

Phrasing and Focus in Bengali

Sameer ud Dowla Khan

UC Los Angeles

Over 15 years after the prosody of Bengali was first analyzed using the Autosegmental-Metrical framework (Hayes & Lahiri 1991), linguists still disagree on many fundamental aspects of the system. Claims about focus, phrasing, and lexically-specified tone are constantly reanalyzed, and before any further details of the system are to be explored, some basic questions need to be addressed:

1. How many layers of prosodic structure are tonally marked?
2. What is the inventory of tones and tone patterns in the language?
3. How is focus realized with respect to tones and phrasing?

Part of the reason why these questions have not been adequately answered in the past is the lack of variety in the data collected and analyzed in previous studies. Many of these studies simply use data transcribed by other authors in the literature, without checking the acoustic record of the utterances or confirming with more speakers. In order to set up an empirically-testable model of Bengali prosody within the framework of Intonational Phonology (Pierrehumbert 1980, Beckman & Pierrehumbert 1986, Pierrehumbert & Beckman 1988; see Ladd 1996 for review), the current study examines an extensive set of recordings of various types of sentences produced by a larger group of speakers of Standard Bangladeshi Bengali, collected in a recent experiment (described in Khan 2006). The following is an outline of B-ToBI (Bengali Tones and Break Indices), a model of and transcription system for Bengali prosody, drawing on elements of the ToBI framework of prosodic transcription and analysis (Beckman & Hirschberg 1994).

Like other Intonational Phonology models of prosody, the proposed B-ToBI model recognizes two types of tones, characterized by their function and alignment: pitch accents mark the heads of prosodic units, and are aligned to phonologically stressed syllables, while boundary tones mark the edges of prosodic units, and are aligned with the right edges of phrases.

Prominence: Stress and pitch accent

In accordance with most previous work on Bengali, the current model assumes that monomorphemes bear primary stress on the initial syllable, and only stressed (*i.e.* initial) syllables can bear a head-marking tone (*i.e.* pitch accent). Pitch accents can be low (L*), high (H*), or rising (L*+H). Low pitch accents (L*) are realized as an F₀ minimum during the prominent syllable, and are the default pitch accent in the language. High pitch accents (H*) are realized as an F₀ peak, and signify sarcastic speech or unexpected information. Rising pitch accents (L*+H) are realized as an F₀ minimum during the prominent syllable, and a sharp rise in pitch in the following syllables. This pitch accent usually signifies focused elements. This analysis is in contrast with previous studies, which have explicitly stated that Bengali does not and cannot bear bitonal pitch accents due to the OCP. Pitch tracks of these pitch accents are provided below.

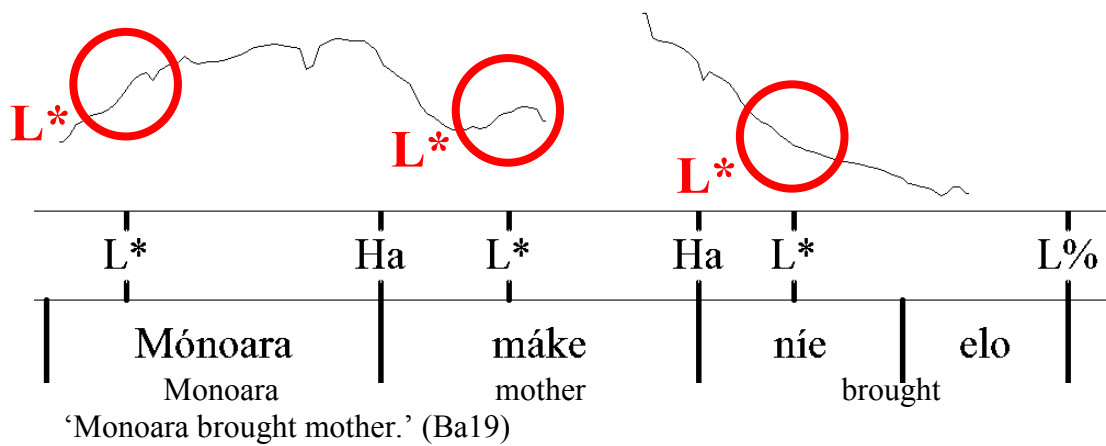


Figure 1. Three content words bear L^* .

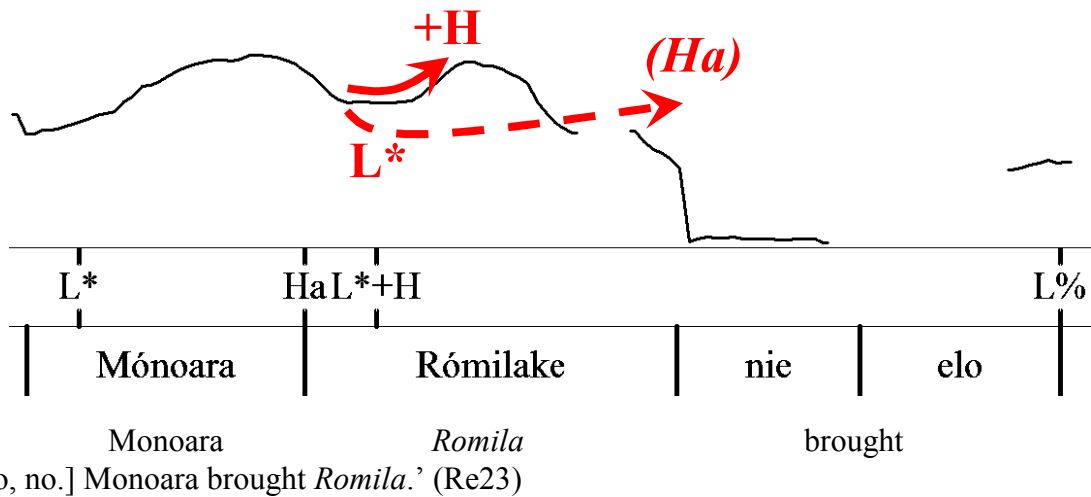


Figure 2. The focused object *Rómilake* 'Romila (ACC)' bears L^*+H . Note the early rise and fall in F_0 , in contrast to the default $L^* \dots Ha$ pattern expected in non-focused contexts (shown in the dotted line).

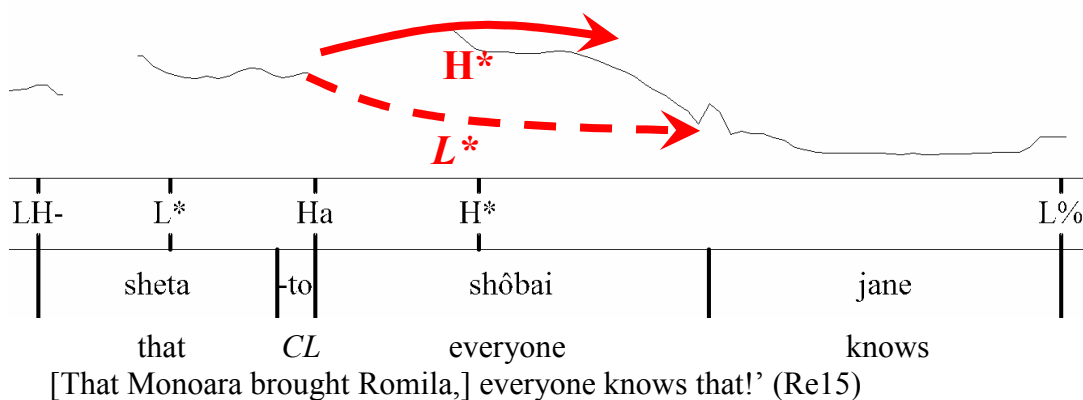


Figure 3. The subject *shôbai* ‘everyone’ bears H* instead of the default L* (predicted L* shown with dotted line; cf. L* on *shéta* [‘feta] ‘that’) or focus L*+H.

Phrasing and boundary tones

Unlike the two-phrase systems proposed in previous analyses, preliminary data from the current study reveal three layers of tonally-marked prosodic phrasing. Roughly the size of a content word, the Accentual Phrase (AP) bears a high boundary tone (Ha) at its right edge. The largest tonally-marked phrase is the Intonation Phrase (IP), which can bear one of four boundary tones. The low IP boundary tone (L%) marks declarative sentences and focused wh-questions. The high IP boundary tone (H%) marks echo wh-questions and various other interrogative sentence types. The rising IP boundary tone (LH%) marks default wh-questions. The falling IP boundary tone (HL%) marks yes-no questions. These tones largely reflect previous models’ analyses. Between the AP and IP levels of phrasing is the Intermediate Phrase (ip), which can bear one of three boundary tones. Both the low and rising ip boundary tones (L-, LH-) mark larger units, such as because-clauses, if-clauses, and relative clauses. The high ip boundary tone (H-) marks smaller units, such as locative phrases and preposed topics. As all three boundaries have the option of bearing a high tone, a three-way comparison of Ha, H-, and H% is provided below.

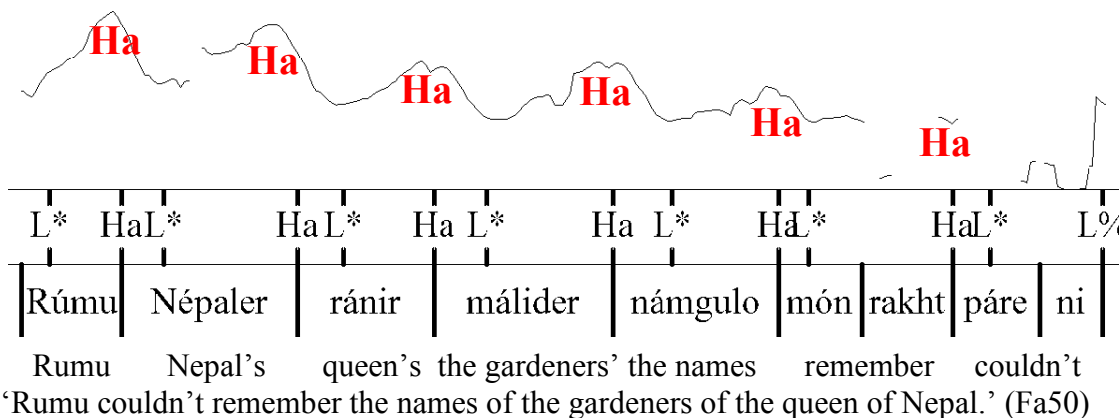


Figure 4. Each non-final content word bears Ha.

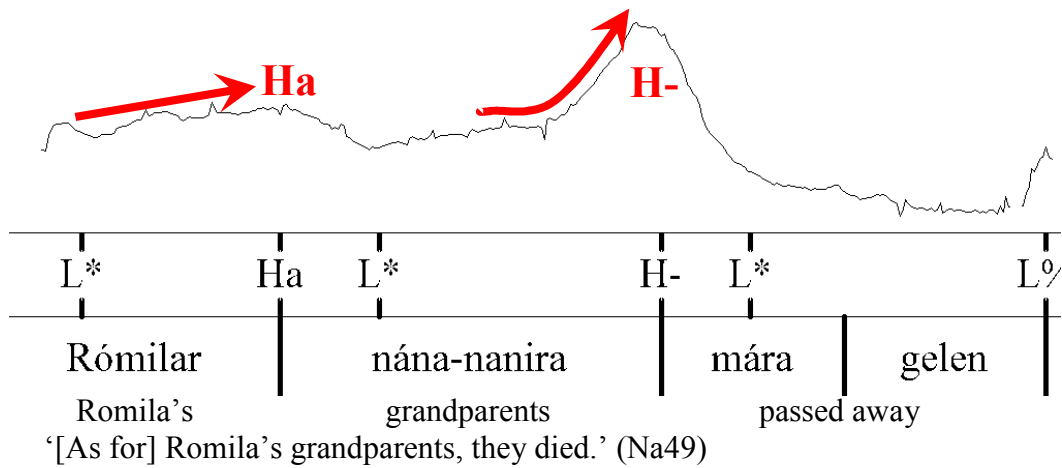


Figure 5. To indicate that the multi-word subject of the sentence (the ip *Rómilar nána-nanira*) is a topic, translated into English as something like ‘As for Romila’s grandparents’, the phrase is marked on its right edge by H-, realized as a sharp F₀ rise on the ip-final syllable. (This differs from LH-, which includes a dip in F₀ before the final rise).

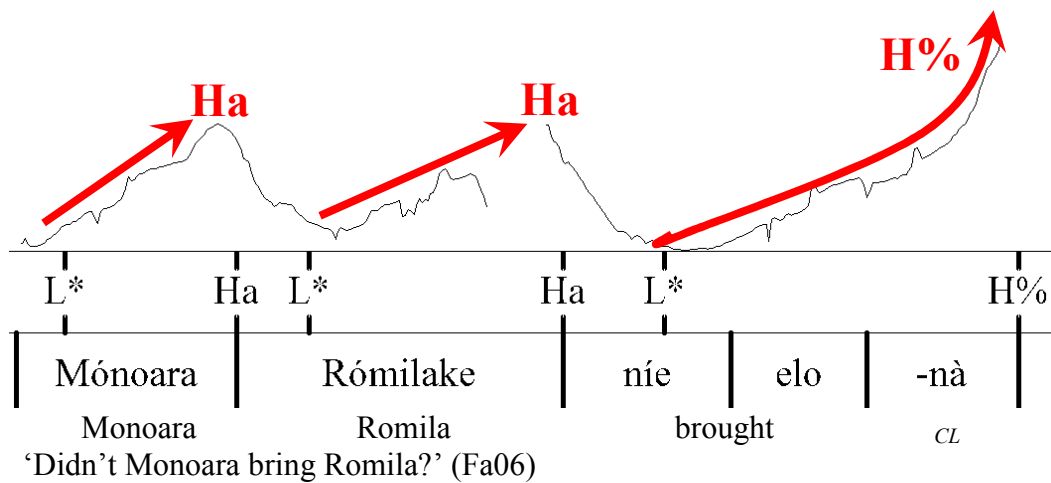


Figure 6. This question is marked with H%, realized as a rise in pitch from the final pitch accent rightwards, and an extreme rise on the final syllable.

Focus realization

Previous studies agree that focus is realized in Bengali with a rising pitch, although the nature of the high target of this pitch rise is controversial. While Hayes & Lahiri (1991) posits a low pitch accent followed by a high boundary tone, Lahiri & Fitzpatrick-Cole (1999) proposes a lexically-specified high tone (H*) on certain focused phrases. Selkirk (2006) describes a floating [H] tone associated with focused elements. The current study adopts the analysis in Michaels & Nelson (2004), which attributes the rise in pitch to a rising pitch accent (L*+H) on the focused word, as described above.

Post-focal words bear no tones, and are instead realized with smooth pitch interpolation towards the final boundary tone (deaccenting/dephrasing), as shown below.

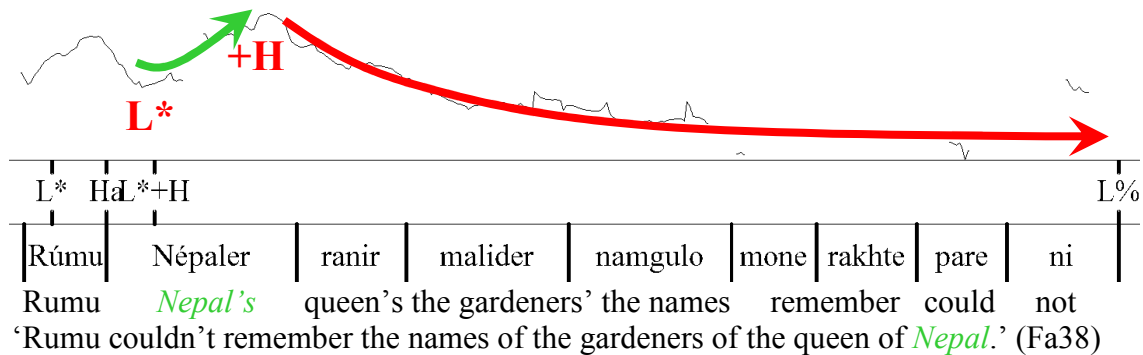


Figure 7. The focused word *Nepal's* 'Nepal's' bears L*+H. Post-focal words bear no pitch accents or boundary tones; their pitch is determined by phonetic interpolation of adjacent tones.

When the focused constituent includes more than one word, two realization options are available to the speaker. In repeated realization, each content word in the focus domain bears L*+H. In representative realization, only the rightmost content word in the focus domain bears L*+H, while preceding words bear default L*. Preliminary data suggest both inter- and intra-speaker variation in choice of realization type.

Conclusions

Previous studies have claimed that Bengali is a language that displays close relationships between the prosodic and syntactic structures, and between tone realization and phonological constraints (e.g. the OCP). These claims, albeit strong, have not been tested on a wide range of data. Before we can answer questions of the relationship between syntax and prosody, optionality in phrasing, or the universality of prosodic phenomena, a detailed, thorough investigation of Bengali prosody is required. In using varied data from numerous speakers, the current study aims to serve as the foundation of an Intonational Phonology model of Bengali prosody (i.e. B-ToBI). Preliminary data reveal a larger tonal inventory than described in the literature, including bitonal pitch accents, previously thought to be nonexistent in the language. The current study also suggests that Bengali is among the few languages (e.g. Farsi, Basque – see Jun 2005) described as tonally marking three prosodic phrases (IP, ip, and AP). Further investigation should reveal more details about this typologically special language.

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