Tone in speech and singing: a field experiment to research their relation in endangered languages of North East India

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Tone in speech and singing: a field experiment to research their relation in endangered languages of North East India

Stephen Morey & Jürgen Schöpf

1. Introduction: DoBeS-Project Assam, India

In the framework of a DoBeS project funded by the Volkswagen Foundation, a team of linguists, anthropologists and an ethnomusicologist is currently researching three language groups in Upper Assam, India, a region known for its linguistic diversity. The full project title, The traditional songs and poetry of Upper Assam – a multifaceted linguistic and ethnographic documentation of the Tangsa, Tai and Singpho communities in Margherita, Northeast India, indicates that the focus of our cooperation has been on artistic expressions of language in the three language groups.

This paper is about two of the language varieties that we are documenting for the DoBeS project: Singpho (Numphuk variety) and Tai Phake. We first present an analysis of the Singpho tonal system based initially on the intuition of one of the more linguistically aware native speakers (Manje La), but extending this with an alternative approach to the system that reanalyses the lengthened vowels of some syllables to be one of the components of tone rather than a component of vowel length. We will then discuss the relation between tones and melody in Singpho and present a new method for investigating the relation of pitch in speech and singing in a field experiment.

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1 The work leading to this paper was funded in part by a grant from the Volkswagen Foundation (DoBeS program – Documentation of Endangered Languages) for the project The traditional songs and poetry of Upper Assam (http://www.mpi.nl/DoBeS), which employed both authors. Some of the recordings discussed were made when Stephen Morey was funded by the Endangered Languages Documentation Programme (http://www.hrelp.org). We acknowledge our teachers Ai Je Let Hailung, Ee Ngyan Khet, Am Saeu Khyo (Phake); Gādūng Lu Bisa Jan, Kiyang Gam, Gungí Gumhtoi, Manje La Singpho (Singpho). Our colleagues Meenaxi Barkataki-Ruscheweyh, Palash Nath and Chaichuen Khamdaengyodtai have been a great help.

2 Many of the Singpho songs are archived at the Endangered Languages Archive at SOAS (http://www.elar-archive.org). Full transcriptions of the texts of the traditional songs can be downloaded from or searched at the Tai and Tibeto-Burman languages of Assam website (http://sealang.net/assam), maintained by the Centre for Research in Computational Linguistics.
For Tai Phake, we will present a traditional analysis of the tones based on the work of Banchob (1987) and then develop this with a discussion of the key features of the tones and the difficulty of notating tones using pitch symbols alone. We will then discuss the way in which Tai Phake tones are realised in traditional songs, and talk about the concept of melody in Tai Phake composition.

2. Numhpuk Singpho

The language called Singpho (ISO-639-3:sgp)\(^3\) takes its name from the Singpho word for a human, \(sum^4pho^3\), (also \(cum^4pho^3\), \(m^4pho^3\)\(^4\). These terms are used interchangeably with \(siŋ^4pho^3\), apparently originally the British pronunciation of the word, but now used by Singphos to distinguish themselves from other communities. Linguistically, Singpho is closely related to Jinghpaw (Jingpho), spoken in Burma (Hanson 1896, 1906, Maran 1971, Matisoff 1974a, b) and in China (Dài 1992 and Dài & Diehl 2003). As such, Singpho is part of the Bodo-Konyak-Jinghpaw group within Tibeto-Burman (Burling 2003).

The Singphos recognise four divisions within India, each speaking slightly different varieties. These are named (using an adaptation of the Jinghpaw script\(^5\)) as:

- Turung Hkawng  Jorhat, Golaghat, Karbi Anglong districts of Assam
- Numhpuk Hkawng  Burhi Dihing River, Assam and Arunachal Pradesh
- Diyun Hkawng  Upper Dihing River, Arunachal Pradesh
- Tieng Hkawng  Lohit District, Arunachal Pradesh

These varieties are more or less mutually intelligible, although speakers of Turung have considerable difficulty understanding the speech of the Tieng and the Diyun and vice versa. The names of the three latter Hkawng (Numhpuk, Diyun and Tieng) derive from the Singpho names of the river

\(^3\) All four varieties of Singpho are subsumed under ISO-639-3:sgp. There is another code for Turung, ISO639-3:try, but this refers to Turung as a Tai language and the Turungs all now speak Singpho, albeit mixed with Tai.

\(^4\) Superscript numerals in the transcriptions represent tones (see Table 1 below).

\(^5\) In the paper, we are using the version of the Jinghpaw orthography currently in use in the Singpho community. In this orthography, \(<hp>\), \(<ht>\) and \(<hk>\) stand for aspirated voiceless stops, the symbol \(<aw>\) for the mid back vowel, and final \(<q>\) for glottal stop.
valleys on which they are settled, the Burhi Dihing, Upper Noa Dihing and Tengapani respectively. The name Numhpuk is related to the Tai name for the river, nam⁴huk¹ in Phake (nam⁴ ‘water’).

2.1. Overview of Numhpuk Singpho tones

The following structures are found in Singpho words:

(1) Monosyllables, as /saa⁴/ ‘eat’
   Monosyllables with initial clusters, as /kraa⁴/ ‘hair of the head’
   Sesquisyllabic words, as /lətaʔ²/ ‘arm’
   Nasal syllables, as /n⁴luŋ¹/ ‘stone’
   Disyllables, as /num⁴saa⁴/ ‘female’

As can be seen in (1), we do not treat the minor syllable of a sesquisyllabic word as bearing tone, whereas we do treat the minor syllable (syllabic nasal) of what we have termed nasal syllables as bearing tone, although this is perhaps marginal. In our analysis, Numhpuk Singpho has three tones on open syllables – syllables with vowel or nasal finals, and two on closed syllables – syllables with oral stop finals. These are based on a system worked out by Manje La, a male speaker, aged around 40 at the time of recording, living at Munggong near Nthem, who categorised the tones as shown in Table 1. The sound file for these five tones appears as MS1.wav.

Table 1: Tonal system in Numhpuk Singpho, after Manje La⁶

<table>
<thead>
<tr>
<th>No</th>
<th>Vowel</th>
<th>Length (s)</th>
<th>Pitch contour (Hz)</th>
<th>Coda</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>aː</td>
<td>0.54</td>
<td>140–135</td>
<td>vowel</td>
</tr>
<tr>
<td>2</td>
<td>aʔ</td>
<td>0.28</td>
<td>140–145</td>
<td>glottal stop</td>
</tr>
<tr>
<td>3</td>
<td>eʔ</td>
<td>0.20</td>
<td>160–170</td>
<td>glottal stop</td>
</tr>
<tr>
<td>4</td>
<td>eː</td>
<td>0.41</td>
<td>150–150</td>
<td>vowel</td>
</tr>
<tr>
<td>5</td>
<td>eː</td>
<td>0.36</td>
<td>190–145</td>
<td>vowel</td>
</tr>
</tbody>
</table>

We exemplify these five categories in Table 2

⁶ When Manje La pronounced these tones, he did so with considerable emphasis.
Table 2: Examples of the five tones from Table 1.

<table>
<thead>
<tr>
<th>No</th>
<th>Tonal features</th>
<th>Examples</th>
<th>Syllable type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>low, usually falling tone</td>
<td>saa¹ ‘to go’</td>
<td>open</td>
</tr>
<tr>
<td>2</td>
<td>low, short tone</td>
<td>sat² ‘rice’</td>
<td>closed</td>
</tr>
<tr>
<td>3</td>
<td>higher, short tone</td>
<td>sat¹ ‘to kill’</td>
<td>closed</td>
</tr>
<tr>
<td>4</td>
<td>mid, level tone</td>
<td>saa⁴ ‘to eat’</td>
<td>open</td>
</tr>
<tr>
<td>5</td>
<td>high, falling tone</td>
<td>sap⁵ ‘to enter’</td>
<td>open</td>
</tr>
</tbody>
</table>

To illustrate the three Numhpuk Singpho tones on open syllables, in (2), the names of three riverine fish are given, all preceded by the word for fish /ŋaa⁴/.

(2)  

\begin{align*}
\text{nga law} & /ŋaa⁴loo⁴/ & \text{‘bhangon fish’ (species unknown)} \\
\text{nga ru} & /ŋaa⁴ruu⁵/ & \text{‘fish, unknown’} \\
\text{nga hpin} & /ŋaa⁴phin¹/ & \text{‘hilghuria fish (Labeodyochilus sp.)’}
\end{align*}

A pitch trace of these three words can be seen in Figure 1 (MS2.wav).

Figure 1: Pitch trace of the words for three Singpho fish
In each case these words consists of two syllables. The first syllable is shown as a level portion corresponding to the word for ‘fish’, which carries the mid-level tone, followed by the portion referring to the particular fish. In the case of the first word, /ŋaa⁴loo⁴/, the second syllable is level and slightly rising. In the case of the second, /ŋaa⁴ruu⁵/, it shows a rise followed by a sharp fall, whereas in the case of /ŋaa⁴phin¹/, the second syllable falls directly to the speaker’s lowest range.

There is a further distinction between words that have closed syllables. In (3) we present four words recorded from Pabitra Ningda, a male Numhpuk Singpho speaker aged about 30 at the time of recording, whose voice range is somewhat lower than Manje La’s (MS3.wav).

(3) Pitch Length (s)

<table>
<thead>
<tr>
<th>Word</th>
<th>Pitch</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>[waʔ]</td>
<td>~110 Hz</td>
<td>~0.21</td>
</tr>
<tr>
<td>[gəwaʔ]</td>
<td>~100 Hz</td>
<td>~0.20</td>
</tr>
<tr>
<td>[waʔ]</td>
<td>rising to 120 Hz</td>
<td>~0.38</td>
</tr>
<tr>
<td>[waʔ]</td>
<td>rising to 120 Hz</td>
<td>~0.21</td>
</tr>
</tbody>
</table>

Phonemically (using Manje La’s system) these would be written as:

(4) /waʔ²/ ‘pig’
/gəwaʔ²/ ‘bite’
/waʔ³/ ‘make a basket’
/waʔ³/ ‘pay a fine’

As can be seen, the word for ‘make a basket’ is significantly longer than the word for ‘pay a fine’, the two being distinguished only by the length of the vowel. Vowel length distinction is present in Numhpuk Singpho, also in Turung (see Morey 2010b: 142), unlike in Jinghpaw which does not have vowel length distinction. Because of this, we can analyse the difference between ‘make a basket’ and ‘pay a fine’ as being a case of vowel length distinction.

An alternative analysis for this, the one adopted in Morey (2010b: 277) for the Turung variety of Singpho, would be to posit a third tone on closed syllables for words like ‘make a basket’, a tone distinguished from the other two closed syllable tones by duration, as well as, or perhaps rather than, by pitch. As we will see below in our discussion of tones in Tai Phake, duration can be one of the features of tone.

Under this alternative analysis of tone, we would have the following tonal system for Numhpuk Singpho, including the longer tone found in ‘make a
basket’ together with Manje La’s fourth tone, and the shorter tone found in ‘pay a fine’ with Manje La’s fifth tone, as follows:

Table 3: Re-analysis of Numhpuk Singpho with three tones

<table>
<thead>
<tr>
<th>No</th>
<th>Equivalent in Manje La’s system</th>
<th>Examples (open) (using Manje La’s tone categories)</th>
<th>Examples (closed) (using Manje La’s tone categories)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1, 2</td>
<td>saa¹ ‘to go’</td>
<td>wa²³¹ ‘pig’</td>
</tr>
<tr>
<td>b</td>
<td>4, 3 (long)</td>
<td>saa⁴ ‘to eat’</td>
<td>waa?³¹ ‘make a basket’</td>
</tr>
<tr>
<td>c</td>
<td>5, 3 (short)</td>
<td>saŋ⁵ ‘to enter’</td>
<td>wa?³¹ ‘pay a fine’</td>
</tr>
</tbody>
</table>

Under this analysis, the tones on closed syllables are realised with less contour than the corresponding tones on open syllables; whereas there is a high rise-fall on the ‘c’ tone when it is on an open syllable, it will be simply high on a closed syllable. The fourth tone is level in citation with an open syllable and this matches the longer duration of the word under a closed syllable, in this case ‘make a basket’.

The most substantial difference between the tonal systems of Numhpuk Singpho and that of Tai Phake, discussed below, is that by and large Numhpuk Singpho speakers have difficulty categorising the five tones and using those categories to assign a tonal category to a new word. Speakers disagree sometimes as to whether words have the same or a different tone. This is quite different from the situation in Tai Phake.

This problem arose early, on the first day of field work in Numhpuk Singpho in November 2005. In the Turung variety, the word udi ‘egg’ is pronounced with both syllables having the high falling tone, similar to the 5th tone in Manje La’s system. Since Stephen Morey (SM) was, at that time, more familiar with Turung pronunciation, SM pronounced it in that way. After some discussion, it emerged that for Manje La, at least, the word should be pronounced with a low falling tone, phonemically as /uu¹dii¹/.

Yet, Manje La had accepted SM’s pronunciation of the word, and this led to a discussion in which Manje La said that ‘there is no substitute word of udi, that’s why if the sound is up and down, you can understand. But in case of the wa you should care about the sound of this word.’ In other words, tones bear less functional load in a word like udi. The combination of two syllables u and di cannot be misunderstood for any other word, whatever pitch and contour might be employed. The syllable wa, on the other hand might mean many things (as we have already seen) and the tones have to be carefully observed. This makes the study of tones in Singpho very challenging.
In our analysis, there are also some toneless syllables in Singpho. The language contains many words which have a sesquisyllabic structure. The term ‘sesquisyllable’ was coined by Matisoff (1973: 86) to describe a very frequent syllable type in Tibeto-Burman languages, particularly those in the southern part of the Tibeto-Burman area (possibly as a result of Mon-Khmer substrate influence). Sesquisyllables refer to an iambic structure in which a minor syllable is followed by a major syllable. In our analysis, tone is carried only on the major syllable, but not on the first, minor, syllable in a sesquisyllabic structure. Thus, in the word /gəbaa⁵/ ‘big’, there is no tone marked on the first short syllable /gə/. (See Morey 2010b: 154 for further discussion of sesquisyllables in the Turung variety of Singpho).

In context, the tones may be (or appear to be) overridden by utterance intonation, and there are some complex rules affecting the pitch of syllables when a word consists of more than one syllable. Further discussion of tones in Singpho varieties of North East India can be found in Morey (2008, 2010b).

2.2. Singpho songs

Manje La, our primary consultant for the Singpho tones, is also a known singer and composer in his community. Intrigued by the question of whether and how speech tone might be reflected in composition and singing we asked Manje La not only to sing his compositions for recording, but also to read their lyrics out, so that we could compare both renditions. The song chosen by Manje La to be the most important for recording is a composition that is linked to a style of singing called sāyawq goi ningkin /səyoʔ² goi¹ niŋ⁴kin⁵/.

This is a style that is fading out, with only a few old people able to sing sāyawq goi today. The sāyawq goi genre consists of several sub-genres. An important sub-genre was sung by a male and a female singer alternating, in which both singers need to be possible marriage partners, and the lyrics can be sexually explicit to an extent not accepted in modern Indian society. This, we believe, is the one reason that the practice of this genre ended about two generations ago.

In order to preserve the old style of song, Manje La has composed a song in a sāyawq goi manner for a completely different purpose, and relating to a different model that does not have the alternating structure nor the improvised character. His song was made to raise donations for public works, e.g. the

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7 We made considerable efforts to record this song with two elderly participants, however when they got together, they were unable to sing to each other.
repairing of the village temple, or to support a family who has lost their house in a fire. For such an event a group of people may visit the houses of the village and sing this song at an individual house until the residents respond with a donation. An Assamese song has been used in recent years and Manje La has taken on the task of composing a song in his native language, Singpho Numphuk, in order to replace the Assamese song. Whether his song has actually been used for the purpose intended is not known to us. We present a musical transcription of one line, in Figure 2; pitch traces for the sung (MS4.wav) and spoken (MS5.wav) versions of the song in Figures 3a and 3b; and a linguistic transcription and translation in (5).

Figure 2: First line of Manje’s sāyawq goi, the sung version, in music notation

\[ \text{First line of Manje's sāyawq goi, the sung version, as Praat pitch contour. For improved visibility the initial melisma is omitted and the display starts after the quarter rest.} \]

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8 Phonetic symbols cannot be printed in the lyrics by limitations of the notation software Finale, version 2003a. See example 4 for the linguistic transcription.
The music notation has come into being by carefully listening to the recording, in half speed or even less. This is a conventional ethnomusicological method. The roughly aligned pitch contours from the software Praat are derived from the sung (Figure 3a), and the read (Figure 3b), version of the same first line. The interesting thing to observe here is that despite the low functional load of pitch in the phonology of Singpho the overwhelming pitches of the sung version correspond to the spoken pitches. This is a rather surprising observation, and we do not have a good explanation for this, but the phenomenon is known already for a Southern African (South-East Bantu) language, Setswana (Schöpf 2008: 125).

In an attempt to learn more about the effects of mutual adaption of a language when set to music we have used Manje La’s recorded singing for a field experiment. We manipulated this sound file with the software melodyne. This software, originally designed to correct pitches in music production environments to save on expensive studio time, is capable of

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9 Unfortunately, the spoken version of Manje La’s song has been lost in a hard disc crash, but the Praat analysis survived (source: http://www.fon.hum.uva.nl/praat/). See also Notes to sound file SM5.wav in the Appendix.

10 Assisted with the software Transcribe!, see http://www.seventhstring.com

11 Offered by the German company celemony, see http://www.celemony.com
altering individual tones\textsuperscript{12}, called ‘blobs’, in sound files, even in polyphonic environments to a certain extent. The manipulation can be with regard to pitch, time or dynamics. This provides a tool of unprecedented flexibility for field experiments. Field experiments are considered an important method in the present area of research where many intricacies of the music culture are not consciously reflected by our consultants, or usually not expressed in language. However, we do imply that there are musical rules no matter if they are reflected consciously or not. The methodological idea is thus to manipulate previously recorded singing, replay these manipulated sound files to the singers and have them describe, or judge, respectively, their impressions. This is done with the vaguest questions possible, in order to not pre-structure the response, e.g. the nature of the manipulation, as well as the point of manipulation, is not disclosed to the informants before playing back the manipulated files. The vague questions of the researcher are intended to invite the informants to reflect on their musical behaviour and develop their own (cultural as well as individual) conceptualisation of their music.

In the present example, the ‘note’ on the syllable du differs when spoken or set to the sāyāwq goi melodic model. In the spoken version it clearly has a low pitch (1\textsuperscript{st} tone, see above; Praat fails to assign a pitch track here, but the auditive pitch is in no doubt). On the other hand, it has a rather prominent high pitch in the sung version. Therefore, JS manipulated the singing pitch on the syllable du down to a lower pitch, observing the available scale of the piece (see screenshot in Figure 4b), and then played it back to Manje La, asking him whether there was an audible difference with respect to his own way of singing this. After the first playing back he could not really make out the manipulation. After a second playing back of the file his response was: ‘the sāyāwq goi tune is lost’. However, he did not specify the nature of my manipulation to the sound file. The result is clear: the melodic model of sāyāwq goi overrules in this instance the pitch of the spoken syllable. This is not surprising, given the low functional load of pitch in Singpho phonology. This was a test of the methodology and, of course, needs more examples to become more refined. A second point of manipulation missed its target as Manje La said this was wrong, but he referred to the lyrics that he had changed in the meantime. The original recording was done in 2006, while the experiment was performed in 2008 and he had improved the lyrics in the interim.

\textsuperscript{12} ‘Tone’ is used here as a musical category, not as a linguistic one. ‘Tone’ in music is not necessarily a transcultural concept, yet the present paper appears inappropriate for the required length of discussion. Equally, the discussion how celemony defines a ‘blob’ in its software melodyne and how this definition can be adapted in the software itself appears to be inappropriate as well.
Figure 4a: Sung line of Manje La before manipulation. The point of manipulation being immediately preceding the long vertical cursor line (see sound file MS4.wav)

Figure 4b: the manipulated file: the syllable du has been brought in line with other notes in a lower pitch (see sound file MS5.wav)
3. Tai Phake

Tai Phake (tai² phā⁴ke⁵), also called simply Phake (Tai Kadai/Southwestern Tai), is spoken by around 2000 people in Upper Assam, North East India. The ISO code for Tai Phake is ISO639-3:phk, but Phake is also mutually intelligible with Tai Aiton (ISO639-3:aio), Tai Khamti (ISO639-3:kht), and to a lesser extent with the highly endangered Tai Khamyang (ISO639-3:ksu). One of the main differences between the four varieties is in the tonal system (see Morey 2005a, b for further details of the other varieties).

Our work is based on word lists, texts and songs recorded between 1999 and 2010 in four Phake villages: Namphakey, Borphakey, Tipam and Phanaeng.

3.1. An overview of tone in Tai Phake

The study of tone in Tai languages rests on a fairly secure historical and comparative basis. All of the spoken Tai languages are tonal, having generally between three and seven tones for words in citation, based on tonal categories that can be related back to Proto-Tai.

In our discussion of Tai tones, we will use ‘pitch’ to refer to a relative pitch, and ‘contour’ to changes in that pitch within the tone. Absolute pitch is not a useful category for tones within a language, because obviously the high pitch range of one individual is not the same as that for another. Most men, for example, have lower absolute pitch than most women. However, we do want to draw a distinction between pitch (high, mid, low) and the contours (rising, falling, rising then falling, and level). Most particularly we want to argue that level is a contour feature.

Li (1977) and Gedney (1972) posited that Tai languages had three proto-tone categories for open syllables, conventionally called A, B and C, and one or two categories for closed syllables (stop final), conventionally called D1 and D2 (long and short). The proto-tones may have been distinguished by phonation.

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13 Superscript numbers for Tai Phake words refer to the tones discussed below.

14 Namphake is located at North 27°16'58", East 95°22'0". Borphakey at N 27°19'41", E 95°42'34". Tipam at N 27°16'45", E 95°23'40". Ninggam at N 27°21'31", E 95°53'30". These recordings are, or will be made, available through the DoBeS archive at http://www.mpi.nl/ resources/data/dobes in the node ‘Tangsa, Tai, Singpho in North East India’.

15 Thanks to our anonymous reviewer, we would like to point out that absolute pitch in music, in music cultures of oral tradition, is a rare, if not disputed concept and is not referred to here.
(breathiness, creakiness and plain) rather than by pitch or contour, but in their modern reflexes they are often categorised by pitch and contour distinctions. (See Morey 2005b for a discussion of the historical tonology of the Tai languages in North East India.)

The modern reflexes of these tones came about from a combination of the proto-tones and the proto-initials which were in four series: voiceless aspirated, voiceless unaspirated, pre-glottalised, and voiced. As an example of how this is applied: in most Tai languages the originally voiced stops have become voiceless and are usually voiceless unaspirated in Shan and the Tai languages of North East India. This would create potential ambiguities if the original initial categories had not affected the modern reflex of the tone. For example, the tone of the group of words that had an originally voiced initial with tone A has generally undergone a different history to that of the group of words that had an originally voiceless initial with tone A. In Phake, the former have the high rising then falling tone (2nd), whereas the latter carry a rising tone (6th).

In our analysis, following Banchob (1987), Tai Phake has six tones (see Morey 2005a: 126 for a more detailed description). We will term these citation tones, because, as we will see later, the tone can sometimes alter. These are listed in Table 4: a record of the tones as spoken by E Kya Gohain, a female speaker aged around 35 at the time of recording. In the analysis we present here, the four tones combine the features of (1) pitch (high, low), (2) contour (level, rising, falling), (3) duration (short, long) and (4) phonation (plain, creaky). The key features for each tone are listed in the second column of Table 4.

Table 4: Tones 1–6 pronounced on the syllable na in Tai Phake

<table>
<thead>
<tr>
<th>No.</th>
<th>Tonal features</th>
<th>Examples</th>
<th>Assamese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>level</td>
<td>nā¹ ‘quarrel’</td>
<td>kaziya</td>
</tr>
<tr>
<td>2</td>
<td>high rising then falling</td>
<td>nā² ‘rice field’</td>
<td>pothar</td>
</tr>
<tr>
<td>3</td>
<td>creaky</td>
<td>nā³ ‘face’</td>
<td>mukh</td>
</tr>
<tr>
<td>4</td>
<td>falling</td>
<td>nā⁴ ‘mother’s younger sister’</td>
<td>mahi</td>
</tr>
<tr>
<td>5</td>
<td>low (falling) and long</td>
<td>nā⁵ ‘melt away’</td>
<td>goli juwa</td>
</tr>
<tr>
<td>6</td>
<td>rising</td>
<td>nā⁶ ‘thick’</td>
<td>dath</td>
</tr>
</tbody>
</table>

The phonetic symbols used here vary slightly from the IPA standard. In Tai Phake, following Banchob (1987) macrons are used to show vowel length, as /ā/. In Singpho length is shown by double vowels as /aa/. Aspiration is shown by a following <h> as /th/, /ph/ and the palatal semivowel is shown as /y/.
Figure 5: Phake tones, showing wave form and pitch trace (tones 1 to 6)

A wave form and pitch trace for each of these tones given in citation (using the words in Table 4) is given in Figure 5.

As can be seen in this table, the 1st, 2nd, 5th and 6th tones are longer and their amplitude greater than the 3rd and 4th tones. This is a reflex of the proto-tone, as the 3rd and 4th tones in Phake are reflexes of the C tone, which is generally believed to have been originally creaky or glottalised (see Morey 2005b) and this explains their shortness. Creakiness is still very much in evidence with the 3rd tone as it is realised by Phake speakers today, whereas its reflex in the 4th tone is the shorter duration of that tone.

The other four tones (1st, 2nd, 5th and 6th) are all longer in duration, as is clear from both the wave form and the pitch trace. All four of these tones also have plain phonation, so in the case of these tones the distinguishing features are pitch and contour alone. For these tones the use of ‘pitch numbers’, where 1 is low, 2 mid-low, 3 mid, 4 mid-high and 5 high, could be employed, as shown in (6):
Tone in speech and singing: a field experiment

(6) Tone 1 44 (or 33)
Tone 2 452
Tone 5 31
Tone 6 335

This notation does not work for distinction of Tones 3, 4 and 5, because they have almost identical pitch traces, and would have to be notated as 31 and we would have the following:

(7) Tone 3 31
Tone 4 31
Tone 5 31

This is demonstrated clearly when we compare only the pitch and contour of the tones, using Hz values, based on the recording, as exemplified in Table 5.

Table 5: Tones 1–6, pitch and contour

<table>
<thead>
<tr>
<th>No.</th>
<th>(1) Pitch (Hz)</th>
<th>(2) Contour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone 1</td>
<td>220–220 level</td>
<td></td>
</tr>
<tr>
<td>Tone 2</td>
<td>220–280–165 rising then falling</td>
<td></td>
</tr>
<tr>
<td>Tone 3</td>
<td>205–165 falling</td>
<td></td>
</tr>
<tr>
<td>Tone 4</td>
<td>195–165 falling</td>
<td></td>
</tr>
<tr>
<td>Tone 5</td>
<td>195–165 falling</td>
<td></td>
</tr>
<tr>
<td>Tone 6</td>
<td>195–300 rising</td>
<td></td>
</tr>
</tbody>
</table>

On the basis of Table 5, we can see that with only features (1) pitch and (2) contour, tones 3-5 could not be contrasted. The feature of (3) duration can also be measured, as in Table 6. This demonstrates that while there is no pitch/contour difference between tones 4 and 5, there is a difference in duration.
Table 6: Tones 1–6, duration

<table>
<thead>
<tr>
<th>No.</th>
<th>Duration (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone 1</td>
<td>0.63</td>
</tr>
<tr>
<td>Tone 2</td>
<td>0.57</td>
</tr>
<tr>
<td>Tone 3</td>
<td>0.44</td>
</tr>
<tr>
<td>Tone 4</td>
<td>0.36</td>
</tr>
<tr>
<td>Tone 5</td>
<td>0.66</td>
</tr>
<tr>
<td>Tone 6</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Historically the difference between tones 3 and 4, and the others, was one of phonation. In the modern language, however, the creaky phonation that we suggest was historically present in tone 4, is no longer present, and remains only in the form of shorter duration. Thus a new contrast is created: one of duration.

The final contrast, between tones 3 and 4, is that of phonation. Tone 3 is creaky and tone 4 is plain. The interplay of the four types of contrast is summarised in Table 7, where the features we take to be contrastive are shown in bold.

Table 7: Phake tones 1–6, summary

<table>
<thead>
<tr>
<th></th>
<th>(1) Pitch (Hz)</th>
<th>(2) Contour</th>
<th>(3) Duration</th>
<th>(4) Phonation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tone 1</td>
<td>mid 220–220</td>
<td>level</td>
<td>long</td>
<td>plain</td>
</tr>
<tr>
<td>Tone 2</td>
<td>mid-high-low</td>
<td>rising then</td>
<td>long</td>
<td>plain</td>
</tr>
<tr>
<td></td>
<td>220–280–165</td>
<td>falling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tone 3</td>
<td>mid-low 205–165</td>
<td>falling</td>
<td>short</td>
<td>creaky</td>
</tr>
<tr>
<td>Tone 4</td>
<td>mid-low 195–165</td>
<td>falling</td>
<td>short</td>
<td>plain</td>
</tr>
<tr>
<td>Tone 5</td>
<td>mid-low 195–165</td>
<td>falling</td>
<td>long</td>
<td>plain</td>
</tr>
<tr>
<td>Tone 6</td>
<td>mid-high 195–300</td>
<td>rising</td>
<td>long</td>
<td>plain</td>
</tr>
</tbody>
</table>

From this, we can say that pitch is arguably not a key feature of any of these tones, although we have highlighted pitch features for tone 2 and tone 5. What is clear is that pitch alone is certainly not the key feature for any of them. For this reason, rather than using the pitch number notations seen in (6) above,
following Banchob (1987), we are using superscripted numbers to indicate the
tone categories that are defined in Table 4 above.

There is a further complicating factor\textsuperscript{17}. Phake, as analysed by Banchob
(1987) and Morey (2005a: 126), has length contrast between /a/ and /aː/, although only in
syllables with final nasals, semi-vowels and stops (long /a/ being written as <ā>). So duration
can be treated as a feature both of the vowel and/or of the tone. With vowels other than /a/,
the duration contrast between words bearing the fourth tone and those bearing the fifth tone is
solely an issue of tone, as with the distinction between /yɔ⁴/ ‘praise’ and /yɔ⁵/ ‘loosen’. It is also the case with
words having final /-a/, because there is no length contrast in this situation\textsuperscript{18}.

We have mentioned above that Proto-Tai is reconstructed as having three
tones on open syllables and one or two on closed, or stop final syllables. As in
the proto-language, there are fewer tonal categories with closed syllables than
with open syllables. Closed syllables in citation in Phake are found with the
1\textsuperscript{st} or 4\textsuperscript{th} tones only\textsuperscript{19}.

These tonal categories in Phake are well recognised by Phake speakers.
Following contact with Dr. Banchob Bandhumedha in the 1960s and 1970s,
and more recently with Stephen Morey (since 1996), many of the Phake elders
and others interested in language issues are accustomed to referring to the
tones using the numbering system in Table 4. For example, when asked to
categorise the tone of an unfamiliar word, some Phake speakers will spell out
all of the possibilities in the order Tone 1 through to Tone 6. Consider the
following exchange between Stephen Morey and Aije Let Hailowng, a male
speaker aged around 75 at the time of recording. In this example Aije Let is
asked about the tone of the negative form of the verb ‘to eat’ (MS7.wav).

\textsuperscript{17} We thank our anonymous reviewer for pointing this out.

\textsuperscript{18} Further work is needed to study the potential implications of this. At this stage we
have not found a minimal quadruplet /(C)jaC⁴/~//(C)jaC⁵/~//(C)jaC⁴/~//(C)jaC⁵/, where the
final C can be nasal, semi-vowel or voiceless stop. In particular, we have not
investigated in detail the phonetic difference between a syllable with short vowel under
tone 5 and a long vowel under tone 4. In many cases the tonal categories are
established or confirmed after comparison with related varieties, where the tonal
distinction is clear.

\textsuperscript{19} There are a small number of words with closed syllables that Banchob (1987)
notates with the 2\textsuperscript{nd} or 3\textsuperscript{rd} tone. Most of these are onomatopoic and are not
reconstructable to Proto-Tai. Words with closed syllables that are reflexes of Proto-Tai
are found with only the 1\textsuperscript{st} and 4\textsuperscript{th} tones.
Members of the Phake community can associate any one of the six tones with any syllable that is possible in the language, and are able to conceive of meaningless but possible words. This clear categorical feature of tones is not shared by Singpho as discussed above.

Another important feature of Tai Phake, already demonstrated in (8) to (11), is the presence of what we will term changed tones. For example, some verbs, in most cases those that carry the 2nd tone (high rising then falling), are realised with a rising tone, the same shape as the 6th tone, when they are negated. This is not found in other Tai languages like Tai Aiton. In some cases both forms are found in a single example, as we see in (12), an example spoken by E Ngyan Kheit Gohain, a female aged around 65 at the time of recording (MS8.wav).

(12) kon² yag² han² ma¹ yag⁶
    person be house NEG have.NEG
    ‘There are people but no houses.’

Tone change processes in Phake are used for negation, imperatives and questions, and are described in detail in Morey (2005b).

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20 An accidental use of the Aiton form of the question particle, in place of Phake /n5⁶/.
3.2. Phake songs

Our discussion of Tai Phake relies not only on recordings but also on interviews with the elder and scholar Aije Let Hailowing, as much a singer and composer as an expert in the language and literature of Tai Phake. The Tai Phakes recognise a number of traditional song styles. Several of these are listed below in Table 8. In Morey 2010a, we discussed the fact that in singing the \( khe \ khyang \) style, constrained as it was by a fixed 7 syllable per line pattern and a rigid rhyming scheme, the key features of the citation tones of Phake are clearly realised. Moreover, the melody of the \( khe \ khyang \) style is also constrained and we have recorded Aije Let Hailowing singing the melody without words (but with the fixed tonal rhymes). The very constrained nature of this style makes it necessary for the tones to be expressed, otherwise the meaning cannot be ascertained.

Table 8: Types of Song-Poetry among the Tai Phake

| \[ mɔ\³ \ kʰəm\² səi\³ yəi\⁴ \] | Rice pounding song |
| \[ mɔ\³ \ kʰəm\² səi\³ ai\² \] | Songs sung when visiting the forest |
| \[ mɔ\³ \ kʰəm\² pʰəi\² \] | Songs in the composed/elaborated style |
| \[ mɔ\³ \ kʰəm\² kʰɛ\² kʰyəŋ\² \] | Songs in the \( kʰɛ\² kʰyəŋ\² \) style |

In the other styles listed in Table 8, there is much more freedom in terms of line lengths and rhyming patterns and we have yet to thoroughly investigate the relationship between speech tone and melody in all of these styles.

In 2010 we discussed issues of speech tone and its rendition in singing with Aije Let. In order to address this we started the discussions on the topic of composition. The same discussion was raised two years earlier with Ai Chang Chakhap of Ninggam village when he was actually composing a song for us to be recorded later on. In both discussions about how songs are to be composed, rhyming rules are explained. Such rules are complex and play an important role for the quality of a ‘song’ in Tai Phake, and apparently, this is the most important aspect of composition to the Tai Phake composers of the old generation (see Morey in print for a brief overview of some of the poetic devices used in Tai Phake).

Continuing the discussion with Aije Let in 2010, on the third (and last) day, he gradually became aware that we were looking at ‘melody’ independent of speech. We had tried to keep our questions deliberately vague in this respect in order to let him choose categories of his own language rather than imposing possibly foreign concepts such as ‘melody’ to him. It must be noted here that the Tai Phake today, and in past decades, have no tradition of instrumental music played by melody instruments. The only instruments in
use are drums and cymbals (apart from ‘modern’ music made by the younger generation after models of popular Assamese music and that which they hear from Thailand and the Shan States of Myanmar). As a last step in our discussion he attempted to sing the melody of the *khe khyang* style, using a vocable syllable *ta*, in the same way as had been done with Stephen Morey some years before (Morey 2010a). However, this was obviously not easy for him and took him a moment to achieve. Apparently, there are types of melodies independent of speech tone for Tai Phake that are used for certain genres, at least for *khe khyang*. But they are by no means the most important aspect of compositional creativity, the melody being rather fixed in this style. Composition in the creative sense, rather, means a creative application of rhyme rules. Indeed, for the *khe khyang* style, the words are carefully chosen so that their tones fit the melodic model that is associated with this genre. This process, we speculate, is rather a constraint driven one where speech tone pitch is negotiated against a melodic model. As yet, we have not been able to address the intricacies of such a process in our research.

Another style listed in Table 8 is the *mɔ¹ kham² sā¹ əi²*, described as ‘songs sung when visiting the forest’. This is not a literal translation of *sā¹ əi²*, but more metaphorical: these songs were sung as love songs by young people when out of the village gathering food or wood, etc. Although the song is no longer sung in that context, older people can still sing the style and Ee Ngyan Kheit has sung several such songs for us. The text of one example is given in (13) (MS9.wav, beginning).

(13) *khun⁰ e⁶ nāŋ⁷ ye⁴ mau¹ caû⁵ co⁵ ciûⁿ'nai³ sā²'əi²*

self wish female PRT NEG be time now PRT.VOC

‘Indeed, ladies, is it not now the time that we should wish for you?’

The rhyming scheme of this style is that the line is divided in two sections, marked off by particles, in this example *ye⁴* and *sā¹*. The stretches of text between these particles have odd numbers of syllables. The last of those content syllables, in this case *nai³*, will rhyme with the last content syllable of the first half of the next line.

A transcription of the melody of example (13) is given in Figure 6. When she sang this for the first time, Ee Ngyan Kheit made an error with the first few syllables, *khun⁰ e⁶ nāŋ²* and repeated them. The transcription below includes both the error and the corrected version.
This error is very helpful in our understanding of how the relationship between melody and tone works. The first word has a rising tone, but in the error version, that rise was not represented, and we believe it was this that caused Ee Ngyan Kheit to repeat the first three words. The rising contour of the tone is reflected in the melody by the rise d''–e''. This is followed by a long note on the syllable e⁶. Here there is only a slightly perceptible rise, as we can see in the left hand side of Figure 7, a Praat transcription of the first line not including the error.

Whilst we can confidently say that at least some of the tones in this style were reflected in the melody, we are not sure that all of them are. The five syllables that make up the content of the second half of the line, mau¹ caü⁵ co⁵ cüŋ² nai³, are sung on short notes with little melodic variation and no rhythmic variation (b'–b'–b'–b'–d''), though four different tones are represented. There is no clear fall on the syllable cüŋ², and it is moreover followed by nai³ on a rising melody which does not convey the features of this tone (short, falling, creaky). It is curious that the content words are sung in that portion of the melody that conveys the least information about tones, whereas the following particles are given considerable melodic prominence.
4. Summary

Researching the role of tone in Singpho Numphuk and Tai Phake, two different languages spoken in Margherita sub-district in Upper Assam, has revealed very different uses of tonal features for both languages. While Numphuk Singpho appears to have a 3-tone system, that system has a reduced function in comparison to Tai Phake which makes extensive use of its six tones (although pitch is apparently not the most important feature of the speech tones). This is also reflected in the degree of consciousness about tone of our consultants in the respective languages.

However, observing the relation of speech tone in singing in both languages we find another divergence in the way this relation is constructed. For Singpho Numphuk, although tonal features are not often used to actually distinguish meaning, the speech tone is surprisingly well represented in the song analysed. Whereas, the field experiment of overruling melody by speech tone through the manipulation of a sound file was emically unacceptable for the sāyawq goi genre.

For Tai Phake, where speech tone is heavily used in all levels of language, we see a style of song (khe khyang) where speech tone is fully represented, while in other genres this appears to be somewhat less the case, and where redundancy to secure understanding has to be brought about by the additional use of features of the language (see Morey 2010c).

We believe that software allowing the detailed manipulation of individual notes in a sound file – speech or singing – will be of major assistance in future research of the relation of speech tone in singing, especially for us and our consultants where it is difficult to address these intricacies through language.

References


## APPENDIX: LIST OF SOUND FILES

<table>
<thead>
<tr>
<th>Name of file</th>
<th>Relating to which section of the text</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS1.wav</td>
<td>Table 1</td>
<td>This was recorded as part of the text numbered SDM08-2006-003.wav, archived at ELAR</td>
</tr>
<tr>
<td>MS2.wav</td>
<td>Example (2), Figure 1</td>
<td>This was recorded as part of the text numbered SDM08-2006-024.wav, archived at ELAR</td>
</tr>
<tr>
<td>MS3.wav</td>
<td>Example (3)</td>
<td>Recording of Pabitra Ningda</td>
</tr>
<tr>
<td>MS4.wav</td>
<td>Figure 3a</td>
<td>This was recorded as part of the text numbered SDM08-2006-126.wav, archived at ELAR</td>
</tr>
<tr>
<td>MS5.wav</td>
<td>Figure 3b</td>
<td>The quality of this manipulated file is much lower because it was re-recorded from playing it back during the actual field experiment through loudspeakers. It should not mislead the reader to attribute this lower quality to the processing quality of the used software. This file is presented because the original manipulated file has been lost in a hard drive crash.</td>
</tr>
<tr>
<td>MS6.wav</td>
<td>Table 4</td>
<td>This was recorded as part of the text numbered SDM01-2007-019.wav, archived at PARADISEC</td>
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<td>MS7.wav</td>
<td>Examples (8)-(11)</td>
<td>This was recorded as part of the text numbered SDM01-20100129-173850_JS_E_AiCheLet_Discussion.wav, archived at DoBeS</td>
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<td>MS8.wav</td>
<td>Example (12)</td>
<td>This was recorded as part of the text numbered 1-1-1-3, included in Morey (2005a)</td>
</tr>
<tr>
<td>MS9.wav</td>
<td>Example (13), Figure 6</td>
<td>This was recorded as part of the text numbered 1-7-1-2, included in Morey (2005a)</td>
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