

REVISTING TONES IN MELAMCHI YOLMO

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ABSTRACT

Melamchi Valley Yolmo (Tibeto-Burman, Nepal) was originally reported to have a four-way tonal contrast. However, other varieties of Yolmo that have been more recently studied only display two-way tonal contrasts. In this paper, we examine newly digitised archival recordings of elicited utterances in Melamchi Valley Yolmo made in the 1970s and 1980s to investigate the acoustic evidence for a four tone contrast. We find there is no evidence to support the original analysis, and that the tone system of Melamchi Valley Yolmo looks similar to other Yolmo varieties.

Keywords: tone production, archival recordings, Tibeto-Burman, Nepal.

1. INTRODUCTION

Yolmo is a Tibeto-Burman language of the Tibetic sub-group. The majority of speakers live in the Melamchi and Helambu Valley area. This variety was documented in the 1970s and 1980s by Anna Maria Hari, who produced a dictionary [8] and grammar [7]. There are also other varieties of Yolmo spoken throughout Nepal by groups of speakers who migrated away from this area one to two centuries ago. One of these is Lamjung Yolmo, spoken in the Lamjung district of Nepal, another is Syuba (also known as Kagate) spoken in the Ramechhap district, which has its own glottonym, but is mutually intelligible with other Yolmo varieties [2].

Hari analyses Melamchi Valley (MV) Yolmo as having four tones, comprised of both a pitch height distinction (low/high) and pitch contour distinction (falling/level). Hari numbered these tones as follows: low falling (1); low level (2); high falling (3); and high level (4), and transcribed them in both the dictionary and grammar. This is similar to Höhlig & Hari’s earlier analysis of tone in Syuba [10], and Hari’s work on Lhasa Tibetan [5], where four-way tonal contrasts were also described. Recent descriptive and acoustic research on Syuba and another variety, Lamjung Yolmo, has found evidence only for

a two-way contrast between high and low tones in those varieties [14], while no further work has been able to support Hari’s analysis of Lhasa Tibetan [11].

Like in other Tibetic languages, e.g. Lhasa Tibetan [13], the tonal contrast in Yolmo varieties is generally located on the initial syllable of the word, including polysyllabic words. Suffixes are not specified for tone, although it is possible that some prefixes might be. Tonal contrasts are also partially constrained by the onset of the first syllable in a word: in Yolmo word-initial voiced obstruents are always followed by low tone, while word-initial aspirated stops and affricates are followed by high tone. All other onsets can be followed by either high or low tone. The pitch movement distinctions included in Hari’s analysis are not described as being conditioned by environment, and we have found no apparent relationship between either the level and falling conditions with regard to onset, offset or syllable shape, as shown in Table 1. We have also found no relation between the falling and level distinctions and Written Tibetan cognate forms.

Table 1: Hari’s four tones in different syllabic environments.

Low Tone	1 (falling)	2 (level)
CV	<i>kò</i> ‘door’	<i>tò</i> ‘stone’
CVC	<i>lám</i> ‘path’	<i>çìj</i> ‘field’
CV:	<i>nò:</i> ‘yng. brother’	<i>gò:</i> ‘head’
CVCV	<i>çàm</i> ‘hat’	<i>çùru</i> ‘necklace’
CV:CV(C)	<i>çà:ma</i> ‘apron’	<i>lò:ma</i> ‘paper’
High Tone	3 (falling)	4 (level)
CV	<i>k^há</i> ‘mouth’	<i>tó</i> ‘rice’
CVC	<i>núm</i> ‘oil’	<i>çíj</i> ‘wood’
CV:	<i>mí:</i> ‘eye’	<i>pá:</i> ‘sauce’
CVCV	<i>çámu</i> ‘mushroom’	<i>kára</i> ‘belt’
CV:CV(C)	<i>ná:sum</i> ‘nose’	<i>tç^há:ma</i> ‘broom’

Hari’s analysis of tone in MV Yolmo as being a four-way contrast is important because it would possibly provide a more detailed story of tonogenesis in the Southern branch of Tibetic languages. It would mean that Yolmo has more in common with lan-

guages of the Tamangic branch including Tamang [12], Thakali [4] and Gurung [9]. Given that the other closely related varieties (Lamjung Yolmo and Syuba) only diverged from the MV variety around a century ago, the four-tone analysis would also give an indication that these varieties are more closely related, and only in recent generations lost the pitch movement distinction to give the two-tone systems that they have now.

However, there are some issues with Hari’s original analysis. Firstly, her transcriptions do not include tonal minimal triplets or quadruplets. On closer inspection of the tonal minimal pairs in Hari’s grammar [7], she provides only a single example where the two different high tones contrast: *nájɥ4* ‘honorific auxiliary’ and *nájɥ3* ‘day after tomorrow’, though these were not present in the recordings we were able to analyse. The overwhelming majority of tone minimal contrasts in Hari’s dictionary [8] are of low/high level pairs (2 and 4) and low/high falling pairs (1 and 3). To quantify this, we identified in the dictionary minimal pairs across different onsets in Hari’s Yolmo dictionary. Of the 84 pairs in the set, there were 79 pairs which were matched across either the level or falling conditions, and only 5 minimal pairs where (e.g.,) the high falling was a minimal pair with a low level (3 and 2), or vice versa (1 and 4). The full set is in the OSF repository for this project [3]

Original recordings from Hari’s documentation of MV Yolmo were recently made available as an Open Access collection [6]. This gave us the opportunity to analyse a set of elicitation recordings to look for acoustic evidence that supports a four tone system. Using existing historical recordings allows us to create a set of more specific hypotheses for subsequent data collection. We pre-registered the data coding and elicitation methods [3], along with the following research question: Does Melamchi Valley Yolmo have a two or four tone distinction, distinguished in production by fundamental frequency (F_0)?

We hypothesised that an acoustical analysis of her original recordings would provide evidence of only a two-tone distinction (i.e. high vs. low) based on F_0 , as has been demonstrated in Lamjung Yolmo and Syuba.

2. DATA AND METHODS

The data for this analysis come from original recordings made by Anna Maria Hari [6]. These recordings were made on cassette tapes in the 1970s and 1980s, and high quality digital copies were made

for archiving. We use recordings AH1-001-A and AH1-001-B, which are listed on the cassette label as "language learning drills".¹ The two recordings are 30min 27s and 30min 56s in length respectively. These are the only recordings in the collection that include English translations spoken before the utterances. The recordings contain productions by a single male MV Yolmo speaker. The recordings follow this pattern: Hari herself utters a target word in English, which is followed by its translation in MV Yolmo, produced within a phrase-initial or phrase-medial carrier frame. A variety of carrier frames are used, including: *didila* ___ *màe* ‘This is called a ___’; and *dì ɲàì* ___ *yimba* ‘this is my ___’.

For our study, we only focused on monosyllabic and disyllabic target words, of which there are 190 different lexical items. Most of these are repeated twice in the same carrier frame, though certain lexical items appear multiple times throughout the recordings in different frames. The recordings were transcribed using the tone categories found in Hari’s dictionary [8], i.e. 1 - low falling; 2 - low level; 3 - high falling; and 4 - high level. If Hari did not assign a tone category to a target lexical item, or if that item was not in the dictionary, it was excluded from analysis. Utterances that repeated verb roots to illustrate verbal paradigms were also excluded. Finally, utterances were discarded if there was noise or distortion, though these were few in number. This resulted in a total number of 498 word tokens for the analysis. Table 2 gives the token counts for each tone category and syllable type.

Table 2: Number of word tokens by tone category

	Tone			
Word Type	1	2	3	4
Monosyllabic	29	33	56	46
Disyllabic	100	63	101	70

We used Praat (v6.0.36) [1] to segment the words and label the tones. We also labelled each target word as monosyllabic vs. disyllabic, as well as its syllable position in a disyllabic word, given that tonal contrasts are usually realised only on the initial syllable. A Praat script was run to extract fundamental frequency (F_0) measurements taken at 1% intervals of each rime; as well as segment duration.

There were three other categories that we labeled but ended up collapsing across due to insufficient token numbers. These were: syllable type (open vs. sonorant-final vs. stop-final); carrier frame type; and repetition number. In any case, although tone and coda segment interactions have been noted in other

languages of Asia, Hari did not describe any specific interaction between tone category and syllable type. We were also concerned about the effect of carrier phrase on F_0 , given that we have found significant interactions between tone and intonation in other Yolmo varieties [14], particularly at the right-edge of words in phrase-final position across different repetitions, i.e. list intonation. In the end, all words we were able to analyse occurred in phrase-initial or phrase-medial position.

Our labelling choices and analysis plan were pre-registered in an OSF repository before labelling began [3]. The repository also contains the Praat Textgrid files. The original recordings are in an open access archive [6].

3. RESULTS

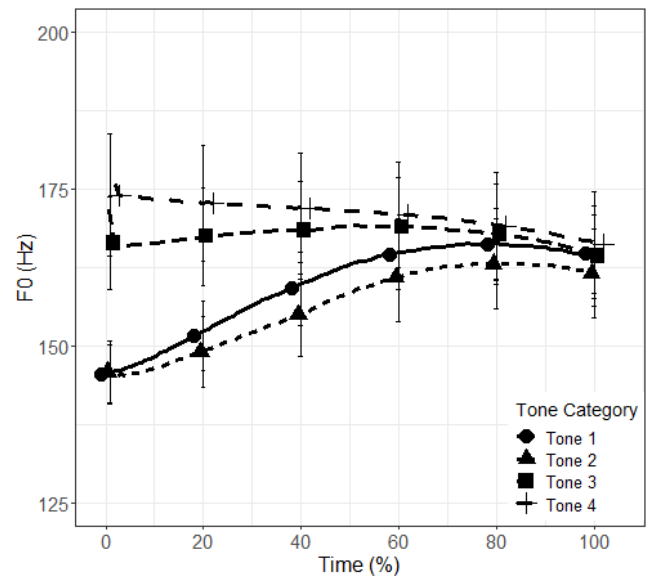
Vowel duration was not found to be affected by tone category. A one-way ANOVA on rime duration of monosyllabic sonorant-final syllables showed no effect of tone category, $F(3,106) = 0.251$, $p = .86$. Although a one-way ANOVA on vowel duration of monosyllabic open syllables appeared to show an effect of tone category, $F(3,104) = 3.38$, $p = .021$, a post-hoc comparison only showed a significant difference between Tones 1 and 4, $p = 0.018$. Since no difference was found between Tones 1 and 2 or between Tones 3 and 4, duration will not be discussed further here.

Figure 1 shows mean F_0 across a time-normalized monosyllabic word rime, starting at the vowel onset and ending at the end of the time. At the beginning of the rime, Tones 1 and 2 are produced with lower F_0 than Tones 3 and 4. However, the contrast in F_0 begins to neutralise towards the end of the syllable, as F_0 in Tones 3 and 4 falls slightly, while F_0 in Tones 1 and 2 rises.

A one-way ANOVA was performed on F_0 at 20%, 50% and 80% of the rime of monosyllabic words, assuming a four-tone analysis. The results support the picture presented above. A significant effect of tone category on F_0 was found at 20% of the rime, $F(3,160) = 23.16$, $p < .001$; and at 50%, $F(3,160) = 6.31$, $p < .001$; but no effect of tone category was found at 80% of the rime, $F(3,161) = 1.102$, $p = .35$. At 20% of the rime, Tukey's comparison showed no significant difference in F_0 between Tones 1 and 2, $p = .917$, and between Tones 3 and 4, $p = .295$.

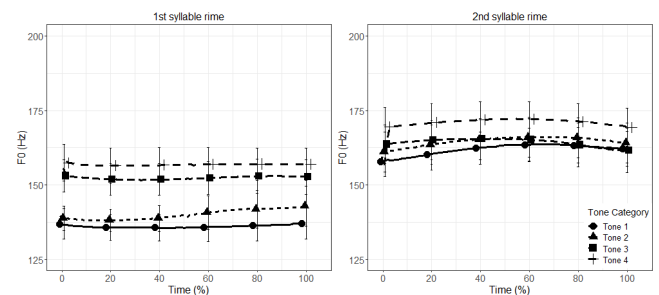
Figure 2 shows mean F_0 across time-normalized rimes in disyllabic words. On the first syllable, Tones 1 and 2 are produced with higher F_0 than Tones 3 and 4. However, the contrast in F_0 is neu-

Figure 1: F_0 across time-normalized vowel and vowel plus sonorant rime of monosyllabic words, with standard deviation halved



tralised on the second syllable, as F_0 in the Tone 1 and Tone 2 words rise to the same height as F_0 in the Tone 3 and Tone 4 words.

Figure 2: F_0 across time-normalized vowel and vowel plus sonorant rime of disyllabic words, with standard deviation halved



A one-way ANOVA was performed on F_0 at 50% of the rime of the first and second syllables, assuming a four-tone analysis. A significant effect of tone category on F_0 was found on the first syllable, $F(3,330) = 77.86$, $p < .001$. Tukey's comparison showed no significant difference in F_0 on the first syllable between Tones 1 and 2, $p = .064$, but there was a significant difference between all other tones, including between Tones 3 and 4, $p = .015$. A significant effect of tone category on F_0 was also found on the second syllable, $F(3,329) = 7.227$, $p < .001$, although Tukey's comparison showed only a significant difference between Tone 4 and the other tones.

On closer inspection, it was discovered that the

higher F_0 on the Tone 4 disyllabic words was largely driven by a handful of tokens produced in a question frame, *k^hyéti _____yèba?* ‘Do you have _____?’, with rising question intonation affecting the second syllable. If all tokens in this frame are removed, we still find a significant effect of tone category on F_0 at the midpoint of the first syllable, $F(3,314) = 68.67, p < .001$, but Tukey’s comparison now shows no significant difference in F_0 on the first syllable between Tones 1 and 2, $p = .103$, or between Tones 3 and 4, $p = .232$. There is still a significant effect of tone category on F_0 at the midpoint of the second syllable, $F(3,313) = 3.641, p = .013$, but Tukey’s comparison only shows a significant difference between Tones 1 and 4, $p = .007$. We would expect this difference to disappear given a larger sample of Tone 4 tokens from non-question carrier frames.

4. DISCUSSION

The acoustic analysis of Hari’s recordings support our original hypothesis, based on data collected from other varieties of Yolmo, that there is only evidence for a two-tone distinction, i.e. high vs. low, in MV Yolmo, and not a four-tone distinction with both height and contour distinctions. Rather, monosyllabic words with low tone start with a low F_0 that gradually rises towards the midpoint of the rime, while monosyllabic words with high tone start with a high F_0 that falls slightly across the rime. In disyllabic words, the low tone is produced with lower F_0 than the high tone across the entire rime of the first syllable, but there is no difference in F_0 on the second syllable. The findings are therefore in accordance with acoustic studies of other Yolmo varieties [14].

This analysis demonstrates that MV Yolmo does not have a distinct tone system to the closely related varieties Lamjung Yolmo and Syuba. Instead, it would appear that all Yolmo varieties share a two-tone system. This distinguishes them from the Tamangic languages that are spoken in similar areas of Nepal, which are described as having a four-tone system, for which there is acoustic evidence [12].

The lack of acoustic evidence for the four-way contrast raises a question; how did Hari manage to consistently pair her falling tones (1 and 3) with the level (2 and 4) in minimal pairs? As mentioned above, in a subset of 84 minimal pairs across various onsets, a falling tone was only paired with a level tone five times. This indicates that Hari was drawing something out of the data to provide these tone categories, even if this feature is not accounted for by current acoustic evidence. As we mention in the in-

roduction, we see no indication of what this might be in terms of the tone itself, or the onset, offset, vowel or Written Tibetan cognate. Hari also makes no mention of morphotonemic alternations revealed only by the addition of specific affixes.

Our analysis highlights the importance of archiving original fieldwork recordings. It is only thanks to Hari’s original recordings being digitised and housed in a persistent and accessible archive that this work could be conducted. Despite coming from a single speaker, the recordings have also allowed us to revisit her original analysis and to provide new acoustic insights on the data. Even if we were to collect new data, there is no guarantee that current speakers would have the same tonal system.

Finally, it is worth reiterating that the aim of this paper was not to simply contradict the earlier work, although we did not find evidence to support Hari’s analysis, but to revisit and enrich the description. Hari’s recordings are also a welcome addition to our own growing collection of data on different Yolmo varieties and will help inform future comparative work on Yolmo.

5. CONCLUSION

This is the first known acoustic analysis of these data to be performed. We have used original recordings of MV Yolmo to demonstrate that there is no acoustic evidence for a four way tonal contrast. The distinction between high and low tone registers is statistically robust, but there is no statistically significant evidence for the contour distinction between the "falling" and "level" types.

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¹ The recordings are available at <http://doi.org/10.4225/72/5705B44788E29>.