

Zo Tonology

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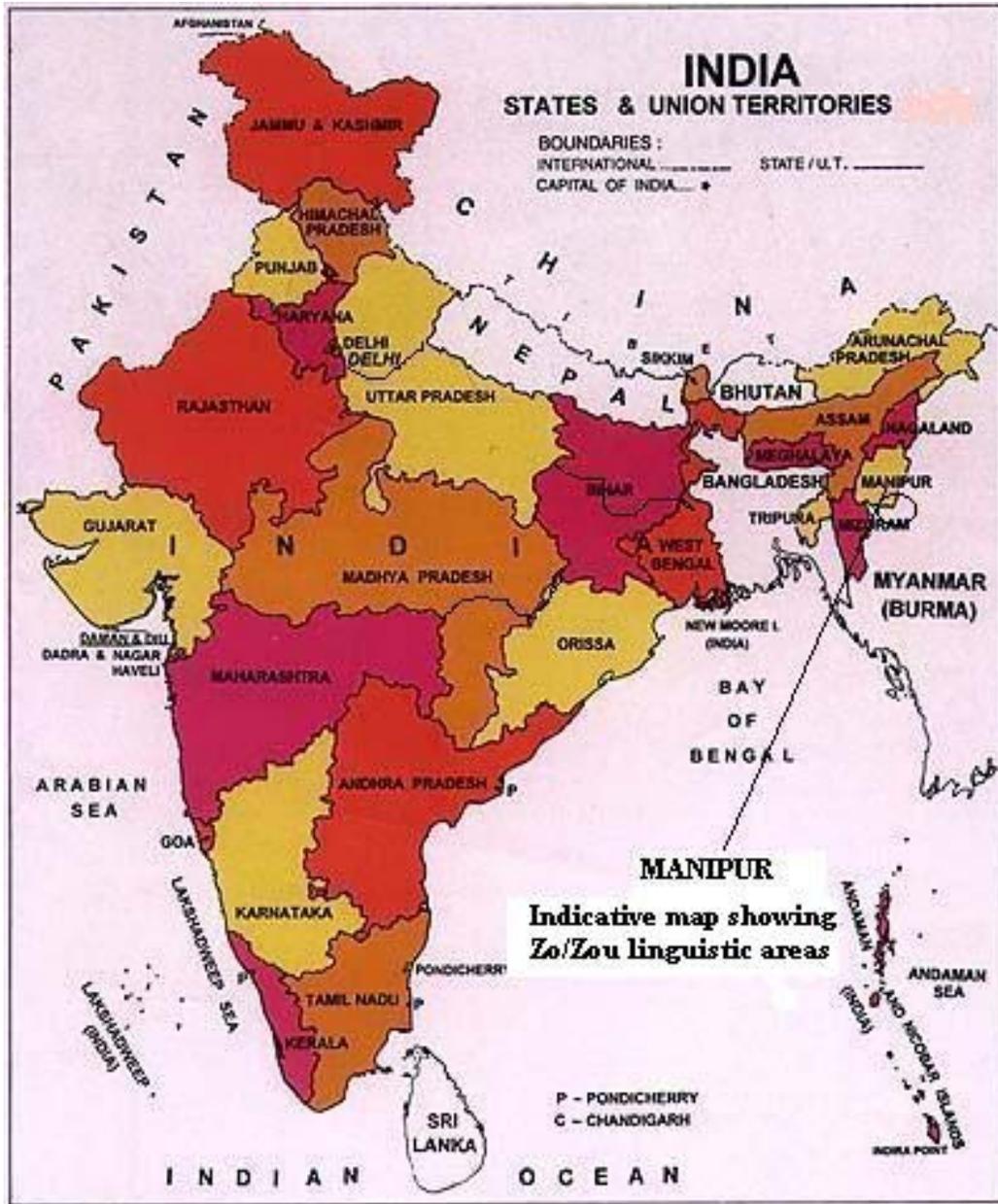
Abstract: Zo¹ is a Northern Kuki-Chin language spoken in Manipur state, India and the Sagaing sub-division and, in Chin Hills of Myanmar respectively. It is a monosyllabic, agglutinating, nonrestricted tone language having *two minimal tone pairs* for most of its main verbs and adjectives, commonly referred to in Kuki-Chin literature as Stem1 and Stem2. Majority of the Zo² verbs undergo morphophonemic changes called *Lax-Tense alternations or Tone Alternations or Morphono-tonemic process*. Since, it was first noted, some useful studies have been done. This paper describes the types of tones attested in Zo in particular, with the appearances of Stem2 verb tones, and it attempts to exhibit the pragmatic tone rules of this language in general.

Keywords: minimal tone pairs, Stem1 and Stem2, morphono-tonemic process.

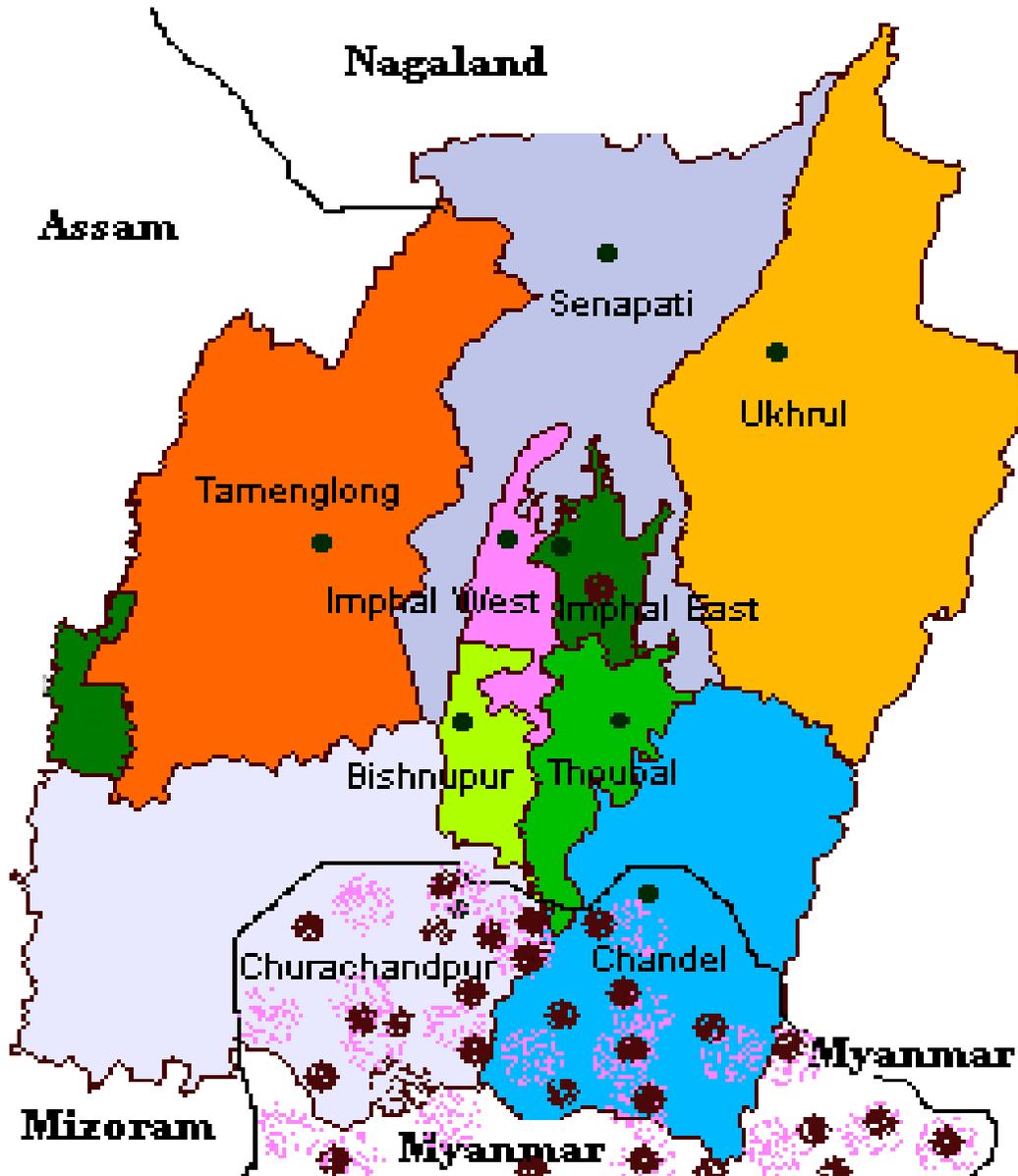
¹ The name of the language is also variously written as Zou, Jou, Yo, Yoe, Zome, Zomi, Kuki-Chin.

² The terminology is used by Khoi Lam Thang (2001); Button (n.d). Here, I am using the practice followed by renowned linguists. Zo is a close cognate of Tiddim Chin. In India, Zou is used for the same language.

³ Tiddim is loconym of Tedim as explained by Khoi Lam Thang (2001) is a language spoken in Tedim and other areas of the Chin Hills of Myanmar (Burma).



Political Map of India showing Manipur State



Indicative linguistic map of Zo/Zou speaking areas

MAP OF MANIPUR & ADJOINING BOUNDARIES OF MYANMAR (BURMA)

1.0 Introduction

Zo or Zou is spoken by 35,000 in India and 75,000 (approximate) in Myanmar (Burma). *Verbal stem alternations*, as they are called, take shape as two distinct variations in the verb stem, formed by the addition or alternation of a single final morpheme. These variations are known as *stem1* and *stem2* (King, 2009), *Form I* and *Form II* (Henderson, 1965). Slightly modifying to suit Zo verbal stem alternations, “Verbal stem alternations, as they are called, take shape as two distinct variations in the verb stem, formed ‘either by deletion of final stop/coda or addition of stop to open syllable or alternation of a single final morpheme’.”

2.0 Types of Zo verbs

The Zo verbs can be classified into 3(three) types: Stem1, Stem2, Stem3 as given below:

Stem1	Stem2	Stem3
<i>pié</i> ‘give’	<i>pié?</i>	<i>pe-</i>
<i>puó</i> ‘carry’	<i>puó?</i>	<i>po-</i>

3.0 What is a tone language?

Let us see some definitions of a tone language.

(i) “A language is a tone language, if the pitch of the word can change the meaning of the word. Not just its nuances, but its core meaning” (Yip, 2002).

(ii) “A language with tone is one in which an indication of pitch enters into the lexical realization of at least some morphemes.” (Hyman, 2007).

(iii) “A tone language is a one which uses the feature of tone to distinguish between lexical items. The tone language use tone in a systematic way to express grammatical distinctions. All languages which use tone in a systematic fashion to express either lexical or grammatical distinctions is a tone language (Goldsmith, 1992).

4.0 Tone

Tone employs the pitch in language to distinguish lexical or grammatical meaning—that is, to distinguish or inflect words. All verbal languages use pitch to express emotional and other paralinguistic information, and to convey emphasis, contrast, and other such features in what is called intonation, but not all languages use tones to distinguish words or their inflections, analogously to consonants and vowels. Such tonal phonemes are sometimes called *tonemes*.

According to David Mortensen (2003) a syllable, in isolation, displays the *Lexical Tone*. Abramson (1979) states that the citation form of a monosyllabic word may be viewed as bearing the ideal manifestation of a tone. According to Matisoff (1999, p.88), “Sinospheric TB languages tend to be more strictly monosyllabic than others.” Zo is monosyllabic, partially agglutinating tone language. The Zo tones are treated as *Suprasegmental* features in this study.

Tone-bearing units (TBU) is the morphological unit in which only a single tone specification is found in the pronounced form (Mazaudon, 1977). TBU is the phonological unit which receives a tonal pitch command (Yip, 2002; Gussenhoven, 2004). Like many tone languages, *the Tone Bearing Unit* (Goldsmith, 1990, p.44) is the “*syllable*” in Zo, whose tonal rhymes consist of i) Short/lax and Long/tense vowel quality ii) Glides (diphthongs, triphthongs) which are realized as Rising(H), Mid(M) and, Falling(L) and Low tones in isolation respectively.

In terms of lexical phonology, the basic tonemes or underlying tones or lexical tones or inherent tonemes either have Lax (short vowel, monophthong) or Tense vowel (diphthong, triphthong) within them as the nucleus depending upon the syntactic constructions with respect to other tonemes in phrasal phonological environments in which they occur as in *morpho-tonemic* process which is explained in Section 6.0.

5.0 Zo tone system: Contour tone system or Register tone system ?

In recent publications, two languages of Sino-tibetan or sinospheric influence (Matisoff) the Mianchi dialect of Qiang (Evans 2008), and Kuki-Thaadow (Hyman 2007) have been noted as having prototypical African tendencies in their tonal systems. Employing Pike’s (1948) characterizations, Hyman (2007) shows the ways that Kuki-Thaadow is more similar to

‘Register tone systems’ (prototypical Bantu), than it is to ‘Contour tone systems’ (Mandarin Chinese, Thai, etc.). Here, the Zo tone system is considered to be Register tone system.

6.0 Morphono-tonemic process of Stem1 and Stem2 in Zo verbs

The change from Form I to Form II or Stem 1 to Stem 2 was earlier described by Eugène Henderson (1965). The tone interacts with morphology in substantial way to produce what is known as *Tense-Lax Verbal Alternations* (Ostapirat, 1998) or *Verbal stem alternations* (King, 2009), *Verbal stem alternations*, as they are called, which take shape as two distinct variations in the verb stem, formed ‘either by deletion of open syllable or addition of consonant or alternation of a single final morpheme’. These variations are known as Form I and Form II (Henderson, 1965) or Stem 1 and Stem 2. The process by which this Form I or *Citation form or original tense (Stem 1)* becomes *lax*, and Form II or *Citation form or original lax (Stem 2)* becomes *tense* vice-versa, often accompanied by processes of epenthesis-excrecence (addition of stop/consonant) or elision (deletion of vowel or consonant/ stop), consonant mutation, monophthongization, voicing or devoicing, resulting in tonal changes usually to falling tone or low tone. This complex process of word formation in Zo, is termed it as “*Morphono-tonemic*” process.

Zo (Khoi Lam Thang, 2001; Thangliênông, 2011, 2012; Button, 2009, 2012) a Northern Kuki Chin has two minimal tone pairs for most of its main verbs, which is commonly referred to in the literature as Stem 1 and Stem 2. Majority of the Zo verbs and adjectives undergo Tone alternations.

The Zo language exhibits a system of tone sandhi in which a given syllable can bear one or two tones depending upon the environment. In isolation, the syllable displays the Lexical or Sandhi Tone (Mortensen, 2003). This tone is usually a direct reflection of the “underlying” or input tone. In a particular morphological and phonological environment, it bears a tone predictable from the lexical tone, which is usually different than the lexical tone. It is also known as *Tone alternations in Zo verbs*.

Quite similar to Lahu, we find that in Zo also there is only a single case of tone alternation between adjacent syllable-morphemes: a phenomenon of tone lowering on certain property concept root morphemes when followed by adverbializer particles by an adverbializer particle *lè?* (e.g. /kaŋ/ → [kàn lè?]).

7.0 Allotonic distribution of tonemes

All tonemes and their allotones occur in all positions. In terms of vowels, considering the vowel lengths; level, short and long, there are 30 vowel tonemes (10 each for each tonal characteristics long and short vowels; Level 10, Falling 10, Rising 10 respectively).

Table 1: /i/ and /i:/ both occur in all positions

Tone→ Position↓	M	M	H	L	H	L
Initials	/iʔ/ 'no'	/i:m/ 'confide'	/ín/ 'house'	/ip/ 'bag'	/í:t/ 'love'	/i:ŋ/ 'yes'
Medials	/bit/ 'secure'	/si:m/ 'partake'	/síl/ 'wash'	/sim/ 'south'	/dí:l/ 'pond'	/dì:n/ 'caution'
Finals	/li/ 'four'	/bi:/ 'thatch' /li:/ 'deep'	/bí/ 'nest'	/mì/ 'putting out'	/sí:/ 'till'	/hli:/ 'drip'

Table 2: /e/ and /e:/ both occur in all positions

Tone→ Position↓	M	M	H	L	H	L
Initials	/eʔ/ 'tear'	/e:ʔ/ 'dung'	/én/ 'look'	/èm/ 'roasted'	/é:m/ 'shine'	/è:m/ 'much'
Medials	/k ^h en/ 'separate'	/le:m/ 'peel off'	/sél/ 'grow'	/tèp/ 'clip'	/té:p/ 'smoke'	/sè:m/ 'work'
Finals	/de/ 'grow'	/de:/ 'shine'			/bé:/ 'bean'	/dè:/ 'sting'

Table 3: /u/ and /u:/ occurs in all positions

Tones→ Positio↓	M	M	H	L	H	L
Initials	/uʔ/ 'govern'	/u:/ 'elder'	/ú:t/ 'willing'	/ùp/ 'steam'	/ú:m/ 'encircle'	/ù:m/ 'garden'
Medials	/tul/ 'faded'	/tu:m/ 'datepalm'	/húl/ 'dry'	/kùl/ 'fort' /lùm/ 'lie'	/bú:ʔ/ 'hut'	/pù:l/ 'epidemic'
Finals	/bù/ 'wear'	/bu:/ 'can' /zu:/ 'wine'		/mù/ 'see'	/tú:/ 'hold' /zú:/ 'rat'	/bù:/ 'rice' /tù:/ 'plant' /zù:/ 'fall'

Table 4: /ɔ/ and /ɔ:/ occurs in all positions

Tones→ Position↓	M	M	H	L	H	L
Initials	/ɔ/ 'Excl.'	/ð:/ 'yes'	/óm/ 'exist'	/əp/ 'brood'	/ó:p/ 'chest'	
Medials	/bɔʔ/ 'crouch'	/sɔ:m/ 'report' /tɔ:m/ 'little'	/tóm/ 'short' /dóm/ 'lift'	/nəm/ 'give' /zəm/ 'link'	/hó:m/ 'empty' /zó:m/ 'oval'	/sò:l/ 'sent'
	/dɔl/ 'teak'	/bɔ:l/ 'do'	/hól/ 'coal'	/sól/ 'cheat'	/tó:l/ 'drive'	/kò:l/ 'cliff'
Finals	/bɔ/ 'bulge'	/bɔ:/ 'rank'	/bó/ 'testes'	/bò:/ 'land'	/tó:/ 'buttock'	/tò:/ 'carry'

Table 5: /ə/ and /a:/ occurs in all positions

Tones→ Position↓	M	M	H	L	H	L
Initials	/əʔ/ 'at'	/a:ʔ/ 'chicken'	/án/ 'food'	/ám/ 'tangy'	/á:m/ 'covet'	/à:m/ 'fiery'
Medials	/bəʔ/ 'bushy' /dəm/ 'heal' /dəŋ/ 'palate'	/ka:ʔ/ 'expand' /ha:m/ 'weed' /da:ŋ/ 'pale'	/dól/ 'sheet' /hóm/ 'rough' /t ^h óm/ 'touch'	/kəl/ 'argue' /t ^h əl/ 'choke' /t ^h əm/ 'hire'	/dá:ʔ/ 'peep' /dá:l/ 'obstruct' /dá:ŋ/ 'shallow'	/hà:m/ 'speech' /dà:n/ 'law' /sà:n/ 'hire'
Finals	/kə/ 'my'	/ha:/ 'tooth' /ŋa:/ 'five'; 'face'	/hól/ 'solid'	/lè/ 'where'	/ká:/ 'forked'	/hà:/ 'release' /hlà:/ 'release'

8.0 Types of Zo tones

My analysis of Zo tones produces, 4 (four) underlying lexical tones in isolation, they are realized as *Rising tone*(H), *Falling tone*(L), *Mid or Level tone*(M) and a slightly Low tone resembling the Falling tone, at times both seem to fall in one category only. Here, I have classed it as a very Low tone separately. Each tone can occur with 'tense/long' or 'lax/short'

vowel/voice quality except the very low tone, giving 6 (six) types of tone qualities or rhymes as shown in Table 6.

Table 6: *Different types of Zo tonal rhymes/patterns based on syllable/vowel lengths*

Toneme 1 Shortrise= H	Toneme 2 Longrise= H	Toneme 3 Shortfall= L	Toneme 4 Longfall= L	Toneme 5 Short low- mid= M	Toneme 6 Long low- mid= M
Hám 'rough'	Há:m 'talk'	Hàm 'wild grass'	Hà:m 'dialect'	Ham 'grasp'	Ha:m 'weed'
Tám 'this'	Tá:m 'wild forest'	Tàm 'pacify'	Tà:m 'wash hand'	Tam 'insipid'	Ta:m 'stay on'
Kán 'solidify'	Ká:n 'cross over'	Kàn 'fried'	Kà:n 'bound'	Kan 'enquire'	Ka:n 'bind'
Kól 'care'	Só:ʔ 'draw'	Sòl 'cheat'	Sò:l 'send.2'	Sol 'planet'	So:l 'send'
Táj 'piece'	Tá:ŋ 'ambush'	Tàn 'ransom'	Tà:n 'light up'	Tan 'calf'	Ta:n 'loose'
*Káp	Ká:p 'shoot'	Kàp 'cry'	Kà:p 'shoot.2'	*Kap	*Ka:p
*Sát	Sá:t 'strike'	Sàt 'pull'	Sà:t 'strike.2'	*Sat	*Sa:t
*Pá?	Pá:ʔ 'exult'	Pà? 'careless'	Pà: ʔ 'praise'	Pa? 'wasteful'	Pa:ʔ 'wet'

There are vowel length distinctions into short and long vowels. The terms; short syllable and long syllable (Henderson, 1965; Ostapirat, 1998; Khoi Lam Thang, 2001) are based on vowel lengths as discussed above. Basing on the syllable/vowel length, we can classify the Zo tonemes based on their rhymes or syllable patterns as; (i) *short rise*, (ii) *long rise*, (iii) *short fall*, (iv) *long fall*, (v) *short low-mid* and, (vi) *long low-mid* as in Table 6. Analysing, the above Table 6, thus, it is possible to classify the surface or lexical tones into (i) *Short tone* and, (ii) *Long tone* on the basis of the syllable/vowel length and, the short fall tones with /ʔ/ finals which are low tones may be classified as *checked tones* (Li, 2005). The tonemes in the last three rows in the above Table 6 occur with (p, t, ʔ) final stops, they can be grouped as

Toneme 7, since they are very low tonemes. Thus, giving us 7(seven) types of tone qualities which can also be seen at Table 8.

The Toneme1 +Toneme2 are high tones (H), the Toneme 3+Toneme4 are Low tones (L), and the Toneme5 +Toneme6 are Low-mid tones (M), thus we have 3 kinds of contrastive tones. The last three rows of tonemes are actually very low tones, considering them as separate very low tonemes, we, finally arrive at 4(four) kinds of contrastive tones in Zo.

Register tone commonly indicates vowel phonation combined with tone in a single phonological system. In Zo the differences in pitch are so intertwined with vowel phonation that neither can be considered without the other, thus, Zo is classed as a *Register tone* language, consists of 4 (four) levels of contrastive tones; Rising (H), Falling (L), Mid-level (M) and Low (L), all have short or long tone/voice qualities respectively.

Of the 4 (four) register tones, it is the mid (M) tone that appears as a Level tone. The high (H) tone is seen as a rise high in the voice range in contrast with the low rise of the rising tone. The low tone appears as a low fall in contrast with the high fall of falling tone.

Like Thadou-Kuki, Paite, Tiddim Chin and other cognates, tone or lexical tone in Zo plays a major role as the only feature distinguishing between words as seen in the minimal quadrilets.

Table 7: Four contrastive lexical tones in Zo

Tones				
Rising	lá:ŋ 'bier'	sá: 'meat'	tóu 'dig'	sám 'hair'
Level or Mid	la:ŋ 'blow'	sa: 'hot'	tou 'sit'	sam 'curse'
Falling	là:ŋ 'frame'	sà: 'thick'	tòu 'up'	sàm 'lack'
Low	kəp 'cry'	nət 'illness'	kəl 'lock'	bəʔ 'bushy'

9.0 Description of Zo tones

At the lexical level, Zo has 4 (four) contrastive tones as shown above in Table 7 viz: level (M), high (H), low (L) and very Low (L) tones. According to tone qualities or tonal rhymes, Zo language has 7(seven) *surface tones* as shown in Table 8 below and as indicated in the last section: viz: i) High rise (H), ii) Low rise (**H**), iii) High fall (L), iv) Low fall (**L**), v) Short mid/level (M), ii) Long mid/level (**M**), vii) Low tone (**L**). From my studies of Zo tones data, I have noted the following level or register tones:- (i) Rising tone, (ii) Falling tone, (iii) Low register tone (low and very low), and (iv) Low-mid tone.

9.1 Rising Tone

The rising tone occurs in both open syllables (sonorants; m, n, ŋ, l and vowel finals) and closed syllables (p, t, ʔ) in long syllables/vowels, however, rising tone does not occur in closed syllables with voiceless stop series (p, t, ʔ) containing short vowels.

The rising tone in closed syllable with voiceless stops series is restricted to long vowel or the diphthongs (ie, uo). In closed syllable, the nasal series and lateral stops do not have restrictions on the type of initial and medial. The open syllable has no restrictions on the type of medial or final vowel but for *i-ended* or *u-ended* diphthongs e.g; ei, ou.

For each rising tone there are two types of tonal rhymes/patterns; one for long vowel or diphthong and the other for short vowel or monophthong. In the closed syllable with rising tone, the final is restricted to nasals (m, n, ŋ), liquid/lateral (l) containing short and long vowel or diphthong and the voiceless stops series (p, t, ʔ) with long vowel or diphthong only.

The Rising tone falls into two classes viz; (i) High Rising tone (HR) starts from low level rising upto fairly high level above the mean pitch and it is often considered as a High tone (H) for analytical purposes and, (ii) Low Rising tone starts from a very low level rising upto or below the mean pitch and, it is represented as H as well for analysis.

i) High Rising tone begins at a mid or low level below the mean pitch height often rising up to fairly high level about 60-70% of the pitch height. The high rising tones are realized within short and long syllables with nasals (m, n, ŋ) and stop finals (p, t). The short vowel rising tone is marked by the symbol H or / ˆ / over the vowel head or the IPA symbol ˧ on or after the word as in /k^hám/ or /k^ham˧/ ‘get intoxicated’, ‘be filled’. The vowel diacritics are; á , é, í, ó/áw, ú.. Examples are; péi; súŋ; súm; tól; kín; ú:t; dóm; p^hiét; p^hín, p^hó:ŋ. ; t^hám; máŋ.

ii) Low Rising tone begins at a very low level and, it rises as high as the mean pitch height or end just below the mean pitch level. Low rising tone occurs with *long* vowel/syllables in open syllables and, in closed syllables with sonorants (l, m, n, vowels, ŋ) and voiceless stop finals (p, t, ʔ) as well. However, the low rising tone in closed syllables with voiceless stop finals does not occur with short vowels. Low rising tone occurs in closed syllable with nasal and lateral approximant stops containing long vowel or diphthong which starts at lower level than the above rising tone reaching to a fairly high level. The Long Rising tone is represented by

the symbol / ˘ : /, or with capital bold letter **H** or its IPA symbol is ʘ, the corresponding vowel or tonemic diacritics as in á: , é: , í: , ó: , ú: Examples are; há:m, ká:n, sé:ŋ, tá:, tú:, sá:ŋ.

9.2 Falling tones

The falling tone starts slightly above the mean pitch and it falls to a very low level in open syllables and closed syllables. For each falling tone, there are two types of rhymes; one with long syllable or long vowel or diphthong (minus short diphthongs; eu, ou, ei) and the other for short syllable or short vowel or monophthong. There is no restriction on length of the medial vowel or diphthongs, that is they are found within short and long syllables. In closed syllables, there is no restrictions on the final consonant or diphthong in the sonorants (l, m, n, ŋ, vowels and diphthongs/triphthongs) and stop/obstruent series (p, t, ʔ).

The Falling tone also consists of two classes viz (i) High falling which falls from above the mean pitch to low level below the mean pitch, such High falling tones are few in numbers in Zo, and, (ii) Low falling tone begins from or below the mean pitch falling to a very low level before final pause.

i) The High falling tone begins somewhere much above the mean pitch falls to low to very low level before final pause. High falling tones are realized with stop final (t). Both the tones are designated by the sequence of capital letters as L or by tone symbol / ˘ / for short syllable, e.g; /kàl/ and by this symbol is / ˘ : / for long syllable, e.g; /hà:m/.

ii) The Low Falling tone starts somewhere below the mean pitch height, falling to a very low level before final pause. It occurs in closed syllables with stop series (p, t, ʔ). It occurs in open syllables and closed syllables with no restrictions on medial vowels either short or long vowel or diphthong in the *morphono-tonemic* class of Stem 2 verbs or Form II (Henderson, 1965) verbs. e.g; kà:, sà: sù:, lè:. or tone III verb sets. When it ends with sonorants (nasals and liquid) it glides down till complete closure. The long falling tone is represented by the symbol / ˘ : / as in à: , è:, ì: , ò: , ù: The capital letter notations for Long Falling tone is **L**.or its IPA symbol ʘ.

9.3 Low-mid level tone

The Low-mid tone occurs in all positions. Low-mid level tone starts at the pitch height which is more or less same as the starting point of the Low falling tone and it maintains a fairly same height all the way then, it falls slightly to a level above the end-point of the low falling tone, before final pause due to reduction in glottal pressure this is explicit in the case of syllable with final stop (ʔ) which falls abruptly at the end. The Low-mid or level tone occurs in both open and closed syllables with sonorants (m, n, ŋ, l, vowels) and voiceless stops /p, t, ʔ/ codas/finals.

But there is no restriction on length of the medial vowel in closed syllable, but the short vowel/monophthong is restricted to open syllable with exception in morpho-tonemic class of Stem 3 verbs (ke-, k^he-, k^ho-, pe-, po-, se-) and pronominal adjectives or possessive pronouns such as *ka, na, i, a*. The diphthongs such as *ia, ie, uo* have no restrictions in closed syllable with nasals and lateral codas, but cannot occur with stops finals. I have denoted it as *Low-mid* tone because of its low level tone quality and its tendency towards becoming a mid level tone i.e it is closer to the mean pitch height than the low pitch height.

For each, Low-mid level tone, there are two types of tonal rhymes or patterns depending upon the length of the vowel or diphthong or syllable length either short or long syllable. The short level tone is attested with short vowel or monophthong or short syllable or short diphthong(ei, ou) e.g; kal; mal; tam, and the long level tone is attested with long vowel or long syllable or diphthongs(ie:, uo:, oi:, ei:). Examples of long level tones are; luo: ; tuoi; na: ; na:ŋ; mau: ; p^ha:ʔ. Level tone is unmarked and it is designated by capital letter M or its IPA symbols †.

i) Short Low-mid tone

It is a fairly level tone below the mean pitch it falls abruptly before the final pause especially in case of tones with stop finals such as *p* and *ʔ*. The starting pitch is almost equal to the starting pitch of the Low falling tone, in fact this tone appears very close to or can be classed as a variant of the Low falling tone (L) in open and closed syllables with voiceless stop series containing short syllables/vowels in a large chunk of Zo tonemes. Henderson (1948) also observed a similar phenomenon in Lushai tone system. In view of the further fall in its pitch height in long utterance forms i.e in a sentence, it can be categorized as Low falling tone (L). It is designated as M or it is left unmarked for analysis e.g; /kəl/ ‘cross’ or ‘step’.

ii) Long Low-mid tone

It occurs in all positions, it begins at the middle ends in middle or slightly falls/glides before pause. The Long Level tone is represented by the symbol / : / as in a : , e : , i : , ɔ : , u : . The capital letter notations for Long Mid or Long Level is **M**: or **M̄**, e.g; /ka:l/ or /kāl/ or its IPA symbol is : ɹ. as in sa:ŋ ‘high’ or sa:ŋ ˥ ‘high.’ I have been using / ˆ / symbol/diacritic to mark this long low-mid tone in many of my books which, is not identical to IPA practice.

9.4 Low tone: This low tone is realized within syllables with stop finals (p, t, ʔ), nasals and liquid (l). It falls abruptly to a very low level. It is designated by IPA symbol ˩ or **L**. Examples are; /kət/ ˩ ‘bind’, /kətʔ/ ˩ ‘cut’, /kəl ˩/ ‘dig’, /kən/ ˩ ‘fried’.

Table 8: Shows the distribution of Zo tones by different syllable rhymes with stop finals.

Tone type and Symbol	Tone Rhyme of vowels	Nasal final	Late ral final	Open/ Oral final	Stoped syllable	Examples
High Rise H; / ˥ /	Short	m, n, ŋ	l	-	-	péi, én; súm, súŋ; hól; kín; p ^h ín, t ^h ám.
Low Rise H; / ˥ : /	Long	m, n, ŋ	l	yes	p, t, ʔ	sá:ŋ, ká:p,p ^h ó:ŋ,há:l p ^h iét, bó:ʔ; tá:, tú:
High fall L; / ˥ ˩ /	Short	m, n, ŋ	l	-	p, t, ʔ	hàm, kàn, pàŋ; kâl; kàp, pat, zàʔ,
Low fall L; / ˥ ˩ : /	Long	m, n, ŋ	l	yes	p, t, ʔ	gà:m, hà:n; ká:ŋ; k ^h â:l, mà:, kà:m, sà:n
Low-mid M, /ə/ or /a/	Short	m, n, ŋ	l	yes	p, t, ʔ	kəm, sən, həŋ, ləl; pət, kəp, kət; kəʔ
Low-mid M; /a:/	Long	m, n, ŋ	l	yes	p, t, ʔ	ha:m, da:n, na:ŋ; pièʔ, p ^h iét, sa:l; sa:., sie:, lie:., sa:p; ta:t; bo:ʔ
Low L	Short	m, n, ŋ	l	yes, in initial	p, t, ʔ	gəm, sən, həŋ, pəl, be; se-; bèp, èt, bèʔ
	Long	m, n, ŋ	l	yes	-	muom, kuon, ŋuŋ; huol, kəp, kət, kəʔ

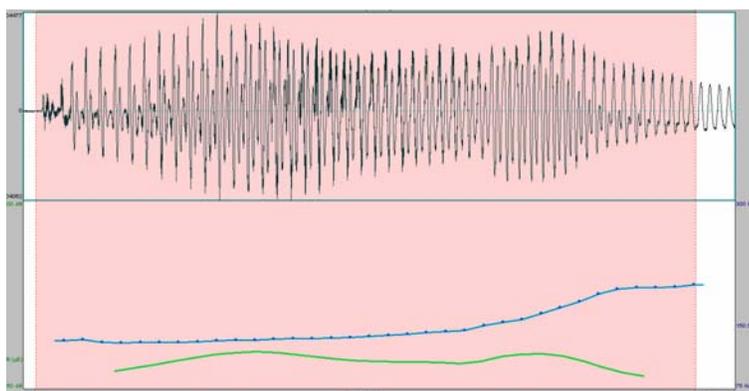
Zo tone pattern distributions

From the analysis of the Zo voice data, I have come to notice that there are 7 (*seven*) *phonetic or surface tones* on the basis of the vowel lengths or tonal rhymes; i) High rising tone (H), ii) Low Rising tone (H), iii) High Falling tone (L), iv) Low falling tone (L) v) short Low-mid tone (M), vi) long Low-mid tone (M) and vii) Low tone (L). It has 4(*four*) *contrastive underlying phonological tones*. The Long Low-mid marked with (M), is considered as a ‘default tone’ (Yip, 2002) while analyzing Zo tones.

10.0 PRAAT diagrams of different types of Zo tones: Register tones and Contour tones.

10.1 Register tones

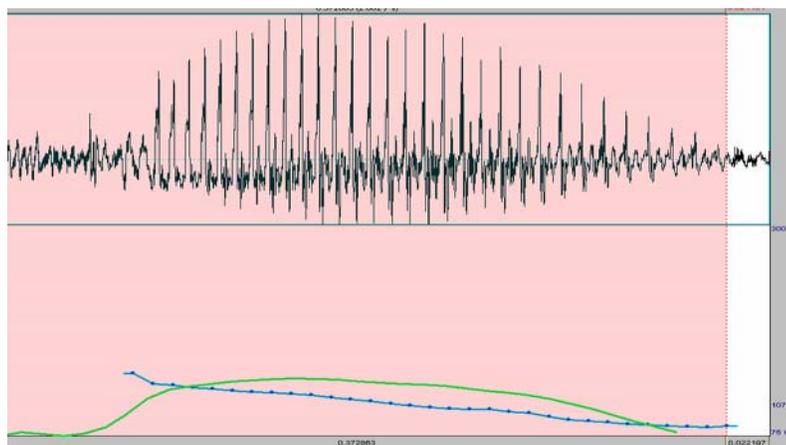
1. Rising tone



Waveform, Intensity curve and Pitch curve of *péi* ‘go’

Figure 1

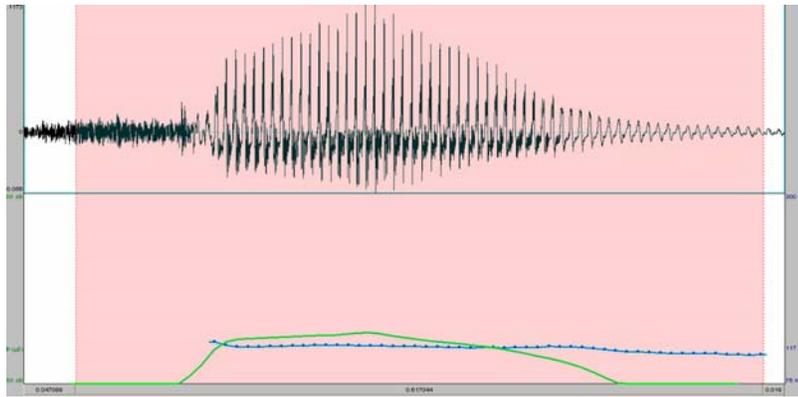
2.0 Falling



Waveform, Intensity curve and Pitch curve of *hà*: ‘moon’

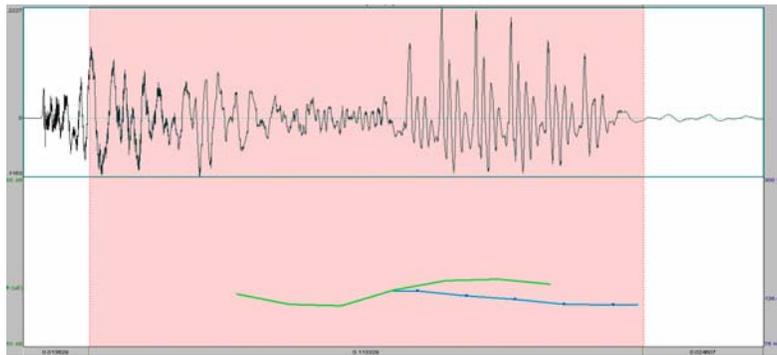
Figure 2

3.0 Mid or Level (M)



Waveform, Intensity curve and pitch curve of *la:* 'soul'

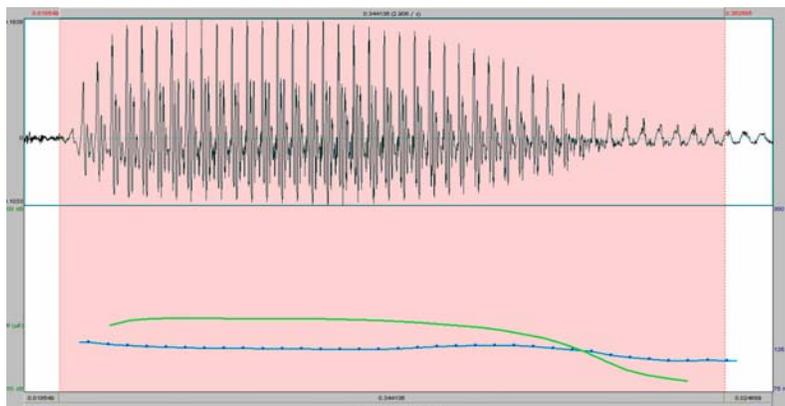
Figure 3



Waveform, Intensity curve and pitch curve of *t^hət* 'kill'

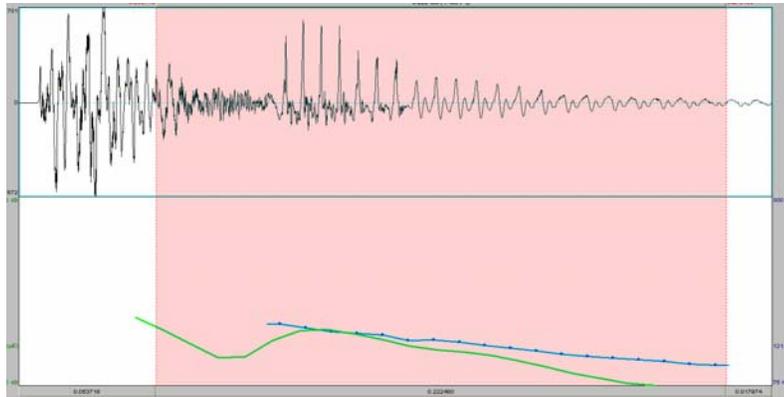
Figure 4

4. Low tone or Low falling tone



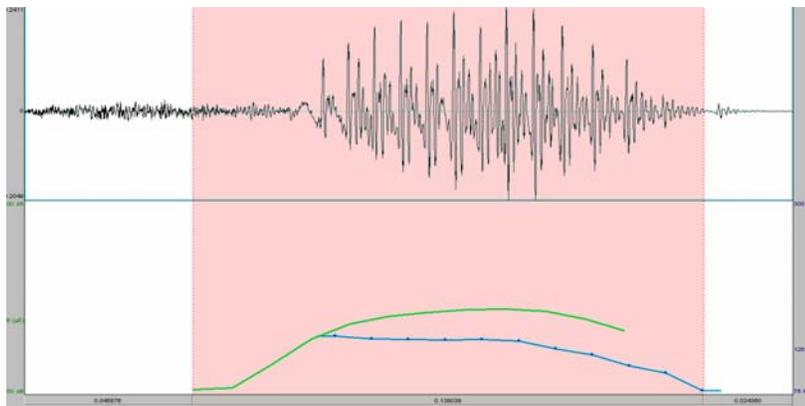
Waveform, Intensity curve and pitch curve of *ka:* 'room'

Figure 5



Waveform, Intensity curve and pitch curve of *t^hàn* 'maggot'

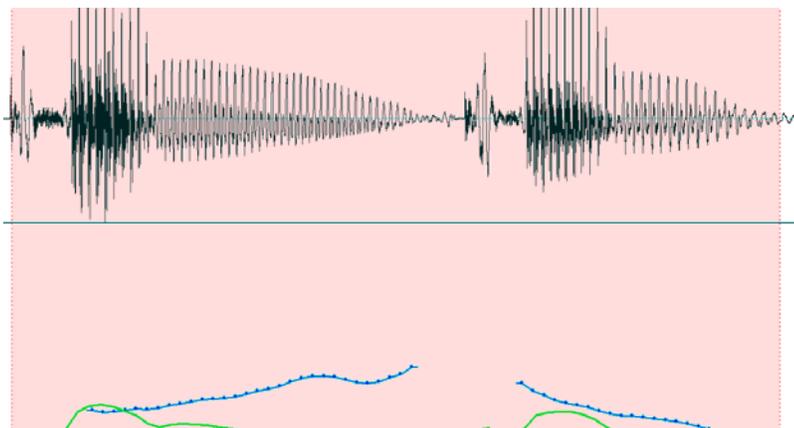
Figure 6



Waveform, Intensity curve and pitch curve of *hǎ?* 'awake'

Figure 7

10.2 Tone alternations from Stem1 to Stem2



Waveform, Pitch, Intensity of Stem1 *t^hám* 'touch' and Stem2 *t^hám* 'touch.2'

Tone changes → Stem1 /H/ → Stem2 /L/

Figure 8

11.0 Contour tone system in Zo

According to Moira Yip (2002: 27) a contour may occur within a single syllable, but only if that syllable is heavy(a long vowel or closed syllable). Contour tones are considered to be sequence of level tones, that tones are properties of weight units (moras or morae) and that therefore, only if a syllable has two moras can it bear two tones, giving rise to a surface contour. The need for two moras imposed by contour tones can cause vowel lengthening. There is a general consensus that in both tone languages and non-tone languages, the tone melodies that are present are best analyzed as consisting of sequence of one or more level tones (generally called High, Mid and Low (Goldsmith 1992)).

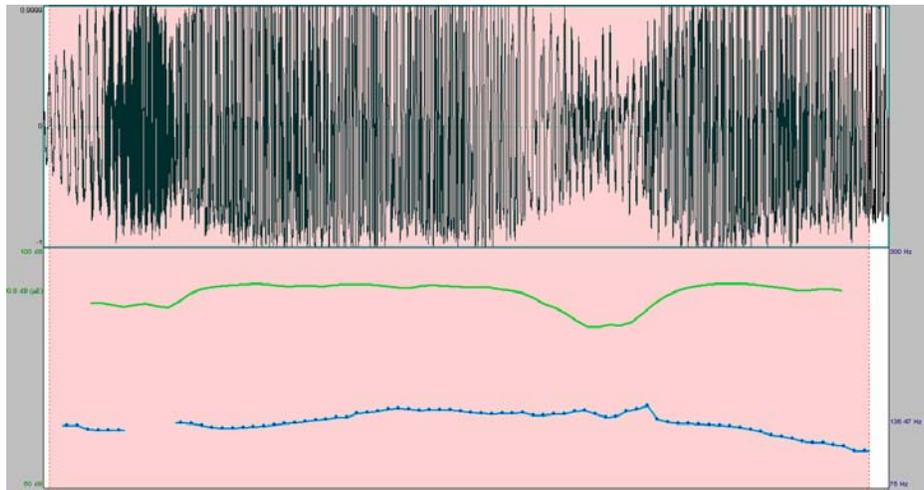
In almost all cases, the rising and falling tones encountered on a single syllable (known generally as contour tones or dynamic tones) are best analyzed as being either allophonic variants of level tone, or, more commonly , as being the realization of sequence of two level tones.

Contour tone is represented as sequences or combinations of level tones, rising contour tone with LH, falling contour tone with HL and, Low-Mid rising with LM or Low-Mid falling with ML as the case maybe, as illustrated in the table below:

Table 9: *Contour Tones in Zo*

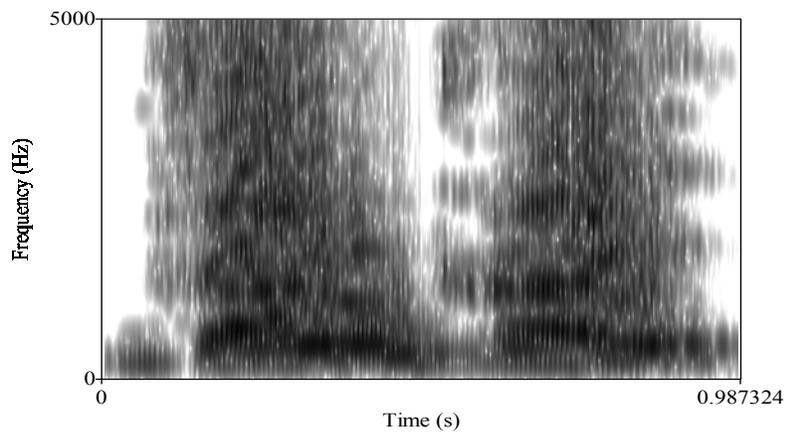
Contour Tone	Symbol	Example	Pattern
Rising	MH	dómká:ŋ ‘lift’	Rising
Falling	HL	zá:ŋkhài: ‘be light’	Falling
Long Mid/Low level	ML	luŋlièn ‘bigh-hearted’	Long level

The following pitch, intensity curves and spectrograms will showcase that the Zo contour tones are sequences or combinations of *register* level tones. The waveforms also prove that the contour in Zo is actually series of two or more register tones. The compound words in Zo are the best examples of contour tones.



Waveform, Pitch, Intensity of zá:ŋkhài: 'be light'

Figure 9



Spectrogram of zá:ŋkhài: 'be light'

Figure 10

12.0 Tone Rules in Zo

The following are some of the rules I have formulated for Zo tones:-

Tone rule 1: The rising or long sound of the first element of a compound disappears or is levelled.

When the words in the open finals /a:/ are compounded with other morphemes, the sound of long vowel disappears thereby they behave just like normal /ə/ with shorter duration of vowel length. That is, when the compounds are derived from an open syllable with a formative,

there is vowel shortening accompanied by *fall or tone levelling* either from high to mid or low to mid which is indicated by shwa /ə/ as in 1 (i-iii).

- | | | | |
|-----|--------------------------------------------------|---|-----------------------------------|
| (1) | Long vowel | | Compounds |
| | i) ηá: ‘fish’ + ná:l ‘slippery’ | = | ηəná:l ‘slippery fish’ |
| | H + H | → | M. H |
| | ii) sá: ‘animal’ + k ^h i: ‘formative’ | = | sək ^h i: ‘deer’ |
| | H + M | → | M. M |
| | iii) vá: ‘bird’ + p ^h uòl ‘formative’ | = | və-p ^h uòl ‘horn-bill’ |
| | H + L | → | M. L |

Final long /u:/ vowels become short vowel when they occur as the first element of a compound word as a compound prefix.

- | | | | |
|-----|---------------------------|---|------------------------------------|
| iv) | bù: ‘rice’ + neŋ ‘morsel’ | = | bu-neŋ ‘rice morsel’ |
| v) | gù: ‘bone’ + ηè:ʔ ‘soft’ | = | gu-ηè:ʔ ‘cartilage’ or ‘soft-bone’ |

Tone Rule 2: Stem2 tone alternations in morpho-tonemic process

In morpho-tonemic process of verbal stem alternations all the verbs and most adjectives, some nouns undergo stem alternations along with tone changes invariably from mid-level or high to low i.e there is always a fall in the tone patterns in verbal alternations. In this process, there are vowel shortening, elision, epenthesis, coda deletion, glottalization, monophthongization, mutation etc., giving rise to verbal, gerund, participial, nominal notions of the verb.

Table 10: *Stem1 to Stem2 Alternations*

Stem1	→	Stem2	Process
/M/, /H/, /HL/	→	L	
/M/ → /L/	→	kàn ‘fry.2’	consonant mutation
/M/ → /L/	→	kà: ‘cry.2’	elision of coda
/ML/ → /L/	→	bieʔ ‘worship.2’	glottalization
Morpho-tonemic process of verbal stem alternations			

Tone Rule 3:**a) Verbs which are already in /L/ appears as L in Stem2**

(2) L → ĩ pet ‘bite’ → pè: ‘bite.2’

b) One-One alternations Stems

In case of One-One alternations of stems, the Stem1 tone alternates from high level to lower level say from /H/ or /LH/ tone to /L./ tone, but there is no morphological changes involved here.

(3) M → L kam ‘lay.1’ → kàm ‘lay.2’

Tone Rule 4:

One feature of the diphthong sound /uɔ/ or /uo/ is always realized as long syllable, when it is used for compound word formation, it monophthongizes to /o/ or /ɔ/ sound, and it occurs as compound prefix for tense-aspect formation, negatives, and first element of compounds as Stem3 prefix. The tone quality also changes accordingly. Falling becomes level, or rising becomes level or remains the same. In all cases, the vowel or syllable shortening occurs.

Table 11: Monophthongization of Stem1

Stem1		Tense-aspects
i)	/buò/ ‘spill’	< /bo-tà/ ‘spill.3-PERF.’, ‘spilled’
ii)	/luo/ ‘vomit’	< /lo-zóu/
iii)	/puó/ ‘carry’	< /po-là/
Compound formations		
iv)	/guo:/ ‘bamboo’	< /go-pùm/ ‘bamboo round’
v)	/k ^h uo/ ‘village’	< /k ^h opí:/ ‘city’ or ‘town’

Tone Rule 5: Shortening of long syllable from Stem1 to Stem2.

Nominals can be formed from Stem1 verbs by alternations due to morpho-tonemic process whereby the tone either falls to low tone or level tone. This type is found in intervocalic positions of Stem2.

(4) Vowel shortening in Stem1 to Stem2 alternation

- i) /mɔ:/ < /mɔt/ ‘madness’
 ii) /tɔ:/ < /tɔpí:/ ‘tigress’

Tone Rule 6: Tone patterns of Personal, Adjective Pronouns and Possessive pronouns.

When the personal is inflected into adjective pronoun the tone pattern changes from M.L to M.M i.e from falling to level tone. The Adjective Pronouns have level tone on its second syllable in allotonic contrasts with the personal pronouns having either high or low tone pattern in the second syllable. The tone patterns of personal pronouns and pronominal adjectives are as shown below:

(5)	Personal pronoun	Adjective pronoun	Possessive pronoun
Tone patterns →	əmə: M.L	əma: M.M	əma:'a: MM.M

The margin of distinction between possessive and adjective pronouns are very thin in normal discourse and written, because the possessive or genitive marker 'a' is normally omitted in such contexts. The some possessive pronouns and adjective pronouns appear as *homotones* when the genitive marker is omitted as in ; *kéi* 'mine' and *kéi* 'my'. They differ in their tone patterns from personal pronouns in nominal and accusative form; *əmə:té:* 'they' the tone pattern is ML.H. Adjective pronoun has tone pattern; MM.H "*əma:té:*'their'" and possessive pronoun has tone pattern in plural as; MM.HM "*əma:té:'a:* 'theirs'" and the singular tone patterns has; M. ə 'his/hers/its', MM.M *əma:'a:* 'his/hers/its', HM *kéi'a* 'mine'.

Table 12: *Tone patterns of personal, possessive and adjective pronouns*

Personal pronoun	Possessive pronoun	Adjective pronoun
H kéi 'i'; 'me'	HM kéi'a: 'mine'	M kə 'my'
H náŋ 'you'	HM náŋ'a: 'yours'	M nə 'your'
H nóu 'you', P ML.H əmə:té: 'they'	HM nóu'a: 'yours',P MM.HM əma:té:'a: 'theirs'	H nóu 'your' MM.H əma:té: 'their'

The tone patterns of personal pronouns, all throughout is high tone (H) and, the tone patterns of possessive pronouns is high(H) to long mid tone(M) as HM and, the adjective pronouns attest mid/low tone pattern in the first and second person singular and high(H) in second person plural. The tone patterns in the third persons of all are ML.H , MM.HM, MM.H respectively.

Conclusions

There are 4(four) contrastive underlying phonological tones and 7(seven) surface/phonetic tones according to its rhymes. The Irrealis (IRR) modalities influences the appearances of Stem2 verb tones, subordination, relative clause, modifiers, intensifiers, nominalizations etc., also affect its appearance in syntactic constructions. The possible tone rules for this language can be laid down explicitly as shown above. Further, research on tone rules is required.

Tone Notations in Zo; a Northern Kuki Chin language

Here, for analysis of Zo tone patterns, I shall be using few conventions for tone notations in Zo, a synthesis of IPA diacritics and tone letter system to give a modified convention of tone notations.

Table 14: *Tone Notations in Zo; a Northern Kuki Chin language*

Tone quality	IPA	Diacritic	Tone Symbols
Register tones			
Kəŋ	Mid Level †	Unmarked /a/	M
Kəːŋ	Mid Level †	Unmarked /aː/	M
Səŋ	Low Fall †	Grave accent /à/	L
Səːŋ	Long Fall †	Grave accent /àː/	L
Sə́ŋ	High Rise †	Acute accent /á/	H
Sə́ːŋ	Long Rise †	Acute accent /áː/	H
Sə̀ʔ, Kə̀p	Low tone †	Grave accent /à/	L
Contour	IPA	Diacritic	Tone Symbols
ŋəkuòì	Low Falling †	Grave accent /àː/	HL or ML
Sə́ːŋ-ín	High Rising †	Acute accent /áː/	LH or MH

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