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Tones and non-tones in Kammu dialects

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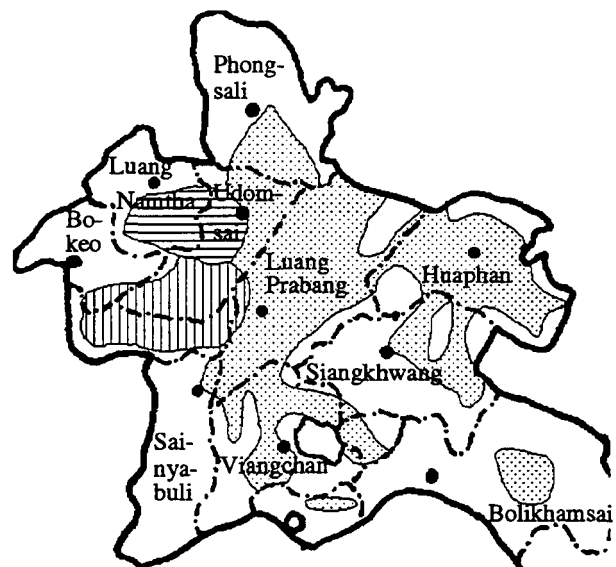
Abstract

This is a preliminary report on the phonetic interaction of tone and consonant voicing in Kammu, a language where some dialects use *Fo* for producing distinctive word tones, while others do not have tones but rely on the contrastive voicing of initial consonants to distinguish words which tonal dialects distinguishes with tones. Speakers of non-tonal dialects produce no significant *Fo* differences in words which differ only in the tones in tonal dialects, and a perception test showed that they did not use *Fo* to distinguish such words when listening to a tonal dialect.

Background

Kammu is the only well-described language which is presently going through the process of acquiring tones. Some dialects of this language have developed a tone contrast, which corresponds to a contrast between voiceless and voiced initial consonants in other dialects (see Svantesson 1983, 1989). The dialects do not differ substantially in other respects, and speakers of all dialects can understand each other without difficulty. In this article we investigate the production and perception properties of *Fo* and segments in tonal and non-tonal dialects.

Kammu is spoken by some 600,000 people, mainly in northern Laos, and belongs to the northern Mon-Khmer branch of the Austroasiatic language family. Our data come from three dialect types, which will be labelled Eastern, Northern and Western Kammu. Eastern Kammu (called Southern Kammu in earlier publications) is non-tonal, and retains the original contrasts between voiced and voiceless stops ($b \sim p$, $d \sim t$, $f \sim c$, $g \sim k$) and sonorants ($m \sim \text{m̥}$, $n \sim \text{n̥}$, $\text{ɲ} \sim \text{ɲ̥}$, $l \sim \text{l̥}$, $r \sim \text{r̥}$, $w \sim \text{w̥}$, $j \sim \text{j̥}$). In Northern and Western Kammu, syllables with voiced and voiceless initials have developed low and high tone, respectively. In Northern Kammu, the consonants of each pair have merged into the unmarked member, so that all stops have become voiceless and all sonorants voiced. Thus the voiced/voiceless consonant contrast is replaced by a low/high tone contrast. In Western Kammu, the voiceless sonorants became voiced, just as in Northern Kammu, but the voiced stops became aspirated voiceless, contrasting both segmentally and tonally with the original (unaspirated) voiceless stops. The situation is illustrated by the following words used in this investigation:



Approximate distribution of Kammu in Laos (according to Chazee 1995). The speakers in this investigation came from Phong-sali, Luang Prabang, Huaphan and Siangkhwang provinces (Eastern non-tonal Kammu); from Luang Namtha and Udomsai provinces (Northern Kammu), and from Luang Prabang province (Western Kammu).

Table 1. Minimal pairs for initial consonant voicing (Eastern Kammu), tone (Northern Kammu), or both (Western Kammu):

E Kammu	N Kammu	W Kammu	
klaaŋ	kláaŋ	kláaŋ	eagle
glaaŋ	kláaŋ	k ^h lāaŋ	stone
taaŋ	táaŋ	táaŋ	pack
daaŋ	tāaŋ	t ^h āaŋ	lizard
ʃaaŋ	ráaŋ	ráaŋ	tooth
raaŋ	rāaŋ	rāaŋ	flower

There are some words which begin with an original aspirated stop. Most of them are Lao loans, but some are indigenous derived words, e.g. *p^haan* 'to kill' (from *haan* 'to die'). In Northern and Western Kammu, these words have acquired high tone (*p^háan*), and may contrast in Western Kammu with low tone words which originally had a voiced stop. Except for a few loanwords, all Northern Kammu words with an initial aspirated stop have high tone.

Since original aspirates are relatively infrequent, the tones have somewhat lower functional load in Western Kammu than in Northern Kammu, where words with original voiced and voiceless stops differ only in the tone.

Tone production

It is generally assumed that tonogenesis of the type found in Kammu is due to the micro-prosodic effects of voiced and voiceless initial consonants, causing F₀ to be lower after a voiced consonant than after a voiceless consonant (see e.g. Löfqvist et al. 1989). In order to investigate this, and also to measure the tones in tonal dialects, the six words given in Table 1 were recorded from 15 speakers of Kammu (8 Eastern, 4 Northern, 3 Western). Each word was put into two carrier sentences:

E: *gii məh __ ɲam* *gii məh __ ɲe?*
 N: *kli məh __ nám* *kli məh __ nè?*
 W: *k^hi məh __ nám* *k^hi məh __ ɲè?*
 'This is a big __' 'This is a small __'

Since Kammu is an unwritten language, the speakers were presented with the 12 sentences written in Lao, and were asked to translate them into their native language and repeat them five times. The three middle repetitions were used for analysis. This procedure was usually repeated once or twice in order to get fluent renderings and also to be able to find three examples of each sentence which were reasonably free from the noise of chickens, motorcycles or children, which were often present during the recording sessions.

The recordings were made in Vientiane, Luang Prabang and Ban Tapen (Luang Prabang province) in Laos, and were analyzed acoustically using the ESPS-Waves+ environment on a Sun workstation at the Dept. of Linguistics, Lund University. Preliminary results show that speakers of Eastern Kammu make no significant F₀ differences in the minimal pairs given in Table 1, while, as

expected, speakers of Northern and Western Kammu make a clear F₀ difference between the high and low tones (cf. Gårding & Lindell 1977 for Northern Kammu).

Thus, from the production point of view, Eastern Kammu is a non-tonal language which does not even use F₀ to sharpen the contrast between words beginning with voiceless and voiced consonants. Northern Kammu relies only on tone, and Western Kammu uses a combination of tone and consonant differences.

Tone perception

In a previous study by Gandour, Gårding & Lindell (1978), it was shown that speakers of the Northern tonal dialect use F₀ as the main cue for distinguishing words with high and low tone.

In this study, a similar experiment was performed, but now the main objective was to find out whether or not speakers of non-tonal dialects can use F₀ as a cue for differentiating word pairs as 'stone' and 'eagle'. The test was performed by speakers of both tonal and non-tonal dialects, and as we had expected, it showed differences in the perception of these words.

The test material was based on two of the sentences which were used in the production measurements: *kli məh kláaɲ nám* 'This is a big eagle', and *kli məh klàaɲ nám* 'This is a big stone'. These two sentences were recorded in Lund by Damrong Tayanin, a speaker of the Northern dialect. Using PSOLA re-synthesis techniques (Moulines & Charpentier 1990; Möhler & Dogil 1995), five synthesized versions of each sentence were prepared, one with the same F₀ as the original recording, one where F₀ of the test word was identical to that of the other recorded sentence, and three at equal distances in between. Three repetitions of each of the ten stimuli were presented in random order to the speakers. Six of the speakers of Eastern Kammu, and three each of Northern and Western Kammu took the test. The test was performed immediately after the recording described above. The speakers indicated on a test protocol whether they heard the word 'stone' or 'eagle'.

Results

Five of the six speakers of Eastern non-tonal Kammu heard the word *kláaɲ* 'eagle' in the great majority of cases, regardless of whether the original was *kláaɲ* 'eagle' or *klàaɲ* 'stone', and regardless of F₀. This indicates

that they used segmental information as their only cue. The sixth speaker seems to have guessed randomly.

Two of the three Northern Kammu speakers consistently used Fo to distinguish between the words, regardless of the original; here as well, the remaining speaker seems to have resorted to random guessing. This result is similar to that found by Gandour et al. (1978).

The results of the Western Kammu speakers are more difficult to interpret: one Western speaker uses the segmental information, and one seems to use a combination of the original recording and Fo.

Conclusion

This investigation shows that there is a clearcut distinction between Northern Kammu which is a tone language and Eastern Kammu which is a completely non-tonal language. Words which differ only in the tones in Northern Kammu differ only in the consonants in Eastern Kammu, and speakers of one dialect do not produce or perceive those features which are characteristic of the other dialect. The two dialects are not intermediate stages between tonal and non-tonal languages, in spite of the fact that speakers of them can communicate without difficulty, and are more aware of lexical than of phonological differences between the dialects.

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