Chapter 1 : Introduction

1.1. General Introduction

Over the last few decades, research on intonation and prosodic phonology has gained significant attention from phonologists. As such, numerous attempts have been made to precisely focus on unfolding the prosodic properties of (non-tonal) languages in general and the way lexical tones interact with intonational properties in particular. However, research aiming at exploring the intonational properties of Indian languages, in particular, is quite limited. Even less work has been done to explore the intonational properties of the tonal languages spoken in North-East India.

Pitch is one of the major features in discourses of prosody, including intonational research. Pitch variations in speech can encode two types of linguistic information, i.e., lexical contrasts and post-lexical meanings. Both exploit the same acoustic property, fundamental frequency or *f0,* which refers to the rate at which the speaker's vocal folds vibrate while producing a particular speech unit. Pitch distinctions used to encode contrastive lexical and/or grammatical meaning are termed lexical tones (Gussenhoven, 2004; Hyman, 1990; Pike, 1948; Yip, 2002). Intonation, on the other hand, involves systematic modulation of pitch or *f0* (alone or together with other prosodic features) to express utterance-level and other post-lexical linguistic and paralinguistic meanings (Cruttenden, 1997; Gussenhoven 2004; Ladd, 2008). All languages exploit f0 variation to varying degrees to express intonational meanings. Even tonal languages that employ pitch for lexical contrast may employ f0 differences for marking intonation (Matisoff, 1994; Gussenhoven, 2004). However, f0 variation for intonation in these languages is deemed to be limited compared to the *intonation-only* languages (Yip, 2002).

As tone languages use the same property of (different) pitch variations to maintain lexical contrasts, it is essential to understand how structural properties of intonation are realized in these languages. While it is a well-known fact that (lexical) tone and intonation interact with one another, the extent of this interaction is yet to be explored in most tonal languages across the world. Although intonation is accepted as a universal property of all languages, the presence of "structural" intonation that refers to categorical

intonational pitch specifications or intonemes in tonal languages remains an area of contention (Hyman and Monaka, 2008).

The majority of Indian languages belonging to Indo-Aryan, Dravidian, and Austro-Asiatic language families are non-tonal. Among the Indo-Aryan group of languages, only a few, viz., Punjabi (Bhatia 1975, Vijayakrishnan 2009), Sylheti (Gope, 2016), Mandeli (Bhaskararao, 1998), and a few others are reported to host tonal contrasts to maintain lexical distinctions. North-East India, on the contrary, is crowded with a large number of tonal languages. The majority of these tonal languages of NE regions belong to the Tibeto-Burman and Tai-Kadai language families. Not much work has been done to understand how intonational properties interact with the lexical tones in these languages. Furthermore, these tonal languages of NE India also differ in terms of tonal complexities, i.e., nature (viz., level vs. contour tones) and the number of tonal contrasts (2 tone system vs. 3 to 5 tone systems) that exist in a given language. These two factors are likely to make tone-intonation interaction an exciting affair. This study, therefore, aims to unveil the patterns of intonation that are at work in these languages by investigating Sylheti, a tonal language with two-way lexical contrasts from the Indo-Aryan language family that is prototypically non-tonal, and Chokri, a Tibeto Burman tonal language with a rich tonal inventory of five lexical tones.

1.2. General Background and Review of Literature

1.2.1. Tone

Tone languages are primarily defined by the use of pitch differences for conveying lexical or grammatical meanings. Formal definitions for tonal languages have undergone modifications as analysis of these languages has progressed over the years. Pike (1948) defines tone languages as languages “having (a) significant, contrastive, but relative pitch on each syllable.” Later, Welmers (1959) pointed out that tone is a property of morphemes rather than syllables. According to him, in tone languages, “both pitch phonemes enter into the composition of at least some morphemes.” Hyman (2006) also shared this view in his definition, “tone languages are ones in which an indication of pitch enters into the lexical realization of at least some morphemes.”

Approximately 50-70% of the world's languages are believed to be tonal. The majority of these languages are geographically concentrated in three regions- (a) Africa, (b) Asia,

and (c) the Pacific area and Central America (Hyman, 2007; Yip, 2002). However, unlike the segmental features, the property of tone and its linguistic functions in these languages were not investigated until the late twentieth century. In recent years, more and more attempts have been made to examine the structural and functional properties of tonal languages.

Tone languages are generally divided into two groups- languages with only level tones with tonal morphemes requiring a specific pitch height and languages with contour tones involving a movement between two pitch heights. These were named register tone languages and contour tone languages by Pike (1948). With increasing rarity, the number of level tone contrasts may reach three, four, or five (Maddieson, 1978). The presence of three level tones is relatively common across the world. A language with three level tones usually comprises high, mid, and low tones.

On the other hand, languages with four-level tones are rarer. Kru languages, Mambila, Cantonese, and Jiangyang, are a few such languages with four-level tones. There have been reports on languages like Dan, Trique, and Bamileke with five tones. However, no unanimous decision has been made on whether they have five underlying level tones or some of them are derived (Yip, 2002.) Most languages with extensive tonal inventories have both register and contour tones, as reported in Cantonese (Zhang, 2010) and Thai (Luksaneeyanawin, 1983).

Tone may develop in previously non-tonal languages as historical sound change processes. Such phenomena, termed ‘tonogenesis,’ can occur when a language loses certain phonemic distinctions, leading to tone development as a compensatory mechanism. This ensures that lexical contrasts are not lost in the face of neutralizations of phonemic contrasts. The development of tones following the loss of voicing distinctions has been well-attested and adequately explained in the literature (Haudricourt, 1972; Ferlus, 2004; Kingston, 2011; Gope, 2016).

In terms of forms and functions, tone has characteristics that make it similar to segmental units and distinguish it from the same. Hyman’s (1990) remark in this regard is noteworthy: “tone systems have properties which SURPASS segmental and metrical systems..... tone can do everything that segmental and metrical phonology can do, but the

reverse is not true.". Features that distinguish tone from segmental phonology have been identified by Yip (2002) as follows:

"a. Mobility: Movement away from the point of origin

b. Stability: Survival after loss of original host segment

c. One-to-many: A single tonal feature shared by two or more segments

d. Many-to-one: Multiple tonal features surfacing on a single host segment

e. Toneless segments: Potentially tone-bearing segments that never acquire phonological tone."

These properties also shed light on the motivations for the tone representation in the Autosegmental framework, which locates the tones in a tier separate and 'semi-autonomous' from the segmental string (Goldsmith, 1976).

Tones in many languages encode grammatical meanings that are typically expressed through segmental affixes in non-tonal languages. There has been ample empirical evidence of tone denoting nominal inflectional categories like number (Hyman, 1981 for Somali), person (Broadwell, 2000 for Zapotec), gender, case (Tucker and Ole Mpaayei, 1955, for Maasai; Ezung, 2014, for Tenyidie) and verbal inflections like agreement, tense, aspect, negation and mood (Kroeker, 1977, for Nambikuára; Hyman and Schuh, 1974, for Aboh Igbo).

1.2.2. Intonation studies in languages

Intonation refers to the manifestations of pitch, duration, and loudness that stretch over utterances in a language for linguistic and paralinguistic communicative functions. Ladd (2008) defines intonation as the "use of suprasegmental phonetic features to convey post-lexical pragmatic meanings in a linguistically structured way." Intonation communicates several utterance-level linguistic meanings. It serves the function of dividing a stream of speech into chunks (Grice & Bauman, 2007). Intonation divides connected speech into groups that are deemed complete by the listeners. Crystal (1969) termed such groups 'tone groups' and defined them as "the most readily perceivable, recurrent, maximal

functional unit to which linguistic meanings can be attached." These appear as prosodic units within a larger hierarchical prosodic structure. They can be defined in terms of intonation features like pauses, final lengthening, pitch reset (Vaissière, 1983), or final lowering (Arvaniti and Godjevac, 2003). Intonation also serves as a modality or sentence type marker that indicates the distinctions among declaratives, interrogatives, imperatives, and other types of sentences (Ladd 1996; Xu 2002). This involves the relative occurrence of a pitch pattern for a particular sentence type, which applies to utterances of varying lengths (Cruttendan, 1997). Intonation may also capture aspects of information structure like focus or givenness.

Although intonation may involve other prosodic features like duration, loudness, and pauses, pitch is considered the primary parameter for post-lexical meanings (Bolinger, 1955). The centrality of pitch in intonation analysis is reflected in the theoretical frameworks that have developed over the years. According to Ladd, early works on intonation were primarily based on impressionistic assumptions, and they lacked a unified approach to describe intonation in different languages. From the mid-70s, several works paved the way for relatively uniform descriptions and methodologies for analyzing intonation. Over the years, the majority of descriptions of intonation have been centered around whether intonational categories should be defined by pitch levels or by pitch configurations, viz., overall tunes (Cruttendan, 1997). Many configurational models assume a superpositional nature of intonation, wherein contours comprise a general overall contour and local perturbations that "ride" on this overall movement. The *Institute for Perception Research* (IPO) model is a well-known superpositional model known for its notion of intonationally meaningful contours as localized movements superposed on a larger declination component. Other substantial models in this group include Fujisaki's model (1983, 2004), which maintains a distinction between larger *phrase commands and* local *accent commands,* and Gårding's (1983, 1987) model, which posits that local F0 minima and maxima can be fitted within a grid of two parallel lines; the grid's overall range and direction correspond to functional differences in utterances, such as distinguishing between statements and questions.

Descriptions of intonation through level tones have been prevalent since the days of American structuralists (Hockett, 1955; Pike, 1945; Trager and Smith, 1951; Trager, 1961). The level tones in these analyses are intended as phonological abstractions,

similar to phonemes. They are defined in relation to one another rather than representing specific pitch ranges. The most influential work in this line to date is Janet Pierrehumbert's thesis, *The Phonetics and Phonology of English Intonation* (1980). Following the metrical theory of Liberman (1975) and the study of Swedish Accents by Bruce (1977), she proposed an Autosegmental-Metrical model of Intonation that was further modified by Beckman and Pierrehumbert (1986), and Pierrehumbert and Beckman (1988). Bruce's (1977) monumental work on Swedish intonation proved the significance of *turning points* in the pitch contour, F0 minimal, and maxima, which temporally align with specific units of the segmental string. He demonstrated that these timing relations are both consistent in terms of production and are perceptually salient. Drawing from him, Pierrehumbert (1980) maintained that the intonation contour can be represented only in terms of two tones- L and H; as the crucial points in the contour are relevant for the description of intonation. The AM model describes the intonation of an utterance as a sequence of tonal events, which are of two types- *pitch accents*, i.e., the most prominent syllables, and *boundary tones*. These phonologically specified and linguistically important elements of the tonal melody are located in a tier separate from the text tier. The surface pitch contour can be obtained by interpolating these important f0 points. The intonational tone inventory comprises *nuclear pitch accents, pre-nuclear pitch accents, phrase accents,* and *boundary tones*. The status of local f0 minima and maxima as nuclear/pre-nuclear pitch accents or boundary tones depends on their relation to the metrical structure. The *nuclear pitch accents* are docked to the most metrically prominent segmental units. In Beckman and Pierrehumbert's (1986) model of English Intonation, six-pitch accents- L*, H*, H*+L, L*+H, L+H*, H+L* and two boundary tones- L%, H% were included. Intonation contours for different post-lexical meanings comprise different combinations of pitch accents and boundary tones from this inventory, making them equivalent to segmental morphemes with distinctive meanings (Guessenhoven, 2004; Ladd, 2008). The AM theory of intonation has been since applied to accounts of intonational phonologies in several other languages, including Dutch (Gussenhvoven,1991, 1999; Gussenhoven and Rietveld, 1992), German (Féry, 1993), Japanese (Pierrehumbert and Beckman, 1988), Bengali (Hayes and Lahiri, 1991) and many others. Ladd (1996) notes that cross-linguistic variations in terms of intonation can be of four types-

(i) *Semantic differences*: differences in the meaning and use of phonologically identical tunes.

(ii) *Systematic* differences: differences in the phonologically distinct tune types inventory, irrespective of semantic differences.

(iii) *Realizational* differences: differences of detail in the phonetic realization of what may be regarded phonologically as the same tune.

(iv) *Phonotactic* differences: differences in tune-text associations and permitted structure of tunes.

The findings of this model had important implications for existing theories of prosodic structure (Collier and 't Hart, 1972; Selkirk 1978 et seq.). Prosodic units like intonational phrases (IP), intermediate phrases, and accentual phrases (AP) are identifiable through particular pitch accents and/or boundary tones belonging to different levels of the hierarchical prosodic structure of individual languages. Moreover, the elements in the tonal tier also make up the lower levels of such phonological structures (Gussenhoven 2015; Ladd 2008).

In 1992, a new system called Tone and Break Indices, aka ToBI (Silverman *et al.*, 1992), was formulated based on Pierrehumbert's works. It is a framework for developing community-wide conventions for transcribing and annotating the intonation and prosodic structure of spoken utterances in a language. Apart from providing a notation system for transcribing intonational tones, it also developed a system for annotating prosodic boundary strength (Gussenhoven, 2004). It was initially developed for Mainstream American English (MaE) and is now known as MAE-ToBI (Pitrelli, Beckman and Hirchberg, 1994; Jun, 2003). Later on, it was adopted in studies on intonation in other languages with the incorporation of required modifications.

1.2.3. **Intonation in tone languages**

Many works on intonation in tonal languages indicate that languages with lexical tones generally avoid complex intonation systems (Cruttenden, 1997; Gussenhoven, 2004; Ladd, 2008; Yip, 2002). Researchers in this area suggest that the use of superimposed intonation can be realized in five ways in tone languages: *Lowering or raising of pitch register, expansion or narrowing of pitch range, imposition or suspension of downdrift, modification of the final tone, the realization of boundary tones at domain edges.*

The pitch register of lexical tones in phrases or utterances can be raised or lowered in some tonal languages to mark intonation. Lowering or raising the pitch register may be employed to express sentence modality, mark prosodic phrases, or indicate focus. In Hausa, the pitch register is higher in question utterances (Inkelas and Leben, 1990). Peng (1997) shows that the Taiwanese exhibit evidence for register lowering. Polar questions in Bemba (Kula and Hamann, 2017) and Chichewa (Downing, 2017) are marked by suppression of downdrift. Mandarin employs pitch range expansion for focus marking, resulting in higher scaling of H and lower scaling of L tone (Xu, 1999). Akan has pitch register lowering as a prosodic means for marking focus (Kügler, 2017).

Many languages are seen to show the downward movement of the f0 contour over the utterance in declarative sentences. Such downward movements, known as downtrends, can be either *declination,* characterized by a time-dependent lowering of f0, or *downstep,* the phenomenon of f0 lowering in high (H) tones influenced by the intervention of a low (L) tone. The study of downtrends in tonal languages has been particularly useful for a better understanding of their nature due to the distinct phonological identities of the tones. Declination can be best understood through analysis of like tone sequences. In Mandarin, for instance, utterances display a gradual slope in the f0 values (Xu, 2017). In Yoruba, when sentences consist of only L-tone words, the f0 values decrease gradually over the utterance (Connell and Ladd, 1990). Bodo, too, exhibits evidence of gradual lowering of f0 in non-initial L and H tones (Das, 2017). However, tone languages may not always observe f0 downtrends. While some languages completely suspend it, others limit it to certain tones. Declination is not seen in the case of all H-tone and M-tone sentences in Yoruba (Connell and Ladd, 1990). The complete absence of declination is seen in languages like Embosi, a two-tone Bantu language of the Republic of Congo (Rialland and Aborobongui, 2017). Polar questions in Bemba and Chichewa are marked by suppression of downdrift (Downing and Rialland, 2017). In Sgaw Karen, accentual phrases are the domain of downstep, which distinguishes them from other prosodic units (West, 2017).

The boundary tones at the edges of various prosodic domains indicate sentence type and mark the edges of prosodic domains. In tone languages, where words already carry pitch specifications, it is interesting to note how boundary tones are accommodated in these languages. Kinande (Hyman, 1990) has a boundary tone H% at the end of its

phonological phrase and an L boundary tone at the end of the intonational phrase. Chichewa and Tumbuka have H boundary tones at the end of embedded clauses (Downing, 2017). Bodo has both monotonal and bitonal boundary tones at the right edge of its intonational phrase (Das, 2017).

Apart from such pitch-based changes, tonal languages may use non-pitch prosodic features like duration, intensity, phonation, or pauses to encode post-lexical meanings. There is an absence of penultimate lengthening to mark non-declarative utterances in Shekgalagari (Hyman and Monaka, 2008), pauses to mark fronted constituents and embedded clauses in Akan (Kügler, 2017) and Chichewa (Downing, 2017), final glottal stop marking imperatives in Lahu (Matisoff, 1973), questions in Kaingang (Wiesemann, 1972; Wetzels, 2008), and negatives in Dagbani (Hyman, 1989) are instances of such non-tonal intonational strategies.

While established frameworks like the AM model work well in intonation only and pitch accent languages, their application in tonal language is not always free from analytical complexities. Advocating for a 'unity of pitch phonology,' AM approaches view pitch contours in both tonal and non-tonal languages simply as strings of tones organized linearly. The identities of theses tones as lexical tones or as intonational pitch accents and boundary tones are considered to be more functional differences. Both types of pitch accents in this framework are similar in terms of structural organization (Gussenhoven, 2004; Ladd, 2008). This view works well while addressing the presence of boundary or edge tones in tonal languages to mark utterance-level meanings. However, such straightforward analysis based on surface tone may run into the issue of overlooking other possible explanations of boundary tones. As Hyman and Monaka (2008) point out, sentence final tones might be floating lexical tones instead of intonational tones, left by a sentence type marking particle (found in abundance in many tonal languages) that got deleted over time.

Moreover, in most East and Southeast Asian languages, intonation does not appear to function by adding tones as it does in some African languages. The intonational patterns do not alter the phonological identity of the existing lexical tones. Intonation is rather superimposed on lexical tone sequences, reminding one of Chao's (1968) ideas of lexical tones as 'small ripples riding on large waves of intonation.' It does not change the phonological specifications of tones, even though it can significantly influence their

phonetic or surface realization. Thus, structurally, intonation seems to be operating on a separate tier from tones (Michaud and Vaissière, 2015). Pitch range/register modification, often exploited in many tonal languages for post-lexical meanings, is one area of the AM model that has yet to have conclusive explanations. In the absence of description regarding how pitch/range register specifications are accommodated in the single tonal tier in AM models, the superpositional models appear more equipped to handle such phenomena. However, the addition of a separate tier for tone register specifications is often offered as a possible way of incorporating such intonational phenomenon into the AM framework (see Ladd, 2008; Snider, 1999).

Hyman and Monaka (2008) listed three ways lexical tones may interact with intonational tones. They are (a) *accommodation*, where lexical and intonational tones are both fully realized (e.g., Hausa contour tones, wherein a low tone is added to the final lexical tone in questions, giving rise to a contour tone; Inkelas and Leben, 1990), (b) *avoidance*, in which phrasal tones are avoided (e.g., Mambila, which has four lexical and two grammatical tones but no boundary tone, Connel, 2017), and (c) *submission*, wherein the intonational tones override the lexical tone (e.g., Akan final lowering, where a final H changes to L, Downing and Rialland, 2017).

1.3. Languages under Study: Sylheti and Chokri

1.3.1. Sylheti

Sylheti is classified within the Bengali-Assamese subgroup of the Indo-Aryan branch of the Indo-European language family. Being part of a large dialect continuum that stretches across much of Indo-Aryan, Sylheti is considered by some to be an independent language and by others as an extreme eastern variety of Bengali (Simard *et al*., 2020). Around 10,300,000 people use Sylheti as their first language, of which approximately 7,000,000 reside in Bangladesh (Lewis et al., 2013). Sylheti speakers of Bangladesh are primarily settled in the Sylhet district of northeastern Bangladesh. In India, Sylheti speakers primarily inhabit two northeastern states: Assam (specifically in the Barak Valley districts of Cachar, Hailakandi, and Karimganj) and Tripura (mainly the northern districts of Kumarghat, Dharamnagar, and Kailashar). The data used for this dissertation is mostly collected from the Dharamnagar region of Tripura. Sylheti is known to follow

its own script called Syloti-Nagari, which is considerably different from the Bengali script (Chatterjee, 1926; Gope, 2016).

Several distinct phonetic and phonological properties distinguish Sylheti from standard Bengali (Gope 2016, 2018; Roychoudhury, 2024). In particular, the application of obstruent lenition has led to loss of contrastive aspiration and processes of *spirantization* and *deaffrication*. The process of *deaspiration* that affects both voiceless and voiced segments has resulted in the complete absence of aspirated obstruents in the language. Moreover, post-deaspiration, the underlying voiceless labial and dorsal stops are further *spirantized* to homorganic fricatives following the phonological process of consonant weakening, e.g. [pan] >[ɸan] "betel," p^{h}ul>[ɸúl] "flower." Deaffrication, on the other hand, changed the post-alveolar affricates (both aspirated and unaspirated, viz. [tʃ], [tʃ^{h}], [dz] and [dz^{h}]) to alveolar fricatives [s] and [z] respectively; e.g. [tʃal]> [sal] "rice,", [tʃ^{h}ad̪]> [sáḍ] 'roof', [dzal]>[zal] "net," [dz^{h}al]>[zál] "hot." As per the latest studies, the segmental phoneme inventory of the language has 17 consonants and 5 vowels (Gope, 2016, 2018, 2021).

1.3.1.2 *Tonal Phonology of Sylheti*

Sylheti is known to have undergone tonogenesis as the aspiration merger has led to the development of two-way tonal contrast in the language. The language at present distinguishes two level tones, Low (V) and High (V́) (Gope, 2016; Mahanta and Gope, 2018), generally corresponding to syllables with historically unaspirated (CV) and aspirated (C^{h}V) consonants, respectively, e.g., low-toned /zal/ 'net' vs. high-toned /zál/ 'spicy.' The voice quality analysis of vowels carrying high tone showed that they are mostly modal in terms of phonation, indicating production through relatively constricted glottis in contrast to low toned vowels that appear to be breathy (Gope, 2021).

In disyllabic roots, both syllables are realized with identical tones regardless of the place of aspiration loss (Gope, 2016). In terms of tonal morphophonology, the language exhibits the presence of *tonal polarity* (Gope, 2016; Mahanta and Gope, 2018). Most nominal affixes in the language are not underlying and specified with tone; they receive a tone opposite to the one carried by the roots. Verbal suffixes, on the other hand, are specified with a low tone, which causes high tone verbal roots to change into low tones.

(see chapter 3 for a discussion on how tonal polarity processes mark prosodic constituents at the level of prosodic word).

In a later study, Raychoudhury and Mahanta (2020) examined the Sylheti variety spoken in the Cachar region (Silchar district) of Assam, India, finding a three-way contrast: high, mid, and low. The authors claim that the syllable position where the loss of aspiration takes place determines the tone quality in Cachar Sylheti.[1]

The confirmed presence of lexical tone in Sylheti opens up the opportunity to understand tone-intonation interaction in an Indo-Aryan tone language. Among the Indo-Aryan group, only a few languages in the northwestern Indian states of Punjab, Haryana, and Rajasthan are reported to have undergone tonogenesis; some of these are Punjabi (Bhatia, 1975; Vijayakrishnan, 2009), Bagri (Gusain, 1999), and Dogri (Kaul, 2012). The intonational properties of these languages from a prototypically non-tonal language family are yet to be explored. In contrast, Sylheti (Gope, 2016) might be one of the only Indo-Aryan languages well outside of this north-western region to have undergone tonogenesis; Sylheti is spoken in Bangladesh and Northeast India, an area crowded with a large number of tonal languages belonging to the Tibeto-Burman and Tai-Kadai language families. It also neighbors dominant non-tonal Indo-Aryan languages like Assamese and Bengali. Such a status makes intonation analysis in this language an opportunity to gain insights into how intonation in tonal languages from prototypically non-tonal language families behave.

1.3.2. Chokri

Chokri is an underdocumented Tibeto Burman language from North-East India. This language belongs to the Angami-Pochuri phylum of Tibeto-Burman languages in North-East India. It is the language spoken by the Chokri-mi or Chokri subgroup of the Chakhesang tribe. The Chakhesangs are a major Naga ethnic group previously known as the former Eastern Angami. The name "Chakhesang" is an acronym constructed to represent three ethnic groups it encompasses: the Chakrü (Chokri), Khezha (Kuzhami), and Southern Sangtam (now Pochury). Chokri speakers primarily inhabit the north-

[1] For this dissertation data was primarily collected from the northern Tripura variety of Sylheti, primarily spoken in the districts including Dharmanagar, Kumarghat, and Kailashar, areas that demonstrate a two-way tonal contrast. The post-lexical pitch contours did not show presence of a Mid tone.

western parts of the Phek District of Nagaland. Some Chokri villages are also located in Manipur. The census of 2011 estimates the total number of Chokri speakers to be about 111,062. However, according to UNESCO (2011), the language is currently at the *vulnerable* level of language endangerment. Each Chokri village has its distinct variety of the language, and no variety is considered unanimously to be the standard variety. The studies in this dissertation are based on the variety of Chokri spoken in Thipüzu village of the Phek district in Nagaland.

1.3.2.1. *Tonal Phonology of Chokri*

Like many other Tibeto Burman languages in the region, Chokri too has lexical tonal contrasts. However, linguistic investigation into Chokri is considerably scarce to date. Bielenberg and Nienu (2001) provides an early account of the phonology of the language (Phek dialect), which reports that there are 33 segmental and 4 tonal phonemes. More recently, acoustic studies on tone in Chokri spoken in Thipüzu village in the Phek district report the presence of 33 consonants, 7 vowels, and 5 contrastive tones- Extra High, High, Mid, Low, Mid Rising- in its phoneme inventory (Tetseo and Gope, 2021; Gope et al., 2024) (see **Figure 1.1**). The language lends a heavy functional load on tonal phonemes as all syllables are marked with tonal specifications, making them the Tone Bearing Units (TBU) (Tetseo and Gope, 2021; Gope et al., 2024; Gogoi and Gope, 2023; Gogoi et. al., *forthcoming*). Morpho-phonological analysis of tone in Chokri shows that in both nominal and verbal roots, the final syllable carries the contrastive tone while the non-final syllables are realized with a default mid tone. Moreover, all the affixes in the language are specified with tones (Tetseo and Gope, 2021).

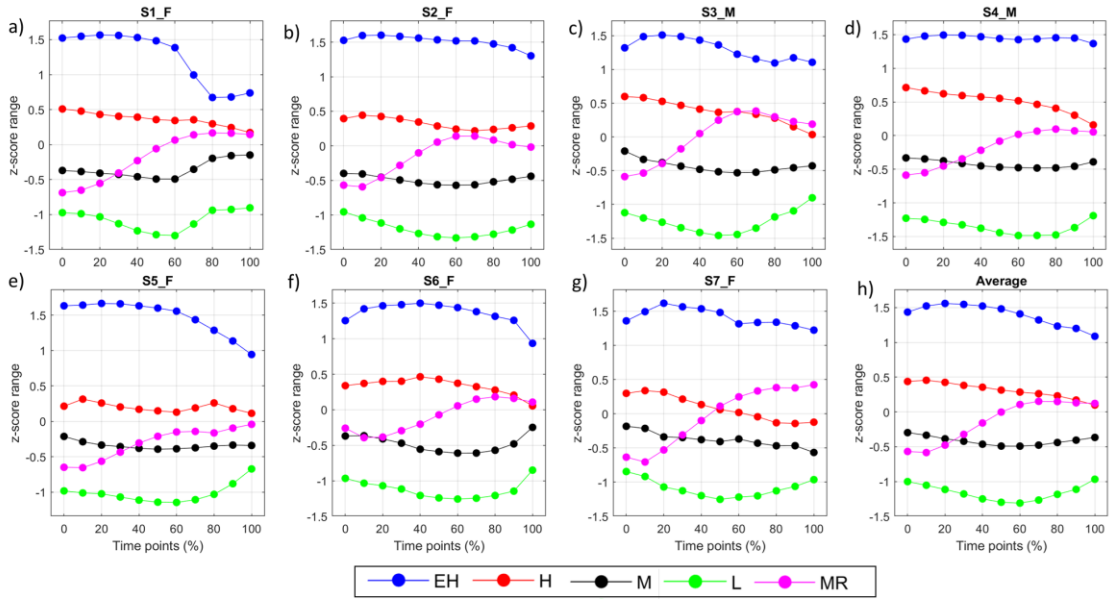

Figure 1.1: Z-score normalized f0 contours exhibited in a Chokri monosyllabic minimal set (5-way contrast) produced by 7 native speakers are shown here- (a) to (g), and the (h) average (averaged across all the tokens by all the subjects). The legends, [S] stands for a subject, followed by the number of the subject and the gender information, where M stands for a male speaker, and F indicates a female speaker. The x-axis indicates the division of the f0 track into eleven equidistant time points, ranging from the onset (0%) to the offset (100%) of the f0 trajectory. This figure is reproduced from Gope et al. (2024).

1.4. (Research) Objectives of the dissertation

The existing literature on patterns of intonation in tone languages is primarily based on studies done in tone languages in Africa and major Sinitic tone languages in East-Asia, such as the Chinese dialects. Most of the tone languages of North-East India have rich tonal inventories of two or more tones (see Konnerth, 2014 for Karbi; Meyase, 2014 for Tenyidie; Morey, 2014 for Singpho, Tangsa, and Tai; Sarmah, 2004; and Das, 2017 for Bodo; Post, 2015 for Tani languages including, Apatani, Minyong and Tanga; and Teo, 2014 for Sumi). Studies of tone in these languages often remark on the complexity of analyzing tone due to their varied interaction with prosodic properties like rhythm and intonation (Evans, 2009; Teo, 2014; Post, 2015). Despite this, not much work has been done on understanding how intonational properties interact with the lexical tones in these languages. Few endeavours have been undertaken to understand how intonation is realized in these languages with robust tonal properties, leading to their underrepresentation in the typological analysis of tone and intonation. Research in this area may thus contribute to the present literature on the interaction of tone and intonation

by unfolding whether these languages adhere to the already observed patterns of intonation or have other ways that are yet to be known.

Following the insights mentioned above, the dissertation aims to work toward the following research objectives:

1. To investigate whether the languages under consideration observe features of downtrends in utterances and to establish the precise nature of downtrends realization.
2. To examine how many layers of the prosodic structures in Sylheti and Chokri are marked with intonational properties.
3. To explore how different sentence types of utterances are marked with intonational features in the two languages.

4. To investigate how in-situ focus is prosodically manifested in Sylheti and Chokri.

An overarching goal of this dissertation is to understand how lexical tones interact with intonational tones in two languages of North-East India that can be placed at two different ends of the tonal contrastivity spectrum. By investigating the intonation properties of languages from two different language families, this work also addresses the relative vacuum that exists in intonation studies in Indian tonal languages. The results obtained from the studies undertaken throughout this dissertation will offer insights into the extent to which the established frameworks on intonation studies, like the AM model, can be applied to tonal languages. The outcome of this work will also contribute to a more inclusive representation of languages other than African and East-Asian languages in typological accounts of intonation in tonal languages.

1.5. Layout of the Dissertation

Chapter 1 introduces the central concepts relevant to the study undertaken in this dissertation. It reviews the existing literature on lexical tones in languages across the world. It also sets the background of the study by presenting a discussion on the studies of intonation in different languages and theoretical traditions related to intonation. An account of available research on intonation in tonal languages is also offered in this chapter, which sheds light on the prevailing research gap, i.e., limited work on intonation

in tonal languages of North-East India that this work aims to address. This chapter also lays down the general aims and the particular objectives of the dissertation.

Chapter 2 is the first core chapter of the dissertation. It concentrates on one of the major functions of intonation- breaking down long utterances into speech units of different levels. This chapter establishes the hierarchical prosodic structure above the level of Prosodic Word (PrWd) in Sylheti and Chokri. It also explores how many levels in this structure are marked by intonational properties in the two languages and what these properties are. Results indicate the presence of pitch accents and boundary tones in Sylheti, along with other prosodic features like pause and pitch reset. Chokri, on the other hand, largely avoids any kind of intonational tones.

Chapter 3 demonstrates how lexical tones are affected by f0 downtrend, a pitch phenomenon operating at the post-lexical level. Other than investigating which downtrends are present in the two languages, Sylheti and Chokri, mathematical modeling is also performed to reveal their precise nature. Results reveal the presence of declination in Chokri that can be modeled with a linear fit (all H and all L tone sequences), while final lowering is restricted to all Mid tone sequences declination, which involves exponential decay fit. It also shows that in Sylheti f0 peaks of declaratives undergo phonological downstep which can be modelled with Liberman and Pierrehumbert's (1984) downstep ratio and lowering constant.

Chapter 4 investigates how different types of utterances are distinguished using intonationcues in Sylheti and Chokri. Especially the distinctions between declaratives and interrogatives are explored in detail in the chapter. Pitch register raising for question sentences emerges as a primary prosodic marker in both languages. Experimental evidence of such register changes is further confirmed through statistical tests. The chapter also discusses other pitch-related and non-pitch prosodic features that contribute to marking particular types of utterances.

Chapter 5 is based on experimental studies conducted to understand how focus is prosodically realized in the languages under study. It looks into the prosodic features of different types of in-situ focus, especially in the object positions. Three types of focus conditions were examined- (i) informational focus, (ii) contrastive focus, and (iii) corrective focus. The results exhibit a different pattern than the predominate view that

focus always attracts higher pitch, intensity, and duration. Pitch lowering on target words consistently occurs for all three focus conditions in both languages. The chapter also discusses how the pitch of pre-focal and post-focal elements is affected. The effect of focus on other prosodic correlates, i.e., duration and intensity, too, is analysed in this chapter.

Chapter 6 summarizes the findings of studies conducted for each chapter. It presents a comprehensive discussion of the obtained results and shows how they have fulfilled the objectives defined in Chapter 1. Apart from demonstrating how this work contributes to the prevailing gap in knowledge, it also points out its theoretical/typological implications and prospective for further research.

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