈqɔ^{21}ʔ]	'hand'
[fa^{43}ʔ.ˈtʰɔ^{43}ʔ]	'spuirrel'
[pɨ^{3}.tʃʰæ^{43}ʔ.ˈnæ^{343}ʔ]	'fly'
[qʰa^{43}.nɔ^{121}.ˈpfɯ^{43}]	'back (upper)'

Therefore, the hierarchical factors which effect the occurrence of stress are as follows:

syllabic position

glottal stop

tone height

4.2 Pitch Patterns

4.2.1 Method of Analysis

For a detailed analysis of the pitch in this language, the entire word list elicited was analyzed with the computer program CECIL[9]. CECIL is a software tool used in speech analysis to help analyze stress, tone, intonation, and length, by providing accurate etic

[9] CECIL stands for Computerized Extraction of Components of Intonation in Language.

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representations or measurements[10]. Data is recorded into a tape recorder or through a microphone and entered into CECIL. In this study, CECIL is used to analyze the sound wave to give the pitch level of each utterance. A glottal stop /ʔ/ is considered as part of tone rather than a final consonant. Only /ʔ/ occurs in the syllable final position, but it occurs only with two tones, /43ʔ/ and /21ʔ/. If it was a final stop it would likely be more widely distributed with all tones. From the data produced by CECIL, it was possible to discover eighteen distinct pitch patterns on single syllables. They are as follows:

45	half-high rising	long
24	half-low rising	long
24ʔ	half-low rising	short
43	half-high falling	long
43ʔ	half-high falling	short
343	mid rising falling	long
343ʔ	mid rising falling	short
21	half-low falling	long
21ʔ	half-low falling	short
121	low rising falling	long

[10] SIL (1990), CECIL Tutorial

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121ʔ	low rising falling	short
3	mid level	long
3ʔ	mid level	short
31	mid falling	long
232	half-low rising falling	long
23	half-low rising	long
1	low level	long
1ʔ	low level	short

There are seven pitch patterns found in short syllables that have a final glottal-stop. Eleven pitch patterns are found in long open syllables. Four level pitches are found, two in short syllables and two in long syllables. There are both falling and rising pitch contours in this language. In the sample frames provided by CECIL for each pitch, the frequency in Hertz (Hz), or pitch, is indicated along the vertical axis, and the time increments are indicated in the lower right hand corner of the frame. The phonemic transcription is printed along the top of the different frames in the proper time sequence.

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4.2.2 CECIL Pitch Plots

The approximate height of each pitch is as follow[11]:

pitch 5 ~ 145 Hz

pitch 4 ~ 138 Hz

pitch 3 ~ 124 Hz

pitch 2 ~ 112 Hz

pitch 1 ~ 102 Hz

Examples of each pitch are as follows[12]:

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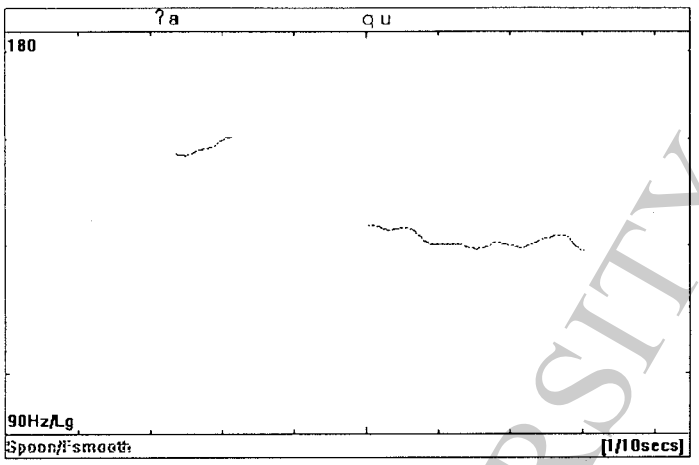
[11] These are male speakers.
[12] The graphs are actual printouts from CECIL.

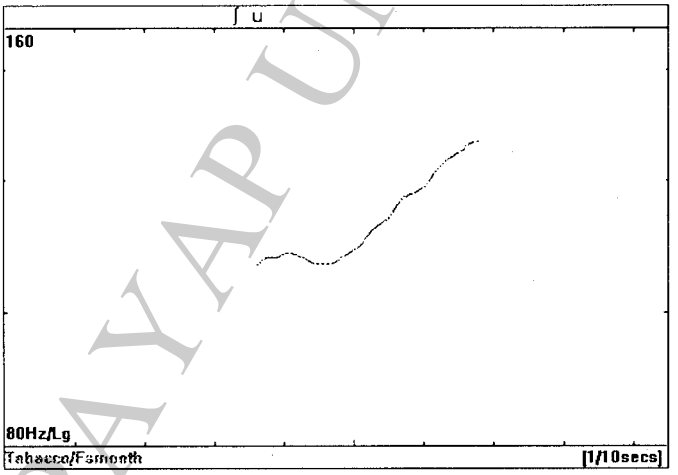
(1) 45 half-high rising long



[ʔa^{45}.qu^{3}] 'spoon'

This pitch begins at roughly 135 Hz, and rises to about 145 Hz.

(2) 24 half-low rising long



[ʃu^{24}] 'tobacco'

This pitch begins at roughly 110 Hz, and rises to about 134 Hz.

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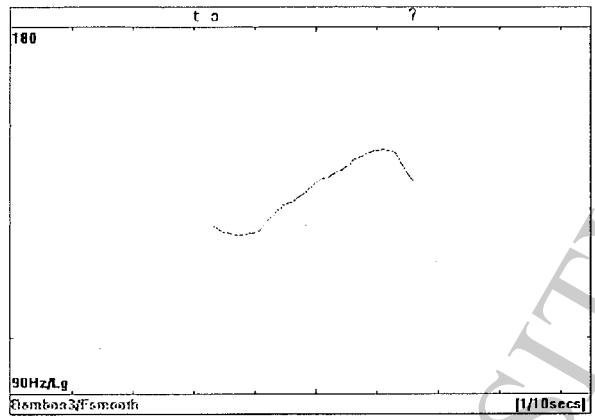
(3) 24ʔ half-low rising short

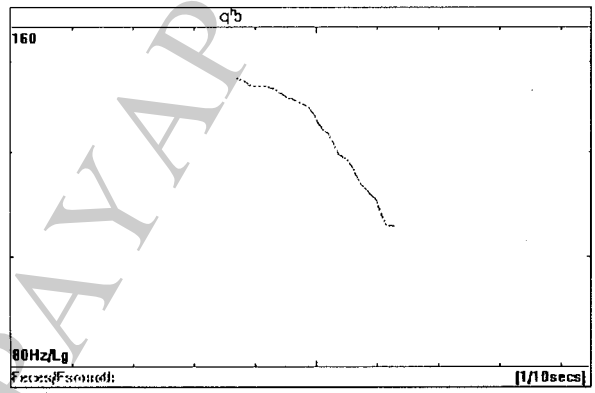


[tɔ^{24}ʔ] 'bamboo tie'

This pitch begins at roughly 117 Hz, and rises to about 135 Hz.

This shows an interesting pattern. Wannemacher states that "A syllable final incomplete glottal stop allows for some air to leak past the glottis, giving a falling pitch" (1996:117). This is also observed in Bakeo. The half-low rising short pitch pattern [24ʔ] does actually drop at the end as can be seen in the CECIL graph above.

(4) 43 half-high falling long



[qʰɔ^{43}] 'feces'

This pitch begins at roughly 140 Hz, and falls to about 121 Hz.

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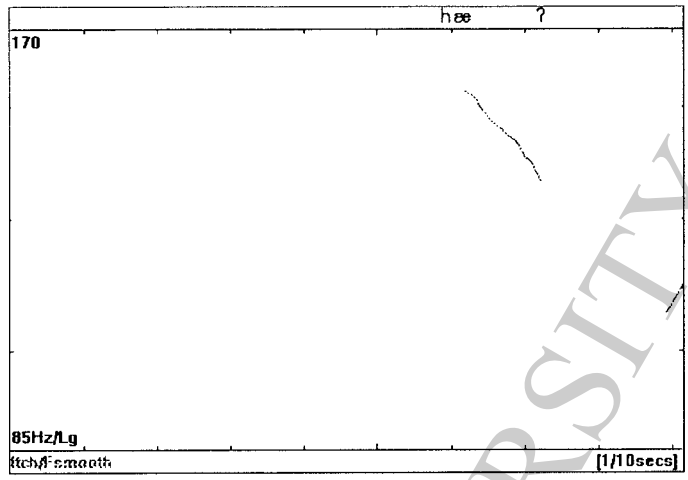
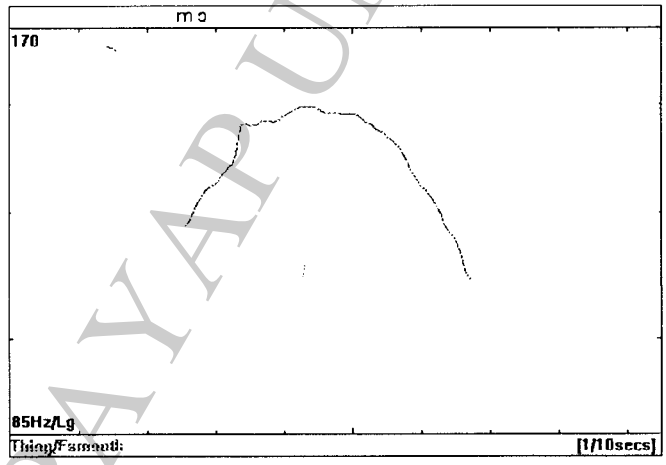
(5) 43ʔ half-high falling short



[hæ^{43}ʔ] 'itch'

This pitch begins roughly at 141 Hz, and falls to about 133 Hz.

(6) 343 mid rising falling long



[mɔ^{343}] 'thing'

This pitch begins roughly at 121 Hz, and rises to about 141, then falls to about 118 Hz.

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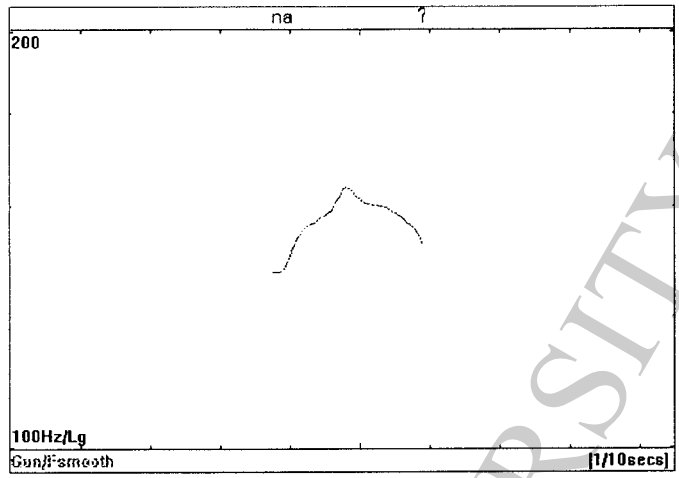
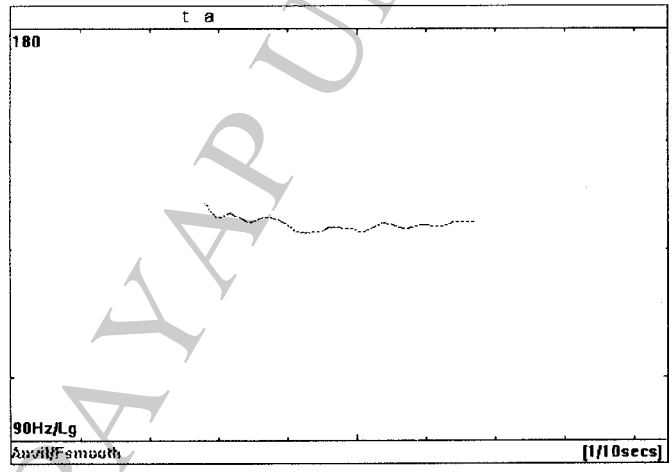
(7) 343ʔ mid rising falling short



[na^{343}ʔ] 'gun'

This pitch begins roughly at 129 Hz, and rises to about 142, then falls to about 132 Hz.

(8) 3 mid level long



[ta^{3}] 'anvil'

This pitch begins roughly at 123 Hz.

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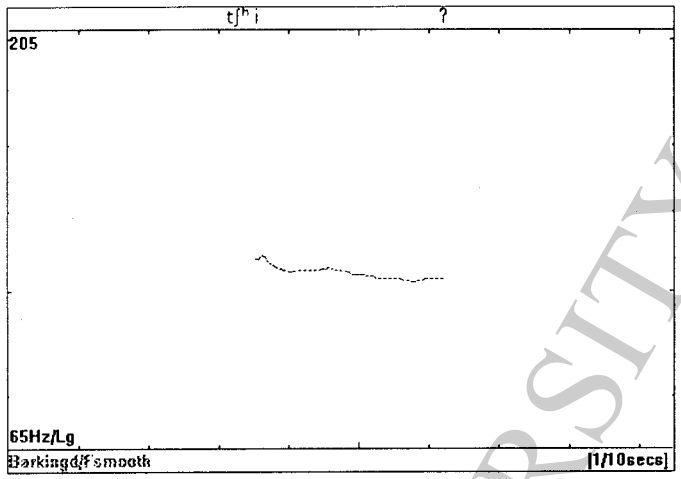
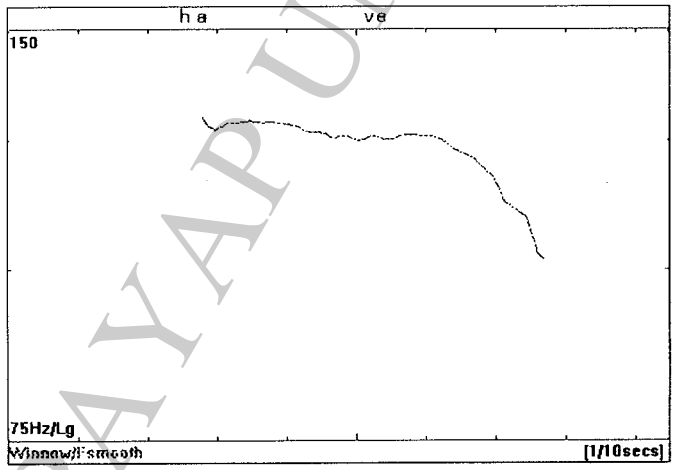
(9) 3ʔ mid level short



[tʃi^{3}ʔ] 'barking deer'

This pitch begins roughly at 120 Hz.

(10) 31 mid falling long



[ha^{3}.ve^{31}] 'winnow'

This pitch begins roughly at 121 Hz, then falls to about 100 Hz.

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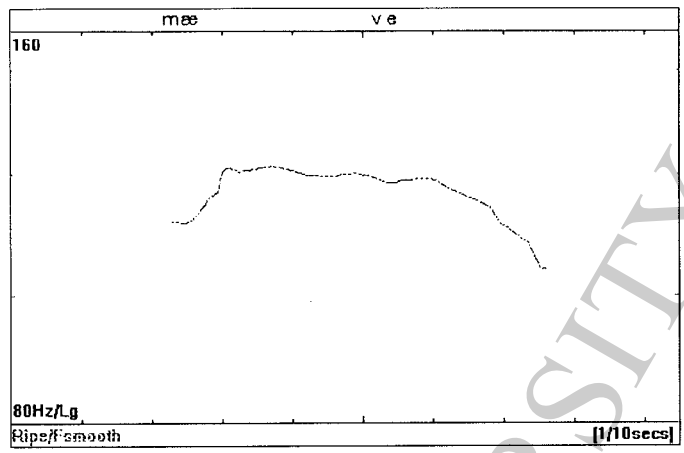
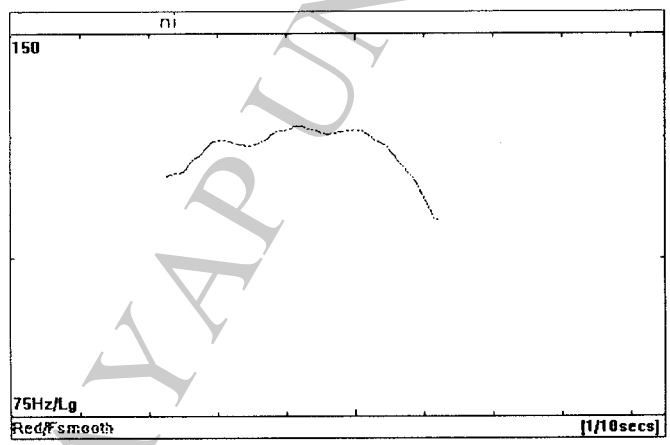
(11) 23 half-low rising long



[mæ^{23}.ve^{31}] 'sit'

This pitch begins roughly at 112 Hz, then rises to about 125 Hz.

(12) 232 half-low rising falling long



[ni^{232}] 'red'

This pitch begins roughly at 111 Hz, and rises to about 123, then falls to about 109 Hz.

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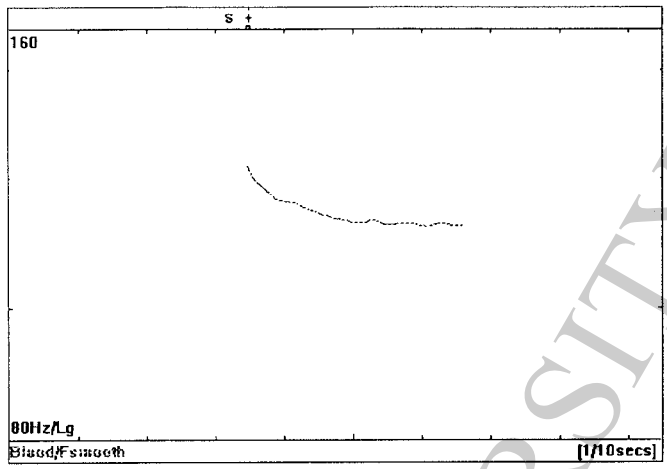
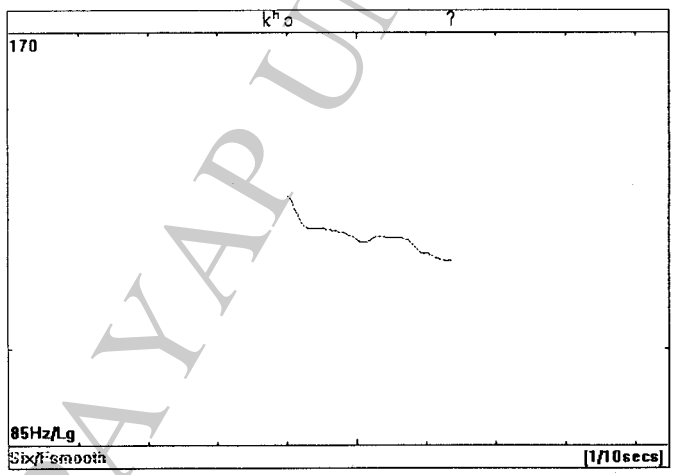
(13) 21 half-low falling long



[sɨ̤^{21}] 'blood'

This pitch begins roughly at 113 Hz, then falls to about 99 Hz.

(14) 21ʔ half-low falling short



[kʰɔ^{21}ʔ] 'six'

This pitch begins roughly at 112 Hz, then falls to about 102 Hz.

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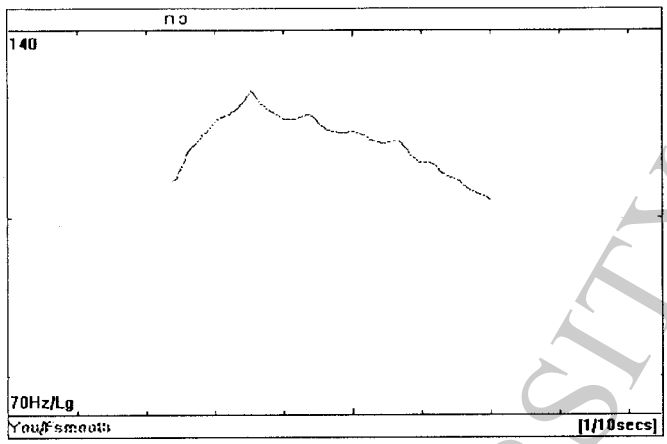
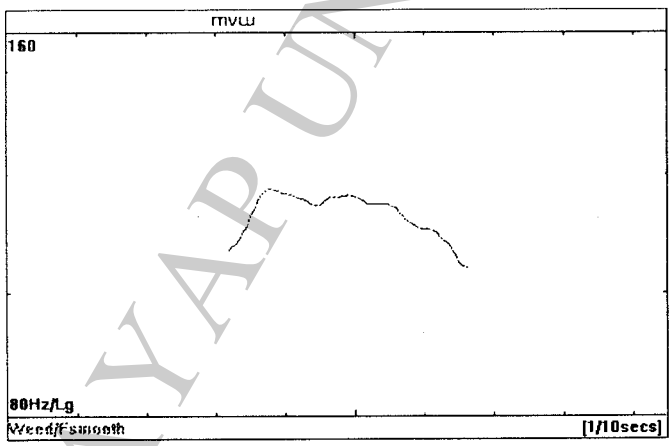
(15) 121 low rising falling long



[nɔ^{121}] 'you'

This pitch begins roughly at 102 Hz, and rises to about 113, then falls to about 100 Hz.

(16) 121ʔ low rising falling short



[mvɯ^{121}ʔ] 'weed'

This pitch begins roughly at 104 Hz, and rises to about 115, then falls to about 105 Hz.

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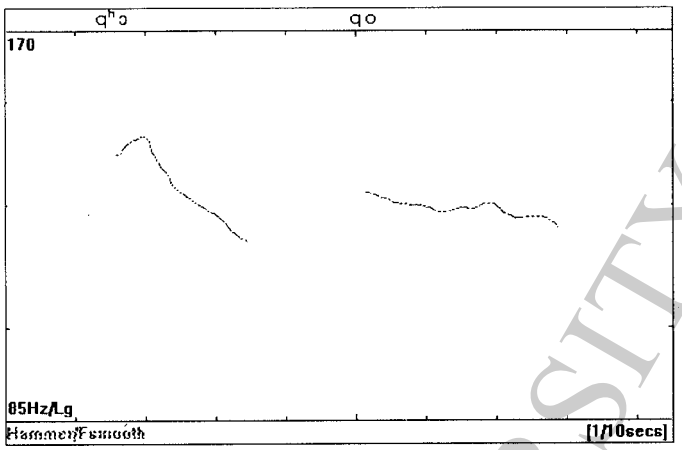
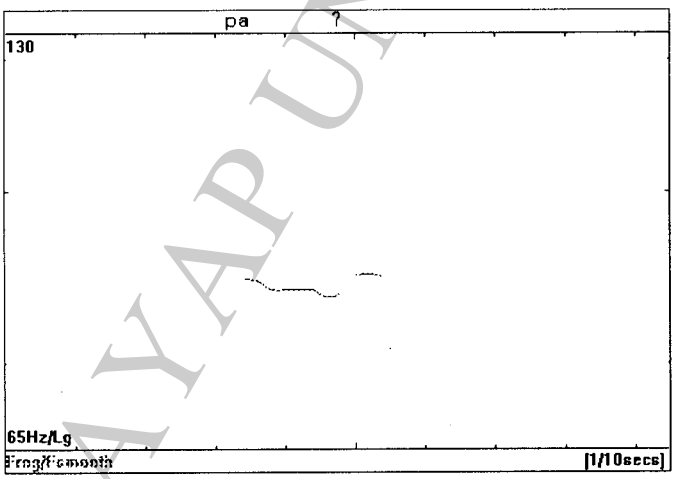
(17) 1 low level long



[qʰɔ^{21}.qo^{1}] 'hammer'

This pitch begins roughly at 102 Hz.

(18) 1ʔ low level short



[pa^{1}ʔ] 'frog'

This pitch begins roughly at 100 Hz.

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4.3 Tonal Processes

Some details of Bakeo pitch patterns can be explained on the basis of tonal processes related to such factors as the position of the syllable in an utterance, the pitch of a contiguous syllable or the voicing of the initial consonant in the syllable.

Consonant types in Tibeto-Burman languages affect tone height and contour (Wannemacher 1996). Matisoff states that "The development of tones in the Lolo-Burmese languages has been influenced primarily by the manner of articulation of the syllable initial consonant." (1973b:21). Voiced initials tend to correspond with lower pitch and voiceless initials tend to correspond with higher pitch at the beginning of a syllable. Wannemacher 1996:335) claims,

> "One explanation for the effect of initial consonant voicing on tone is based on differences in sub-glottal pressure and airflow associated with different glottal apertures. Airflow through a constriction in a tube causes a vacuum at the point where air enters the tube. The higher the airflow, the greater the vacuum pressure. This is called the Bernoulli effect. The Bernoulli effect produces a negative pressure on air in the lungs as air passes through the larynx. A spread glottis allows less impeded and swifter airflow and hence an increase in the Bernoulli effect. The increase and decrease in pitch related to voicing is caused by variations of pressure caused by the Bernoulli effect. A syllable initial voiceless or aspirated segment with modal voice has a spread glottis and induces a large Bernoulli effect. The high rate of airflow vibrates the vocal folds at a higher frequency as they come together for voicing on the following glide or vowel. Ohala states that "Upon release of a voiceless aspirated consonant... the rate of air flow is initially very high, since there is momentarily little resistance to the air flow at the open glottis or in the oral cavity. Thus when the vocal cords do adduct for voicing they meet a very high rate of air flow and consequently vibrate at an initially high rate, gradually returning to their "normal" rate of vibration." (1973:8). A voiced initial, however, decreases airflow through the glottis due to the greater glottal constriction necessary for voicing and does not allow a large Bernoulli effect. The rate of vibration of the vocal folds during the production of

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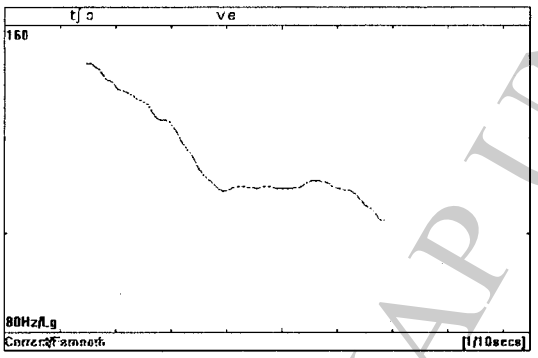
the following vowel is not markedly increased and lower pitch results (Ladefoged 1972)."

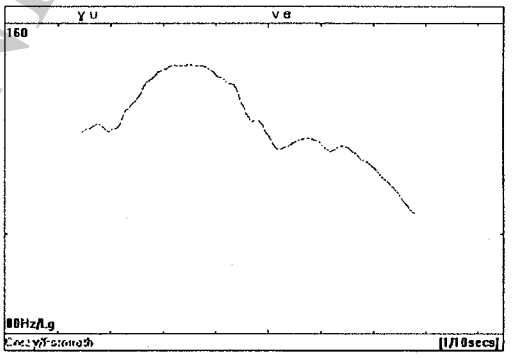
This pattern is evident in Lahu Bakeo tone patterns.

Half-high falling long pitch pattern /43/ occurs only in a syllable which has a voiceless initial consonant, while mid rising falling long pitch pattern [343] occurs only in a syllable which has a voiced initial consonant. Note the examples below.

[hɔ^{43}]	'heavy'	[mvɯ^{343}]	'horse'
[t^{h}æ^{43}]	'one'	[læ^{343}]	'python'
[tʃɔ^{43}.ve^{31}]	'correct'	[ɣu^{343}.ve^{31}]	'crazy'
[tɔ^{43}.k^{h}ɔ^{43}]	'language'	[n̥vu^{343}.q^{h}ɔ^{43}]	'mucus'



[tʃɔ^{43}.ve^{31}] 'correct'



[ɣu^{343}.ve^{31}] 'crazy'

The two pitch patterns, then, are analyzed as variants of a single emic tone /43/. This process can be expressed as:

43 ⟶ 343 / [voiced initial consonant]

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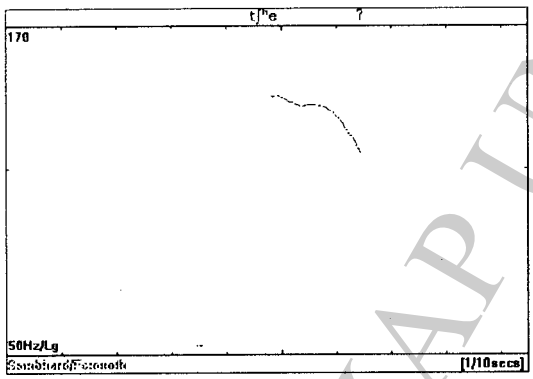
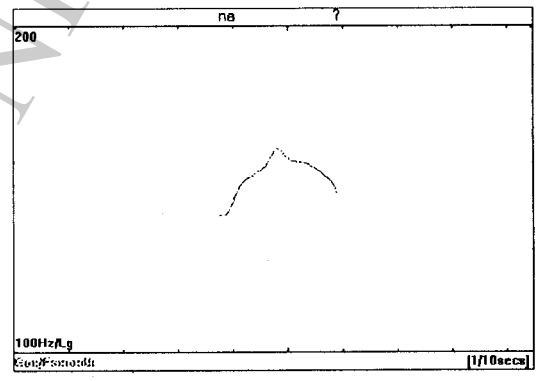
This is an example of voiced initial consonant causing lower pitch syllable initially (see section 4.3).

The same process occurs in relation to the half-high falling short pitch pattern /43ʔ/ and the mid rising falling short pitch pattern [343ʔ]. The half-high falling short pitch pattern /43ʔ/ occurs only in a syllable which has voiceless initial consonant, while mid rising falling short pitch pattern [343ʔ] occurs only in a syllable which has a voiced initial consonant. Note the examples below.

[qʰa^{43}ʔ]	'village'	[ŋa^{343}ʔ]	'bird'
[hæ^{43}ʔ.ve^{31}]	'itch'	[ɣɔ^{343}ʔ]	'stir'
[tʃʰe^{43}ʔ]	'sambhar deer'	[kʰæ^{43}.pæ^{43}.læ^{343}ʔ]	'dish'





[tʃʰe^{43}ʔ] 'sambhar deer' [na^{343}ʔ] 'gun'

The two pitch patterns, then, are analyzed as variants of a single emic tone /43ʔ/.

This process can be expressed as:

43ʔ ⟶ 343ʔ / [voiced initial consonant]

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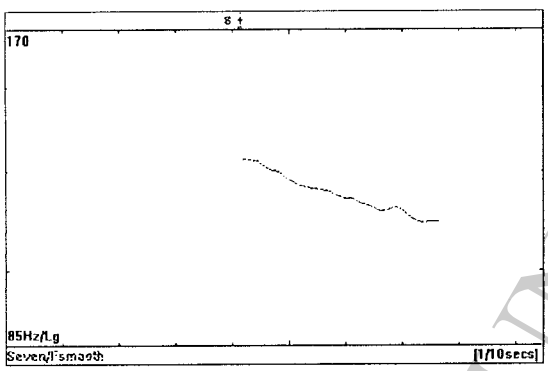
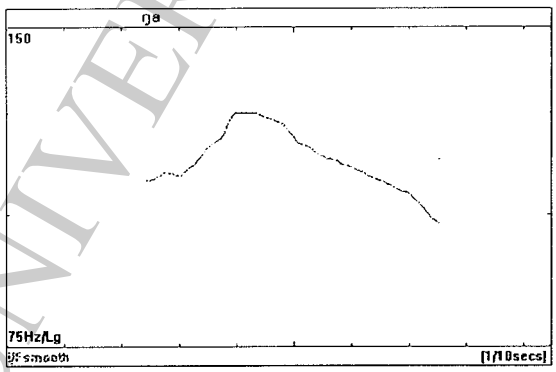
This is another example of a voiced initial consonant causing lower initial pitch.

Half-low falling long tone /21/ occurs only in a syllable which has a voiceless initial consonant, while low rising falling long pitch pattern [121] occurs only in a syllable which has a voiced initial consonant. Note the examples below.

[sɨ̤^{21}]	'seven'	[ŋa^{121}]	'I'
[hɔ^{21}.ve^{232}]	'cry'	[la^{121}.ve^{232}]	'come'
[pə^{21}.ve^{232}]	'to comb'	[ju^{121}.ve^{232}]	'catch'





[sɨ̤^{21}] 'seven' [ŋa^{121}] 'I'

The two pitch patterns, then, are analyzed as variants of a single emic tone /21/.

This process can be expressed as:

21 ⟶ 121 / [voiced initial consonant]

This is another example of a voiced initial consonant causing lower initial pitch.

The same process which occurs in relation to a half-low falling long tone /21/ and a low rising falling long pitch pattern [121], also occurs with a half-low falling short

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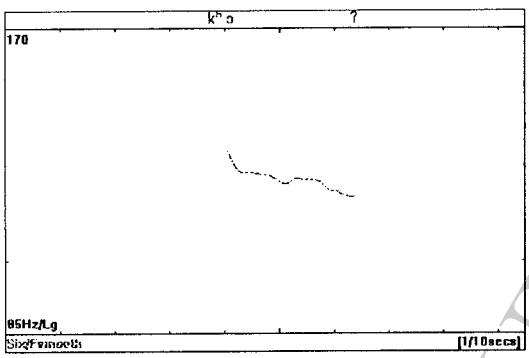
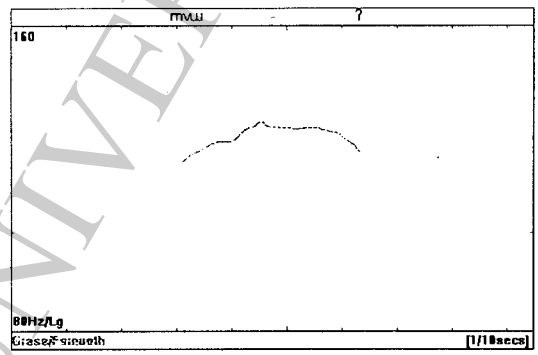
tone /21ʔ/ and a low rising falling short pitch pattern [121ʔ]. The half-low falling short tone /21ʔ/ occurs only in a syllable which has a voiceless initial consonant, while low rising falling short pitch pattern [121ʔ] occurs only in a syllable which has a voiced initial consonant. Note the examples below.

[kʰɔ^{21}ʔ]	'six'	[mvɯ^{121}ʔ]	'grass'
[tʃʰɔ^{21}ʔ]	'hear'	[lo^{121}ʔ.ve^{232}]	'enter'
[pæ^{21}ʔ.ve^{232}]	'be'	[və^{121}ʔ.ve^{232}]	'wear (clothes)'



[kʰɔ^{21}ʔ] 'six'



[mvɯ^{121}ʔ] 'grass'

The two pitch patterns, then, are analyzed as variants of a single emic tone /21ʔ/.

This process can be expressed as:

21ʔ ⟶ 121ʔ / [voiced initial consonant]

This is another example of a voiced initial consonant causing lower initial pitch.

Voiced initials tend to correspond with lower pitch and voiceless initials tend to correspond with higher pitch at the beginning of a syllable. This is because when we

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produce voiceless initial consonants, vocal folds are spread which causes air passes through faster. Therefore, vocal folds vibrate faster and cause to start with a higher pitch on the vowel. On the other hand, when we produce voiced initial consonants, vocal folds close together which causes air passes though slower. Therefore, vocal folds vibrate slower and cause to start with lower pitch on the vowel.

For a mid level long tone /3/, there are four variants. If it occurs in a syllable with a voiceless initial consonant, it will be tone /3/. If it occurs in a syllable with a voiced initial consonant, it has three variants as follow:

1. If it occurs after tone /3/ or higher, it becomes [31], if word final.
2. If it occurs after a pitch which is lower than /3/, it becomes [232].
3. If it occurs after a pitch which is lower than /3/ and occurs before a pitch [31], it becomes [23]. The pitch does not fall due to assimilation to the following [31].

Mid falling long pitch pattern [31] occurs only in the final syllable of an utterance which has a voiced initial consonant which follows a higher or same pitch level, as in the examples below:

[$q^ha^{21}.ma^{23}.le^{31}$] 'how much'

[$ha^3.ve^{31}$] 'winnow'

[$te^{43}.gæ^{31}$] 'together'

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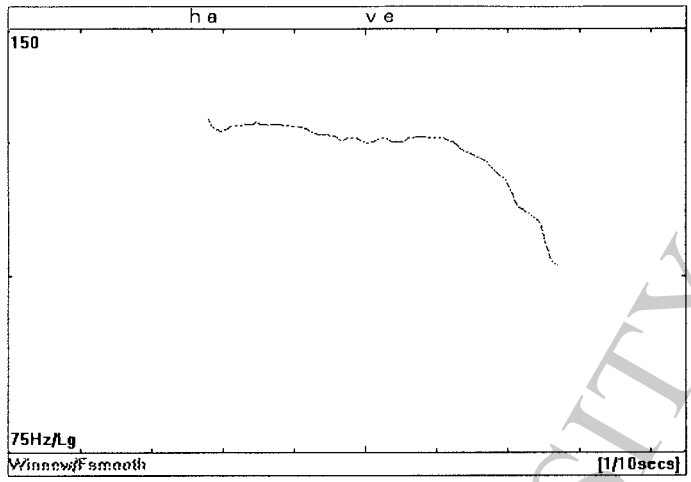

[ha^{3}.ve^{31}] 'winnow'

The two pitch patterns, then, are analyzed as variants of a single emic tone /3/. This process can be expressed as:

3 ⟶ 31 / [3 or higher pitch]___

Half-low rising falling long pitch pattern [232] occurs only in a voiced initial consonant syllable which occurs after a pitch lower than /3/ but not before a [31]. Examples are shown below.

[te^{21}ʔ.ve^{232}] 'alive'

[ni^{232}] 'red'

[və^{121}ʔ.ve^{232}] 'wear (clothes)'

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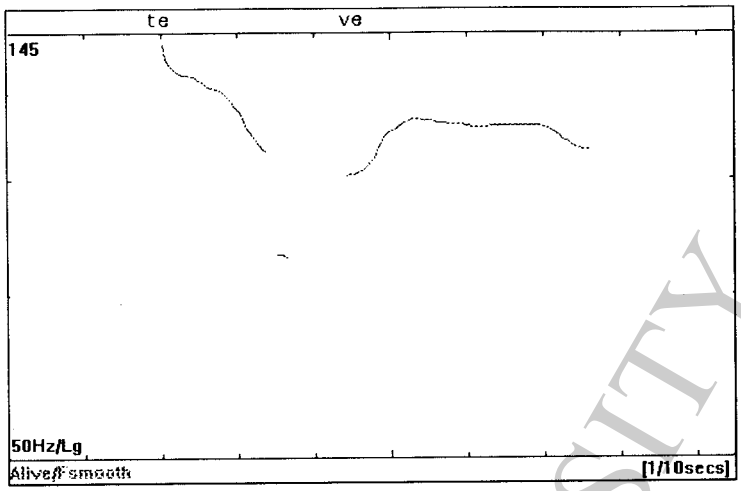

[te^{21}ʔ.ve^{232}] 'alive'

The two pitch patterns, then, are analyzed as variants of a single emic tone /3/. This process can be expressed as:

3 ⟶ 232 / [lower than 3] __

This is another example of a voiced initial consonant causing lower initial pitch.

There is another allotone of the mid level tone. A half-low rising long pitch pattern [23] occurs in a syllable with a voiced initial consonant which is preceded by a pitch lower than /3/ and followed by a mid falling long pitch pattern [31], as in the examples below:

[na^{23}.ve^{31}] 'listen'

[mə^{23}.ve^{31}] 'sit'

[q^{h}a^{21}.ma^{23}.le^{31}] 'how much'

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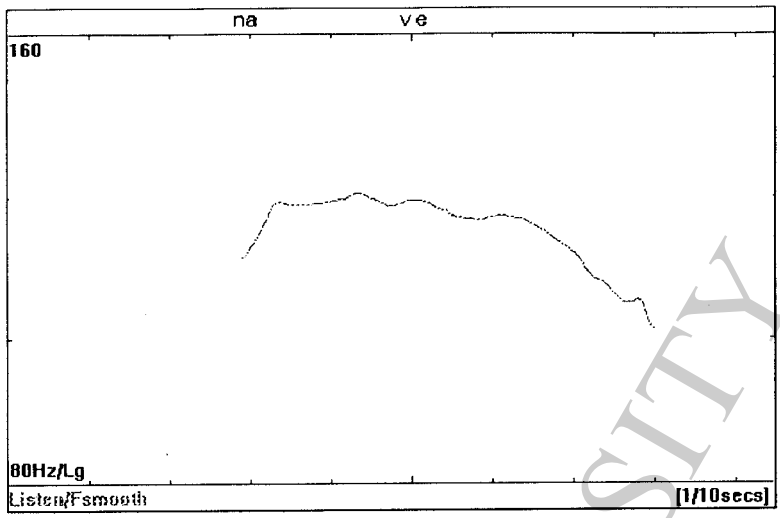

[na^{23}.ve^{31}] 'listen'

This process can be expressed as:

3 ⟶ 23 / __ [31] #

This is another example of a voiced initial consonant causing lower initial pitch.

Therefore, the tone /3/ has the following pitch variants.

3 ⟶ 31 / [3 or higher pitch] __

232 / [pitch lower than 3] __ vd C_i

23 / __ [31] # vd C_i

There are some words which the same speaker pronounces with different pitches on different occasions. Some words with mid level long tone /3/ may have an allophone of mid level short pitch pattern [3ʔ]. Note examples below.

[t^{h}æ^3] [t^{h}æ^{3}ʔ] 'skirt'

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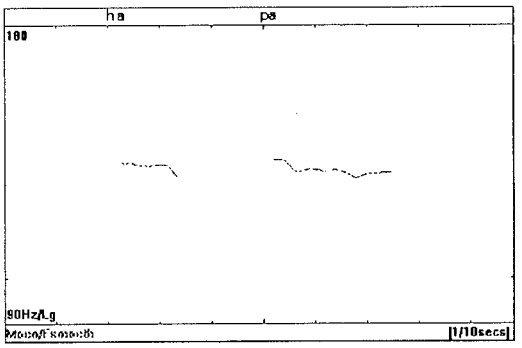
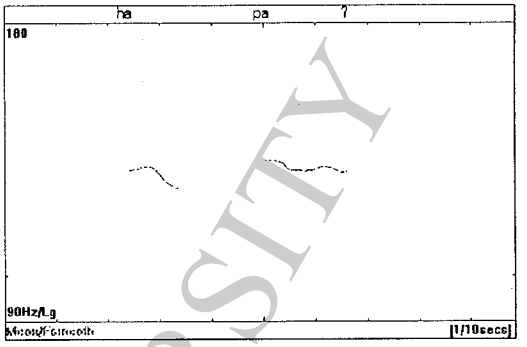
[ha^{3}.pa^{3}] [ha^{3}.pa^{3}ʔ] 'moon'

[ha^{3}] [ha^{3}ʔ] 'dry field'



[ha^{3}.pa^{3}] 'moon'



[ha^{3}.pa^{3}ʔ] 'moon'

This process can be expressed as:

3 ⟶ 3 ~ 3ʔ

Some words with low level long tone /1/ may have an allophone of low level short pitch pattern [1ʔ]. For examples:

[ha^{1}] [ha^{1}ʔ] 'pants'

[la^{21}ʔ.qɔ^{1}] [la^{21}ʔ.qɔ^{1}ʔ] 'hand'

[pa^{1}] [pa^{1}ʔ] 'frog'

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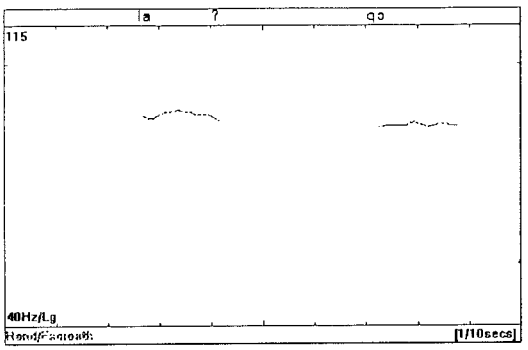
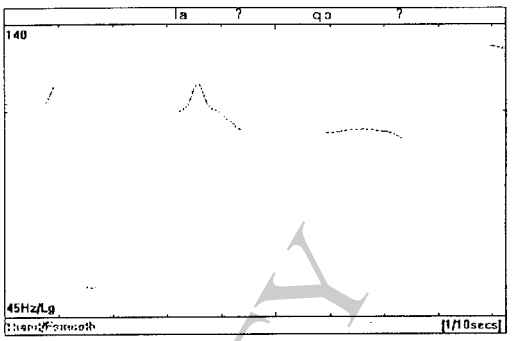


[la^{121}ʔ.qɔ^{1}] 'hand'



[la^{121}ʔ.qɔ^{1}ʔ] 'hand'

This process can be expressed as:

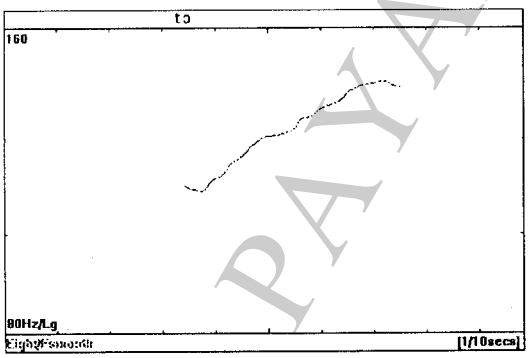
1 ⟶ 1 ~ 1ʔ

Some words in half-low rising long tone /24/ may have an allophone of half-low rising short pitch pattern [24ʔ]. Note examples below.

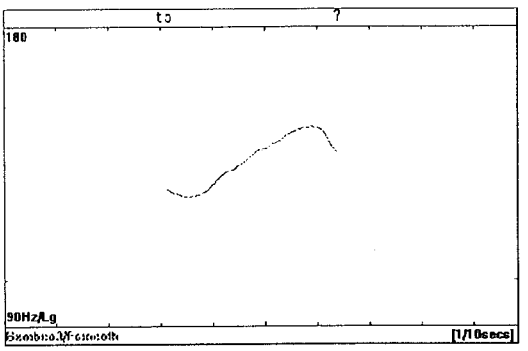
[tɔ^{24}] [tɔ^{24}ʔ] 'bamboo tie'

[k^{h}ɨ^{24}] [k^{h}ɨ^{24}ʔ] 'tripod'

[ʔa^{3}.ɲa^{24}] [ʔa^{3}.ɲa^{24}ʔ] 'younger brother or sister'



[tɔ^{24}] 'bamboo tie'



[tɔ^{24}ʔ] ' bamboo tie'

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This process can be expressed as:

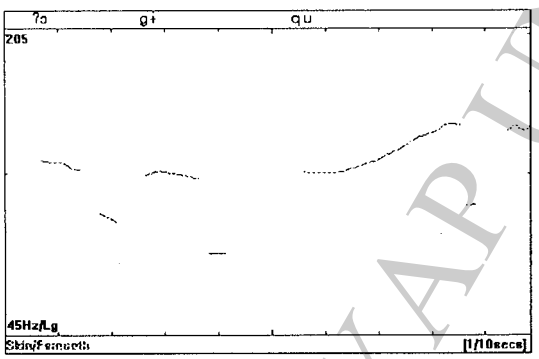
24 ⟶ 24 ~ 24ʔ

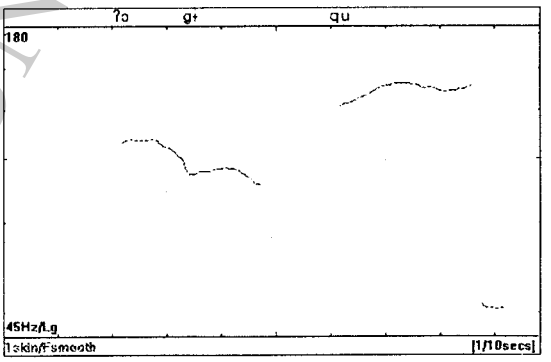
The possible reasons that the tones free vary between tone and tone with glottal are: First, from stress type three, we know stress and glottal stop are related in some way, therefore, it's possible that the speaker adds some glottal quality when he stresses a syllable. Second, it may also be possible that the tone historically had a glottal final and it is now losing it, but this require further investigation.

Some words with half-low rising long tone /24/ may have an allophone of half-high rising long pitch pattern [45]. For examples:

[hæ^{24}.ve^{31}] [hæ^{45}.ve^{31}] 'wash (person)'

[ʔɔ^{21}.gɨ^{121}.qu^{24}] [ʔɔ^{21}.gɨ^{121}.qu^{45}] 'skin'





[ʔɔ^{21}.gɨ^{121}.qu^{24}] 'skin' [ʔɔ^{21}.gɨ^{121}.qu^{45}] 'skin'

This process can be expressed as:

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24 ⟶ 24 ~ 45

4.4 Tones of Lahu Bakeo

There are therefore seven phonologically distinct tones in Lahu Bakeo. For convenience, The seven tones are numbered as follows.

Tone 1 is the half-high falling long tone, marked /43/.

Tone 2 is the half-low falling long tone, marked /21/.

Tone 3 is the half-low rising long tone, marked /24/.

Tone 4 is the low level long tone, marked /1/.

Tone 5 is the mid level long tone, marked /3/.

Tone 6 is the half-high falling short tone, marked /43ʔ/.

Tone 7 is the half-low falling short tone, marked /21ʔ/.

There are 4 falling, one rising and 2 level tones in the language. Tones 6 and 7 differ from Tones 1 to 5 in that they have a final glottal-stop /ʔ/. They occur in short vowel syllables. The other five tones, on the other hand, do not have a final glottal-stop. They occur in long vowel syllables.

4.4.1 Tone Contrast

In this section, two sets of tone contrast define the seven contrastive tonemes occurring in the same environment.

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43 half-high falling long tone	[tʃa^{43}.ve^{31}] 'to eat'	[ha^{43}.ve^{31}] 'to miss out'
21 half-low falling long tone	[tʃa^{21}.ve^{31}] 'to patient'	[ha^{21}] 'pants'
24 half-low rising long tone	[tʃa^{24}.ve^{31}] 'to boil'	[ha^{24}.ve^{31}] 'to spend the night'
1 low level long tone	[tʃa^{1}.ve^{31}] 'to feed'	[ha^{1}.ve^{31}] 'to be poor'
3 mid level long tone	[tʃa^{3}.ve^{31}] 'to seek'	[ha^{3}.ve^{31}] 'not allow'
43ʔ half-high falling short tone	[tʃa^{43}ʔ.k^{h}æ^{3}] 'string'	[ha^{43}ʔ.ve^{31}] 'to be brave'
21ʔ half-low falling short tone	[tʃa^{21}ʔ.ve^{31}] 'to push'	[ha^{21}ʔ.ve^{31}] 'love'

Table 10: Bakeo Tone Contrast

4.4.2 Bakeo Tonemes

/43/	[43]	*/pɨ^{43}/*	*[pɨ^{43}]*	'dog'
		/tʃɔ^{3}.kɔ^{43}/	*[tʃɔ^{3}.kɔ^{43}]*	'mosquito'
	[343]	*/nu^{43}/*	*[n̪vu^{343}]*	'cattle'
		/ʔu^{3}.mæ^{43}/	*[ʔu^{3}.mæ^{343}]*	'partridge'

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/21/	[21]	/kə^{21}/	[kə^{21}]	'sweat'
		/ɣo^{43}.pi^{21}/	[ɣo^{343}.pi^{21}]	'belly'
	[121]	/və^{21}/	[və^{121}]	'snake'
		/na^{21}.q^{h}ɔ^{43}/	[na^{121}.q^{h}ɔ^{43}]	'nose'
/24/	[24]	/ʔɔ^{21}.ɣu^{24}.qu^{3}/	[ʔɔ^{21}.ɣu^{24}.qu^{3}]	'bone'
		/ja^{43}.næ^{24}/	[ja^{343}.næ^{24}]	'baby'
	[24ʔ]	/ʔɔ^{21}.gɨ^{21}.gu^{24}/	[ʔɔ^{21}.gɨ^{121}.gu^{24}ʔ]	'skin'
		/ʔa^{3}.ɲa^{24}/	[ʔa^{3}.ɲa^{24}ʔ]	'younger brother'
	[45]	/ʔa^{24}.qu^{3}/	[ʔa^{45}.qu^{3}ʔ]	'spoon'
		/tʃɨ^{24}.qæ^{21}ʔ/	[tsɨ^{45}.qæ^{21}ʔ]	'bow'
/1/	[1]	/ʔɔ^{21}.pu^{1}/	[ʔɔ^{21}.pfɯ^{1}]	'wife's father'
		/ʔɔ^{1}.mə^{3}/	[ʔɔ^{1}.mə^{232}]	'powder'
	[1ʔ]	/ha^{1}/	[ha^{1}ʔ]	'pants'
		/la^{21}ʔ.qɔ^{1}/	[la^{21}ʔ.qɔ^{1}ʔ]	'hand'
/3/	[3]	/ʔɔ^{21}.ha^{3}.ku^{3}/	[ʔɔ^{21}.ha^{3}.ku^{3}]	'spirit'
		/ʔa^{3}.ka^{43}ʔ/	[ʔa^{3}.ka^{43}ʔ]	'water'

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	[3ʔ]	/$t^{h}æ^{3}$/	[$t^{h}æ^{3}$ʔ]	'skirt'
		/$ha^{3}.pa^{3}$/	[$ha^{3}.pa^{3}$ʔ]	'moon'
	[31]	/$ha^{3}.ve^{3}$/	[$ha^{3}.ve^{31}$]	'winnow'
		/$q^{h}a^{21}.ma^{3}.le^{3}$/	[$q^{h}a^{21}.ma^{23}.le^{31}$]	'how much'
	[23]	/$mə^{3}.ve^{3}$/	[$mə^{23}.ve^{31}$]	'sit'
		/$na^{3}.ve^{3}$/	[$na^{23}.ve^{31}$]	'listen'
	[232]	/ni^{3}/	[ni^{232}]	'red'
		/$te^{21}ʔ.ve^{3}$/	[$te^{21}ʔ.ve^{232}$]	'alive'
/43ʔ/	[43ʔ]	/$ʔa^{3}.ka^{43}ʔ$/	[$ʔa^{3}.ka^{43}ʔ$]	'water'
		/$ʔɔ^{21}.q^{h}o^{43}ʔ$/	[$ʔɔ^{21}.q^{h}o^{43}ʔ$]	'above'
	[343ʔ]	/$ɣɔ^{43}ʔ$/	[$ɣɔ^{343}ʔ$]	'stir'
		/$na^{43}ʔ$/	[$na^{343}ʔ$]	'gun'
/21ʔ/	[21ʔ]	/$lɔ^{21}.q^{h}o^{21}ʔ$/	[$lɔ^{121}.q^{h}o^{43}ʔ$]	'valley'
		/$ʃa^{3}.pæ^{21}ʔ$/	[$ʃa^{3}.pæ^{21}ʔ$]	'soap'
	[121ʔ]	/$mu^{21}ʔ$/	[$mvu^{121}ʔ$]	'grass'
		/$lo^{21}ʔ.ve^{3}$/	[$lo^{121}ʔ.ve^{232}$]	'enter'

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