

Chapter 6: Conclusion

6.1. Introduction

Through our studies on the intonational properties of Sylheti and Chokri, we have shown how major functions of intonations, i.e., phrasing, marking sentence type, and indicating focus, are achieved in two languages with different levels of tonal contrasts. The primary goal of this dissertation was to reveal how post-lexical meanings are encoded through prosodic features in the presence of lexical tones in tonal languages from two different language families of the north-east India region. Sylheti, a tonal language from the prototypically non-tonal Indo-Aryan language family, showed some intonational properties that are shared with those of its related languages, such as Standard Bengali of Bangladesh and Standard Kolkata Bengali. Nevertheless, many other features of the language assert its identity as a tonal language. The impact of lexical tone on the Chokri language, on the other hand, primarily relies on non-pitch prosodic properties or segmental morphemes to express post-lexical linguistic meanings. However, features like pitch raising for question sentences, a pitch lowering for in-situ focus, and the presence of downtrends hint at limited tone-intonation interaction in the language. The following sections summarize the major findings of this work. A discussion on the implication of the research, its limitations, and prospects for future work is presented towards the end.

6.2. Prosodic structure and intonation

Analysis of higher units in the prosodic structures of Sylheti and Chokri revealed important insights into intonational phonology in general and tone-intonation interaction in particular. The presence of pitch accents similar to those found in other (non-tonal) south Asian languages marking APs in Sylheti is one of the significant findings. While cross-linguistic research indicates the absence of pitch accents in tonal languages, Sylheti seems to be an exception. The scaling difference of AP (L*Ha) contours induced by sentence medial lexical tones is a shred of evidence for an interesting interaction of tone and intonation. Other than that, boundary tones, pitch reset at IP left boundaries, and pauses make up the rest of the intonational phonology of the language.

On the other hand, the use of phrasal pitch variation to indicate a prosodic unit boundary is evidently restricted in Chokri. The preference for other intonational properties like duration or pause over boundary tones to mark IP and ip boundaries confirms the limited

use of f0 based on intonation in this language. At a lower level, i.e., the level of PrWd, both affixes and roots constitute individual prosodic words, which further highlights the functional weight of lexical tone in Chokri.

6.3. Downtrends

In both Sylheti and Chokri, the surface realization of f0 contours is subject to downtrend effects to varying degrees. The downtrend in Sylheti influences the scaling of phrasal tones. It exhibits final lowering in all sentences regardless of sentence type. It also showed the presence of a phonological downstep that affects the AP boundary tones and produce a series of f0 peaks. The rate of change to lower f0 observed between two successive peaks can be predicted through downstep ratios. In Chokri, on the other hand, the downtrend influences the scaling of lexical tones. Declination is present in all like tone sequences in the language. However, the precise nature of the downward movement of the f0 contour is different for all M tone sequences. Sentences bearing all M tone sequences are realized with an exponential fit. On the other hand, sentences carrying all H tone or all L tone sequences form a linear fit. Downstepping of H tones induced by an intervening L tone was also observed in the language. Our study provided a detailed analysis of mathematical modelling of downtrends in the two languages that not only offer better insights into the phenomenon but also can aid the development of speech technology.

6.4. Intonational marking of sentence types

One of the major findings of this study is the use of pitch register modification to distinguish the interrogative utterances from the declaratives in both Sylheti and Chokri. Sylheti question sentences have a super high H* pitch accent on the non-final question words, together with a raised global pitch that prosodically makes them different from statement utterances. This applies to all three types of questions examined in this work: yes/no or polar question, wh questions, and alternative questions. In Chokri, on the other hand, the only prosodic marker for question sentences is global pitch and intensity raising. However, the alternative questions are not subject to any kind of prosodic changes in the language. Global modification of pitch is a discrete intonational feature used for intonational function in both languages. Neither of the languages demonstrates intonational cues to indicate imperative utterance. This study also shows how phrasing

can be used as a prosodic feature employed to distinguish particular sentence types. List utterances, in particular, show evidence for this as non-final elements of such sentences constituting individual prosodic units in both Sylheti and Chokri. Non-final elements of Sylheti lists are marked by both perceived junctures that are more salient than those between PrWd, making them equivalent to *ips*. They are also realized with LH- ip right boundary tones, which is not seen in other constructions. In Chokri, the prosodic features of non-final list elements include both relative juncture and a final lengthening.

6.5. Prosodic Encoding of focus

Another important issue that was examined in this dissertation was whether the two languages employ intonation to indicate focus. In-situ focus was taken under consideration, wherein objects produced with informational focus, contrastive focus, and corrective focus, along with the pre-focal and post-focal elements, were compared to their broad focus counterparts. Both Sylheti and Chokri exhibited focus induced lowering on the target words for all three focus conditions. This finding is significant as most theories and descriptions on focus presume a higher pitch on the focused elements, either in the form of nuclear accent or register raising (Büring, 2010; Samek-Lodovici, 2005). Our results add to the limited evidence of pitch lowering as a means to encode focus, suggesting that deviation (rather than the direction of deviation) in terms of suprasegmental features is the requirement for prosodic realization of focus in languages. The lexical specifications of tone are not changed during the process of register lowering. In Sylheti, pitch modification of pre-focal and post-focal words is used as a strategy to maintain distinctions between three types of focus. This distinction, however, is not prosodically indicated in Chokri, as all three types of focus are realized through an overall lowering of the pitch of the whole IP containing the focused word. Both languages also employ intensity and duration in varying degrees to mark focus.

6.6. Implications

As stated at the beginning of the dissertation, this work reveals the dynamic ways in which lexical tone and post-lexical intonation interact in languages with different tonal complexities. The findings of the multiple experimental analyses have significant implications for the theoretical and/or typological accounts of intonation in general and the phonological studies in Sylheti and Chokri in particular. The intonational strategy primarily employed in the languages under study is the modification of the scaling of f_0 .

In Sylheti, it manifests in three ways- (i) scaling differences of IP medial AP tones induced by different underlying lexical tones, (ii) global pitch register raising in questions, and (iii) pitch register changes on target elements along with surrounding words for denoting focus. In Chokri, the global register lowering marks focus while the raised register indicates questions. Ladd (2008) has remarked that ‘register modification’ is one of the ‘unresolved issues’ in the AM model of intonation. While specification in a register tier can be accommodated to the AM accounts of intonation in our case, it cannot fully address the patterns like the ones in Sylheti, especially the scaling difference of phrasal tones under the influence of lexical tones.

As a language where the tonogenesis process seems to be still at work, Sylheti shows characteristics of a language undergoing transition in terms of intonation patterns. The strong presence of intonation contours similar to other (non-tonal) south Asian languages reinforces its pre-tonogenesis linguistic features. The consistently maintained different f_0 scaling for L and H lexical tone distinctions, on the other hand, indicates a gradual transformation from an intonation-only language to a tonal one. Chokri, on the contrary, with a heavier reliance on lexical tone, appears to be more stable in terms of intonational behavior as it consistently avoids any kind of phrasal tones.

For annotation of speech in Sylheti and Chokri, we offer modified versions of ToBI in the languages following the findings of our analysis.

6.6.1. Levels of transcription and symbolic labels for Sylheti_ToBI

Only one tonal tier suffices for Sylheti, which hosts the phrasal tones. The lexical tone is realized only in terms of the raised scaling of phrasal tones when a High tone is present IP medially, and it can be indicated by adding \uparrow before the affected phrasal tones.

Tier 1: Tone Tier: that marks phrasal tones

Labels:	Descriptions
Pitch accents:	
L*	default pitch accent (low alternative)
L*H	default pitch accent (rising alternative)
H*	question word pitch accent
Lexical scaling:	
↑	raising of AP's H due to the presence of IP-medial, non-word-final lexical H
AP boundary tones:	
Ha	all non-IP-final APs
IP boundary tones:	
H%	first half of incomplete sentences
HL% , L%	all other sentence types
Register Changes:	
↑q(.....)	Register raising in questions (enclosing affected IPs)
↓f(.....)	Focus-induced lowering (enclosing the portions affected)

Table 6.1: inventory of labels in the tone tier for Sylheti ToBI

Tier 2: transcription tier: IPA transcriptions of the words constituting the utterance, the H tones are marked with diacritic.

Tier 3: glossing/ translation tier: glossing of words.

Tier 4: break index tier: break indices

Index/diacritics	Descriptions
1	PrWd boundary
2	AP boundary
2-	Non-final APs of recursive AP
3	ip boundary
4	IP boundary

Table 6.2: Inventory of break indices for Sylheti ToBI

6.6.2. Levels of transcription and symbolic labels for Chokri_ToBI

The tonal tier in Chokri hosts the lexical tone labels along with labels for register specifications.

Tier 1: Tone tier: marks underlying lexical tones

Labels:	Descriptions
Lexical Tones	
EH	Extra High tone
H	High tone
M	Mid tone
L	Low tone
R	Mid-Rising tone
Register Changes:	
↑q(.....)	Register raising in questions (enclosing affected IPs)
↓f(.....)	Focus induced lowering (enclosing affected IPs)

Table 6.3: inventory of labels in the tone tier for Chokri ToBI

Tier 2: transcription tier: IPA transcriptions of the syllables constituting the utterance.

The tone of each syllable is marked with diacritics.

Tier 3: gloss/ translation tier: glossing of words.

Tier 4: break index tier: break indices

Index/diacritics	Descriptions
1	PrWd boundary
3	ip boundary
4	IP boundary

Table 6.4: Inventory of break indices for Chokri ToBI

In terms of Hyman and Monaca's (2011) classification, rather than strictly falling under one group, Sylheti situates itself between the '*accommodation*' and '*submission*' categories of tone intonation interaction. The '*accommodation*' strategy here is different from the original postulation that suggested reserving some syllables for lexical tones while intonational tones are realized on others. In Sylheti, the IP medial syllables accommodate both types of tones without either causing obliteration of the other. Similarly, although '*submission*' indicated the complete overriding of lexical tones by intonemes, the medial lexical tones are recoverable in Sylheti. On the other hand, the restricted use of intonational boundary tones for post-lexical linguistic information in Chokri places it in the category of '*avoidance*', affirming the view that tonally rich languages do not have complex intonation systems.

6.7. Limitations and Future Research

As this dissertation joins the very limited existing works on intonation in tone languages in the region, it has certain limitations and additional areas that need further investigation. The findings of this work are based on the analysis of scripted utterances in controlled environments; an additional analysis of intonation in spontaneous speech will potentially offer a deeper understanding of various aspects of intonation in the languages. Subcategories of sentence types like – negatives, negative yes/no questions, and permissions were not investigated in this study. In terms of prosodic focus, analysis of ex-situ focus in the future will facilitate a complete account of the phenomenon in the two languages. In addition to contributing to the limited existing research on intonation in Indian tonal languages, our findings will also be instrumental in developing computational models as well as speech technologies- linguistic resources that have the potential to safeguard languages from endangerment.

References:

- Büring, D. (2011). Focus and Intonation. In Russell, Gillian & Fara, Delia Graff (eds.). *Routledge Companion to Philosophy of Language*. New York, USA: Routledge.
- Ladd, R. (1996). *Intonational Phonology*. Cambridge: Cambridge University Press.
- Hyman, L. M, & Monaka, K. C. (2008). Tonal and Non-tonal Intonation in Shekgalagari. *UC Berkeley PhonLab Annual Report*, 4. <http://dx.doi.org/10.5070/P74429729r> Retrieved from <https://escholarship.org/uc/item/4429729r>
- Samek-Lodovici, V. (2005). Prosody-syntax interaction in the expression of focus. *Natural Language & Linguistic Theory* 23: 687–755.