Four versus Five: The Number of Tones in Tenyidie

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Abstract

Tenyidie, also known as the Angami language, is a Tibeto-Burman language spoken in the Kohima district of Nagaland. Unlike most of the languages in this family, which have two or at most three level tones, it has four level tones, as exemplified below.

| Extra High (h) | M | ‘to cut’ |
| High (H):      |   | ‘to arrange’ |
| Mid (M):       |   | ‘to blame’ |
| Low (L):       |   | ‘to paste’ |

In this study, we report on two aspects of the tones in Tenyidie – first, the categorisation of the tones in the language; and then, we go on to motivate a phonological representation for the phonetically non-distinct fifth tone.

Observing the pattern of alternations in morphological derivations, it could be difficult to explain why while h and H generate an L tone on the following suffix and M and L generate an M tone for the same set of data, in another set, h and M generate an h tone on the suffix and H and L generate an H tone.

Based on Yip (2002) [1], we show how the morphophonemic alternation can be explained as a consequence of a two tier structure, as:

\[ \pm \text{Upper} \]
\[ | \]
\[ \pm \text{raised} \]

Finally, turning to the other issue concerning the number of tones in Tenyidie, though phonetic studies point to the language having only four tones, grammarians of Tenyidie claim that there are five, capturing native speakers’ intuition. We extend our phonological analysis to the fifth tone arguing for a bi-tonal representation basing our analysis on the same set of morphophonemic alternation. The fifth tone is observed as a tone which is phonetically high but has the property of Mid, as is seen below where the fifth tone (H’) specifies a Mid tone on the suffix /-lie/ just like the Mid tone on /ra. di/ specifies a Mid tone on the suffix.

| ra. li - liē (H - L) | ‘rest’ + imperative | ‘take rest’ |
| ra. li - liē (H’ - M) | ‘slow’ + imperative | ‘slow down’ |
| ra. dē - liē (M - M) | ‘change’ + imperative | ‘change’ |

Index Terms: tone, phonology, representation, Tenyidie, Angami, Naga, Tibeto-Burman.

1. Introduction

1.1. Background

Tenyidie, also referred to as the Angami language, is a Tibeto-Burman language spoken by the tribe of Angami. The Angamis are a tribe in the southern border of the Nagaland state of India. They reside in the district of Kohima. Nagaland lies in the far north-eastern border of India, sharing the international border with Myanmar (Burma).

Tenyidie falls under the Naga languages, which is a part of the Kuki-Chin-Naga branch. The following is the classification given by Matisoff (1978) [2].

\[ \begin{array}{c|c|c|c|c}
| & Sino-Tibetan & | & Tibet-Burman & | \\
| & | & | Kamarupan & | \\
| & | & | | Kuki-Chin-Naga (Matisoff, 1978) |
\end{array} \]

1.2. Tone

Tenyidie is a tone language. A tone language is one where the change in pitch of a word changes the meaning of the word itself. As Yip (2002) says:

\[ \text{A language with tone is one in which an indication of pitch enters into the lexical realization of at least some morphemes.} \]

In Tenyidie, the orthograph ‘da’ has at least four meanings, ‘to cut’, ‘to pack’, ‘slice (of bread)’, and ‘to paste’; which are different in their pitch productions. A different pitch produces a different meaning just like a different height or backness in a vowel can change the whole meaning of the word.

The pitch or tone feature in tone languages functions the same as vowels or consonants do in a word, when it comes to producing contrastive words. A syllable is thus defined in tone languages as one with at least a vowel and a tone, or the notion of the absence of the tone with it.

1.3. Structure of a Tenyidie word

Tenyidie has a very simple syllable structure, mostly CV. There are only six vowels in the inventory /a, e, i, o, u, ə/. There are conflicts in the number of consonants in different studies but it may be safely said that there are more than forty distinct consonants in the language. Thus, most contrasts are carried about by the large inventory of consonants. Contrast is also brought about by the different combinations of not just the consonants and the vowels but of these two along with the tones in the syllables. The fact that the syllables are just CV gives tones more importance to delivering contrasts in the

\[ ^1 \text{The status of lie/ and wo/ needs more discussion as to whether they are vowel glides or parts of consonant clusters. They are given as /Cie/ and /C'oo/ here.} \]
language as even the large inventory of consonants has only one slot in the syllable.

Non-derived Tenyidie words are mostly monosyllabic or disyllabic. There are only very few non-derived trisyllabic words, for example, ‘kemena’, meaning ‘flirtatious’, and ‘kelηg’o’, meaning ‘satisfying’.

2. Tones

2.1. Descriptive study of tones in literature

N. Ravindran (1974) [3], Burling (1960) [4], and Kuolie (2006) [5] separately wrote about there being five tones in Tenyidie. The tones have however been differently identified and characterised. This number of tones is what grammarians of Tenyidie claim to be, which in fact captures native speakers’ intuition. The following are examples of the five different tones appearing on the same CV segment forming five different words, according to Kuolie (2006).

1. pê ‘to incline’  High tone
pê ‘fatty’  High-Low tone
pê ‘bridge’  Mid tone
pê ‘to tremble’  Low-High tone
pê ‘to hit/shoot’  Low tone

2.2. Phonetic studies of tones

In a study of the structures of Tenyidie, Blankenship et al (1992) [6] wrote of there being only four tones in Tenyidie, represented with the numbers from 1 to 4 from highest to lowest in pitch, as:

1. su ‘to wash face’
2. sul ‘in place of’
3. sul ‘to block (as of view)’
4. sul ‘deep’

A more thorough study into the number of tones was done by Dutta et al (2012) [7], where the statistical analysis of the pitch was done by using all the five tones mentioned in previous literature and determining whether all these five tones were phonetically different. The F0 for each tone was analysed for this study, and the study concluded that there were in fact only four tones which were phonetically distinct. This study thus was consistent with that of Blankenship et al. In this study, the two tones following the tone with the highest pitch (in 1, High-Low tone and Mid tone) were eventually merged into a single phonetic tone. The tones were named Extra High, High, Mid and Low from the highest pitch to the lowest. All these four tones appear to be level tones. The previous set with five tones is thus changed as below, with changes put in bold.

We continue this study with this notion of the tones in Tenyidie.

1. pê ‘to incline’  High tone
2. pê ‘fatty’  High-Low tone
3. pê ‘bridge’  Mid tone
4. pê ‘to tremble’  Low-High tone
5. pê ‘to hit/shoot’  Low tone

2.3. Tones in monosyllabic and polysyllabic words

Most words in Tenyidie are monosyllabic or disyllabic non-derived words, but only very few are trisyllabic. Each syllable has just one tone. Each and every non-derived word carries a single lexical tone and not more. This lexical tone always falls on the last syllable. All other non-final syllables are specified a Mid tone which acts as the non-lexical default tone.

Examples of disyllabic and trisyllabic words with tones specified are given below.

4. mɛnɛ  ‘soft’  tɛk ‘tiger’
rɔdɛ ‘to change’  kɛsɛ  ‘new’
kɛmɛnɛ  ‘flirtatious’  kɛlɛg ‘satisfactory’

2.4. Phonological representation of tone

Tones can be generally represented by the binary features [+high] and [±low]. In a system with only two level tones, the convention is to name the tones a High tone and a Low tone. In such a system, the High tone is represented with the feature [+high], and the Low tone with the feature [–high].

Languages with three tones have a High tone, a Mid tone, and a Low tone. Both the [+high] and [±low] binary features for tones come into play here. The tones in a three tone system can thus have the following representations:

High  [±high, [–low]
Mid  [–high, [±low]
Low  [–high, ++low]

However this pattern of representation is not sufficient for a tonal system with four level tones. Obviously, the fourth combination, [±high, +low], is logically impossible since the tone cannot be both high and low at the same time. As in the case of Tenyidie, there are four level tones, namely, Extra High, High, Mid, and Low. The representation that we propose is adapted from the model used by Yip (1980) [8] for Chinese. In this model, the four-way contrast is represented by two binary features placed at two different hierarchical levels.

The first feature [+Upper], called a ‘Register’ feature, divides the four tones into two based on the pitch range. Under this division, the two higher tones, Extra High and High, come under the higher register, the [+Upper] register. The lower two tones, Mid and Low, come under the lower register, [–Upper]. Note that the term ‘register’ here refers only to the pitch, and is independent of the sense where it is used to describe voice quality distinctions, such as the creaky register and the modal register.

The second feature [±raised], called a ‘Pitch’ feature (also known as a ‘Tone’ feature), further divides the Register feature into two each to finally give four distinct feature specifications. So, the [+Upper] register has a higher [+raised] tone, the Extra high tone, and a lower [–raised] tone, the High tone. Likewise, the [–Upper] has a higher [+raised] tone, the Mid tone, and a lower [–raised] tone, the Low tone. Hence, we have the following:

Table 1. Register and Pitch features for four level tones.

<table>
<thead>
<tr>
<th>Register</th>
<th>Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>[+Upper]</td>
<td>+raised</td>
</tr>
<tr>
<td></td>
<td>–raised</td>
</tr>
<tr>
<td>[–Upper]</td>
<td>+raised</td>
</tr>
<tr>
<td></td>
<td>–raised</td>
</tr>
</tbody>
</table>

That is,

Extra High  [+Upper, +raised]
High  [+Upper, –raised]
Mid  [–Upper, +raised]
Low  [–Upper, –raised]

This proposal is supported even in Tenyidie data in the observations of morphophonemic alternations to tones. In Tenyidie, the tones on certain suffixes (clitics) are not specified completely. In such a case the suffixes are produced

2 The Mid tone functions as both lexical and non-lexical. In /pêlɛ/, ‘to trust’, /pê/ has a non-lexical tone and /–lɛ/ has a lexical tone.
with a tone from a choice of two, depending on the tone it follows. The following examples exhibit this process and in doing so support the above mentioned model.

5. (i) \( \text{peté} + \text{te} = \text{peté} \text{lié} \) ‘to drive’ + imperative
\( \text{rai} + \text{lie} = \text{rai} \text{lié} \) ‘to rest’ + imperative
\( \text{rad} + \text{te} = \text{rad} \text{lié} \) ‘to change’ + imperative
\( \text{pelé} + \text{te} = \text{pelé} \text{lié} \) ‘to tie’ + imperative

5. (ii) \( \text{peté} + \text{te} = \text{peté} \text{tê} \) ‘to drive’ + past
\( \text{rai} + \text{te} = \text{rai} \text{tê} \) ‘to rest’ + past
\( \text{rad} + \text{te} = \text{rad} \text{tê} \) ‘to change’ + past
\( \text{pelé} + \text{te} = \text{pelé} \text{tê} \) ‘to tie’ + past

The first support of this proposed model in Tenyidie comes from the fact that tones on the suffixes are chosen from the same Register feature. In the first set, (5) (i), the imperative suffix ‘-lie’ exhibits only two tones, the Low and the Mid. Both of these tones belong to the [+Upper] register. This phenomenon is not just restricted to ‘-lie’, but is also observed in the same way in the negative imperative suffix ‘-tie’, and the continuous suffix ‘-tê’.

Likewise, in the second data set, (5) (ii), the past tense suffix ‘-tê’ also exhibits only two tones on it after the process. But here, the tones are Extra High and High, both of which belong to the [+Upper] register. Continuous suffixes ‘-39’ and ‘-3a’ also exhibit this type of tone change.

The above data thus show a demarcation of the two lower tones from the two higher tones, supporting the division of the tones into two registers.

Secondly, the choice of the suffix is dependent on the tone it follows. However, this is not random and the choice is made based on either the Pitch feature or the Register feature of the tone it follows, depending on the suffix. In (5) (ii), the suffix simply copies the Pitch feature it follows, i.e., the [+raised] or [-raised] on the suffix is a copy (an assimilation) of the previous tone. ‘-te’ assumes an Extra High tone, a [+raised] tone, when following an Extra High tone /peté/ and also when following a Mid tone /rai/, which is also a [+raised] tone. Likewise, the [-raised] feature of the High tone in /rai/ and the Low tone in /pelé/ is assimilated in the ‘-te’ suffix as it assumes a High tone. This supports the division of the tones into the [+raised] and [-raised] features.

Thirdly, in (5) (i), the tone on the suffix is not a copy of the Pitch feature. We observe that there is a dependence on the Register feature. In this case, [+Upper] tones, /peté/ (Extra High) and /rai/ (High), are followed by a [-raised] tone, the Low tone, on the suffix ‘-lie’. In the same manner, [-Upper] tones, /rad/ (Mid) and /pelé/ (Low), are followed by a [+raised] tone, the Mid tone, on the suffix ‘-lie’. This again supports the division of the tones in the Register features [+Upper] and [-Upper].

The tone changes and the implied relation of the tones in this morphological process may be better seen in the following tables that are given below.

Table 3. For (5) (i). In the resulting phrases, the [+Upper] feature of the stem triggers a Low tone on the suffix, and the [-Upper] feature of the stem triggers a Mid tone on the suffix.

<table>
<thead>
<tr>
<th>Word</th>
<th>Suffix</th>
<th>Resulting Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pe</td>
<td>ta lié</td>
<td>pe ta lié</td>
</tr>
<tr>
<td>2 ra</td>
<td>lié</td>
<td>ra lié</td>
</tr>
<tr>
<td>3 ra</td>
<td>all</td>
<td>ra all</td>
</tr>
<tr>
<td>4 pe</td>
<td>all</td>
<td>pe all</td>
</tr>
</tbody>
</table>

5. (ii) Table 4. For (5) (ii). In the resulting phrases, there is an assimilation of the [+raised] feature to the suffix.

<table>
<thead>
<tr>
<th>Word</th>
<th>Suffix</th>
<th>Resulting Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pe</td>
<td>tu all</td>
<td>pe tu all</td>
</tr>
<tr>
<td>2 ra</td>
<td>li all</td>
<td>ra li all</td>
</tr>
<tr>
<td>3 ra</td>
<td>all</td>
<td>ra all</td>
</tr>
<tr>
<td>4 pe</td>
<td>all</td>
<td>pe all</td>
</tr>
</tbody>
</table>

We can now say that there are not just two theoretical classes but two natural classes, as:
(i) Register: a. [+Upper] Extra High & High
   b. [-Upper] Mid & Low
(ii) Pitch/Tone: a. [+raised] Extra High & Mid
   b. [-raised] High & Low

3. The fifth tone

As mentioned earlier, statistical studies showed that there was no phonetic evidence of the number of tones being five in the language. The four phonetic tones are level tones, and it is observed that the pitch difference between the Extra High tone and the High tone is roughly equal to that between the High tone and the Low tone (with the Mid tone in between them). Following is an image showing the pitches of the four tones.

Figure 1. Different pitches on ‘da’ having different meanings

While there might be only four distinct phonetic tones, there are some evidences which point towards the fact that there is one more tone, a fifth tone. This tone is not phonetically distinct to the High tone, but behaves in a different manner morphophonemically. Recall the fact that there have been studies which said that there were five tones in the language. From examples given earlier, we have the following:

Five Tone Model

<table>
<thead>
<tr>
<th>Word</th>
<th>Resulting Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>pe 'to incline'</td>
<td>pe 'to incline'</td>
</tr>
<tr>
<td>pe 'fatty'</td>
<td>pe 'fatty' 'bridge'</td>
</tr>
<tr>
<td>pe 'bridge'</td>
<td>—</td>
</tr>
<tr>
<td>pe 'to tremble'</td>
<td>pe 'to tremble'</td>
</tr>
<tr>
<td>pe 'to hit/shoot'</td>
<td>pe 'to hit/shoot'</td>
</tr>
</tbody>
</table>

Four Tone Model

<table>
<thead>
<tr>
<th>Word</th>
<th>Resulting Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>rali - lié</td>
<td>'rest' + imperative</td>
</tr>
<tr>
<td>rali - lié 'slow'</td>
<td>'slow'</td>
</tr>
<tr>
<td>tú - hję</td>
<td>'write' + neg. imperative</td>
</tr>
<tr>
<td>kélé - hję</td>
<td>'rescue' + neg. imperative</td>
</tr>
<tr>
<td>rali - tê</td>
<td>'rest' + past</td>
</tr>
<tr>
<td>rali - tê 'slow'</td>
<td>'slowed'</td>
</tr>
<tr>
<td>tų - bą</td>
<td>'write' + present cont.</td>
</tr>
<tr>
<td>kélé - bą</td>
<td>'rescue' + present cont.</td>
</tr>
</tbody>
</table>

The phonetic High tone has been split into two in the five tone model. These two High tones appear to have different morphophonemic properties. Observe the following data sets:

6. (i) rali - lié 'rest' + imperative 'take rest'
   (ii) rali - lié 'slow' + imperative 'slow down'
   (iii) tų - hję 'write' + neg. imperative 'don’t write'
   (iv) kélé - hję 'rescue' + neg. imperative 'don’t rescue'
   (v) rali - tê 'rest' + past 'rested'
   (vi) rali - tê 'slow' + past 'slowed'
   (vii) tų - bą 'write' + present cont. 'writing'
   (viii) kélé - bą 'rescue' + present cont. 'rescuing'
In, (6) (i) and (ii), as well as (iii) and (iv), while one High in the verb is followed by the Low in the suffix, the other High in the verb is followed by the Mid in the suffix. In (v) and (vi), as well as (vii) and (viii), the first High in the verb is followed by the verb is followed by the Mid in the suffix. In (i) and (ii), the process of suffixation of ‘-lie’ with /rəlI/, ‘to rest’, is in sync with (5) (i), the tone change in the suffixation in (ii) differs with /rəlI/, ‘to slow down’. In this case, ‘-lie’ assumes a High, as if the stem tone (which is a High) is a Mid or a Low, i.e., a [-Upper] tone. Observe that these two stem words are the same CV’s and have the same tone but the tonal change is different upon suffixation. A pitch track of the two phrases is presented in the following figure. (6) (iii) and (iv) exemplifies this case with different CV’s but the same High.

Figure 2. rəlI + lie (rest + imperative) and rali + lie (slow + imperative)

In (6) (v), the tonal change is the same as in (5) (ii), with /rəlI/, ‘to rest’, initiating a High on ‘-te’. However, the other /rəlI/, ‘to slow down’, initiates an Extra High, as if the tone in the stem word is an Extra High or a Mid, i.e., a [-Upper] tone. (6) (vii) and (viii) exemplifies this case but with different CV’s.

From the above analysis, we may thus say that the second High in each pair, (6) (ii), (iv), (vi), (viii), are different Highs from the one we have been talking about so far. This High seems to have a [-Upper] Register and a [+raised] Pitch, which is actually Mid, High being [+Upper], [-raised].

We, therefore, now have a tone in the inventory which sounds like High, i.e., has the same pitch value as High, meaning phonetically same, but functions like Mid instead, observing the tonal change in the morphological processes. We call this tone the fifth tone in the language as it is an addition to the other four in function. This is a phonological tone.

The problem now arises in representing the fifth tone. It does not have the same features as the High tone because it triggers different tones on suffixes than those triggered by the High tone. It seems to have the features of the Mid tone but is not perceived as Mid. This would need to be a tone which would have overt High features and so sounds like one, and at the same time have covert Mid features which allow the observed morphophonemic tone alternations. Since the interaction happens at the right edge of the stem word, the covert Mid features would be in that edge. Hence, we assume that the fifth tone is bi-tonal, a binary combination of High and Mid, where Mid is not realised in the surface explicitly, but still participates in the morphophonemic alternations. The tone would have a High followed by a Mid in it, where the Mid acts a floating tone. The fifth tone is thus represented as:

\[
\begin{array}{ccl}
\ (\sigma) & \ (\sigma) & \ T_i \\
\end{array}
\]

Following shows the morphophonemic alternations in two different tonal sets for High, the fifth tone, and Mid in the (last syllable of the) verb stem, in that order.

7. (i) ro. li - liè 'rest' + imperative ‘take rest’ 
M. H - L  
ro. li - liè 'slow' + imperative ‘slow down’ 
M. H<MP> - M  
ro. di - liè 'change' + imperative ‘change’ 
M. M - M

7. (ii) ro. li - té 'rest' + past 'rested/stopped' 
M. H - H  
ro. li - té 'slow' + past ‘slowed down’ 
M. H<MP> - h  
ro. di - té 'change' + past ‘changed’ 
M. M - h

4. Conclusion

From statistical analysis, it is seen that there are only four distinct phonetic tones – Extra High, High, Mid and Low. These tones can be categorised into four distinct tones by representing them with two features, the Register [±Upper], and the Pitch [±raised], the Register feature being placed above the Pitch register in the hierarchy.

Though there are only four phonetic tones, morphophonemic evidences show that the phonetic High tone exhibits two forms of alternations. This leads to the assumption that there is a fifth tone too which is not phonetically distinct, and is therefore a phonological tone. Hence, there are four phonetic tones and five phonological tones in Tenyidie.

The proposed representation of the fifth tone is that it is bi-tonal, made up of the binary combination of High and a Mid tone, where the Mid tone is not realised phonetically, but participates in morphophonemic alternations.

The Mid also functions as the non-lexical default tone. There is only one lexical tone in a non-derived word and only the last syllable bears this lexical tone while the rest bear the default Mid. A Tenyidie word can thus be represented as:

5. References