The raising and lowering of pitch caused by a voicing distinction in sonorants (nasals and approximants) : an epidemic disease in SEA languages

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Introduction

Hundred of languages spoken in the mainland of Southeast Asia and Southern China can be classified according to their genetic relationship into 5 major language families : Tibeto-Burman, Tai-Kadai, Hmong-Mien (Miao-Yao), Mon-Khmer, and Austronesian. All Languages in the Tai-Kadai,Hmong-Mien language families are tonal, and some Tibeto-Burman, Mon-Khmer and Austronesian[1] languages have tone.

Consonantal perturbation of Fo associated with obstruents have been well attested in many languages. (A brief survey can be found in Maddieson, 1984.) It has been known among SEA language specialists that voiced sonorants normally have the same effect on pitch of the vowels as do voiced obstruents, and voiceless sonorants go together with voiceless obstruents in raising pitch. Maddieson (1984) did some spectrographic measurements of the effect of voiceless and voiced nasal and lateral sonorants on Fo of the following vowel in five pairs of Burmese words spoken by three speakers. According to his findings, there was a general difference in Fo at vowel onset between pairs of words which contrast in sonorant voicing, i.e., the voiced sonorants lower the pitch and the voiceless ones raise the pitch of following vowel as expected. Finally, he concluded : "Our findings only lead us as far as the conclusion that different supra glottal configurations may have relatively little importance in explaining consonant effects on pitch...It seems probable that a better understanding of the details of laryngeal settings for voicing and voicelessness will have to precede the formulation of a new theory accounting for such effects." (Maddieson, 1984: 14).

The role of pitch raising and lowering of sonorants in SEA languages

In this section, some examples of pitch raising and lowering of nasals and approximants will be drawn from the four language families of SEA : Mon-Khmer, Tibeto-Burman, Tai-Kadai, and Hmong-Mien.

The Monic branch of the Mon-Khmer language family comprises only two languages : Mon and Nyah Kur or Chao Bon (Diffloth, 1984). Both of them are register languages(2); pitch differences in Mon and Nyar Kur can be regarded as a component of the two contrastive register complexes (L-Thongkum, 1982 and 1988). There are three types of nasals and approximants occur in normal-voice syllables and the breathy-voice ones occur only in breathy-voice syllables. Regarding pitch differences, three pitches can be heard : high, mid, and low, in syllables having voiceless sonorant+clear vowel, voiced sonorant+clear vowel, and murmured sonorant+ murmured vowel, respectively (L-Thongkum, 1990). In Nyah Kur, voiceless sonorants affect pitch of the following vowel the same way as voiceless aspirated obstruents. As a result, three different pitches can be heard clearly in the Ban Tha Pong dialect of Nyah Kur; for example, high pitch : [chəmum 342 ~ m̥um 453] 'a bear', [chəlo:ŋ 342 ~ l̥o:ŋ 453] 'high,tall' [thuər 453] 'a wasp'; mid pitch : [ma: 342] 'up to (such and such point)', [luɲ 342] 'to shrink (of cloth), [tɔ 342] 'till, until'; and low pitch : [m̥a:m̥ 231] 'father's younger brother', [l̥u̥: 231] 'to howl', [t̥h̥ɯ̥l̥ 231] 'thigh', etc. (L-Thongkum, 1982 and 1984).

Although the majority of Mon-Khmer languages are non-tonal, some Waic languages, Kawa and Samtao (Plang), have two tones : high vs. low (Diffloth, 1980), and some Angkuic languages, U and Man Met, have four-tone and six-tone systems (Diffloth,1991). In tonal Mon-Khmer languages, words having voiceless sonorant initials always have high tone; for example, Kawa; /hlá?/ 'leaf', /hlé?/ 'rain', /hlát/ 'to fear', /hlácŋ/ 'high', /hmáiŋ/ 'male', /hmáɲ/ 'to ask', /hmóŋ/ 'to hear', /hnám/ 'blood', /hɲáp/ 'difficult', /hŋó?/ 'to yawn', /hwiak/ 'dark', /hyáck/ 'ear', etc; Samtao : /l̥hé?/ 'rain', /l̥há?/ 'leaf', /l̥hó?/ 'tree bark', /l̥hét/ 'iron', /l̥húŋ/ 'high', /m̥hɔ́ŋ/ 'to hear', /m̥híŋ/ 'male', /m̥hũ?/ 'rope', /m̥hál/ 'dry field', /m̥hɯ́y/ 'axe', /n̥hãp/ 'difficult', /n̥hám/ 'blood', /ỳhúk/ 'ear', etc. Words with voiced sonorant initials can have high or low tone, depending

upon their phonological history, i.e. *ʔmV > mV́, and *mV > mV̀ (Diffloth, 1980).

Burmese, a Tibeto-Burman language, has four contrastive tones (U Thien Tun, 1982). In the speech of my Burmese informant, Mr.Wen Go, the phonetic characteristics of these four tones are : Tone 1 = breathy tone [32˜], Tone 2 = clear tone [453], Tone 3= creaky tone [51˜], and Tone 4 = glottal tone [42ʼ] or high-falling tone with abrupt end. Each of these four tones has two allotones, i.e., high [H] vs. low [L]. The high allotones only occur in syllables begun with voiceless aspirated obstruents and voiceless sonorants; for example, /n̥a^{1}/[1H] 'nose' vs. /na^{1}/[1L] 'ill', /ŋ̊a^{2}/ [2H] 'to borrow, to hire' vs. /ŋa^{2}/[2L] 'fish,five', /ɲ̊i^{3}/[3H] 'to ignite' vs. /ɲi^{3}/[3L] 'be caught as by fire', /m̥ɛʔ^{4}/[4H] 'gad fly' vs. /mɛʔ^{4}/[4L] 'dream', /l̥õu^{1}/[1H] 'to warm one's self' vs. /lõu^{1}/[1L] 'secure, safe', /l̥we^{2}/[2H] 'go out of way' vs. /lwe^{2}/[2L] 'vary', /l̥a^{3}/[3H] 'handsome, pretty' vs. /la^{3}/[3L] 'moon, lunar month', /l̥ai^{4}/[4H] 'seriously' vs. /lai^{4}/[4L] 'to flow'.

In general, Tai-Kadai languages have fully-developed tone systems. Lakkja, a Tai-Kadai language spoken in Jinxiu Autonomous Yao County, Guangxi Province, China, has six tones. These six tones can be divided into two tone categories : the high series tones (Tone1 = [453], Tone 3 =[45], Tone 5 = [33]) and the low series tones (Tone 2 = [231], Tone 4 = [214], Tone 6 = [221]). Words with voiceless sonorant initials always have one of the three high series tones or odd-numbered tones (L-Thongkum,1990); for example, /n̥aŋ^{1}/ 'outside', /l̥a^{3}/ 'after', /l̥oŋ^{1}/ 'to extinguish', /w̥a:i^{5}/ 'quick, fast', /ja:u^{3}/ 'dry', etc. This type of tonal behavior is also predictable in lexical items having voiceless sibilant and voiceless aspirated obstruent initials. In Kjang E, Shangnan Maonan, and Sui, the high series tones also occur in words with voiceless sonorant initials, whereas words with voiced sonorant initials can have tones in both categories; for instance, E : /n̥aŋ^{1}/ 'bamboo shoot', /n̥ok^{7}/ 'bird', /n̥am^{3}/ 'water', /hwi^{1}/ 'fire', /hjɛn^{1}/ 'teeth', /l̥ek^{7}/ 'steal'; Shangnan Maonan : /m̥a^{1}/ 'dog', /m̥ai^{5}/ 'new', /m̥at^{7}/ 'flea', /m̥u^{5}/ 'pig', /n̥ɔ^{3}/ 'rat', /hja^{1}/ 'two', /l̥ɜm^{1}/ 'wind', /l̥ap^{7}/ 'dark', /w̥an^{1}/ 'day,sun', /w̥in^{3}/ 'to fly', and so forth (Edmondson, 1991).

In the Miao-Yao language family, the Mien dialects of the Yao branch have six tones. The dichotomy, high series (Tone1 = [33], Tone3 = [354], Tone5 = [13] and low series (Tone2 = [31], Tone4 = [231], Tone6 = [11]) tones, is also applicable to the Mien dialects. Like Lakkja, words having voiceless sonorants and voiceless aspirated obstruents as initials always carry the high series tones; for example, /m̥ei^{1}/ 'fat,lard', /n̥ɔi^{1}/ 'day,sun', /ɲ̥aŋ^{5}/ 'year', /w̥in^{1}/ 'to turn one's head', /l̥a^{5}/ 'moon', etc. (L-Thongkum,1991).(3) This type of phenomenon also exists in Hmong Daɯ or White Miao; for example, /m̥u^{35}/ 'spear', /n̥u^{55}/ 'day,sun', /n̥ia^{35}/ 'tooth', /ɲ̥u^{35} (mẽ^{33})/ 'intestines', /l̥ɯ^{55}/ 'brain', /l̥ua^{33}/ 'rope', etc. In Hmong Daɯ, eight tones occur in non-checked syllables : /55/, /33/, /35/, /51/ (the high set), /22/, /21(glottalized)/, and /31(breathy)/ (the low set). Like Mien, words having voiceless sonorant initials can carry only tones in the high set (the author's field notes).

The evidence from Mon-Khmer, Tibeto-Burman, Tai-Kadai, and Hmong-Mien languages as shown above confirms very well that the "birth" and "death" of voiceless sonorants do have effect on the pitch of the following vowel, i.e. they are pitch raisers.

Flaws in phonetic theories

The knowledge obtained from working on a large number of SEA languages of many linguists and phoneticians specializing in SEA languages and linguistics tells us that there are still flaws in phonetic theories that should be reviewed and revised.

Firstly, sonorants (nasal, lateral, and semi-vowel) in SEA languages are equal to obstruents in many phonetic and phonological aspects, such as their status and distribution in phonological inventories, effect on Fo or pitch of the following vowel, history of phonological development, and so on. In the "International Phonetic Alphabet Chart" revised in 1989, there are no separate symbols for voiceless sonorants; only a diacritic placed under a voiced sonorant symbol (e.g.n̥) is provided, whereas there are seven separate symbols for voiceless plosives : p, t, c, k, q, and ʔ. This fact seems to hint that phoneticians, especially in the Western world, have viewed voiceless sonorants as "illigitimate children" of "secondary importance". In my opinion, the diacritic provided for voiceless sonorants and devoiced obstruents (e.g.d̥) is not inclusive enough

and may cause frustration to field linguists in selecting a suitable symbol for the sound they-hear. Let us look closely at the following phonetic symbols representing possible sounds in human language :

	Plosive	*Nasal*	*Lateral*
Voiceless	[p]	[m̥]	[l̥]
Voiceless+Aspiration	[ph]	[m̥h]	[l̥h]
Voice	[b]	[m]	[l]
Devoiced	[b̥]	[m̥]	[l̥]
Voice+Aspiration	[bh]	[mh]	[lh]
Glottalized	[ʔb]	[ʔm]	[ʔl]
Creak+Voice	[b̰]	[m̰]	[l̰]
Breath+Voice	[b̤]	[m̤]	[l̤]

So far, when the sounds in SEA languages have been transcribed, the symbols m̥, hm, mh, m̥h have been used interchangebly for the so-called "voiceless bilabial nasals" and l̥, hl, lh, l̥h for "voiceless lateral approximants" Do these four nasals or laterals in each set have the same phonetic quality ? I think that these eight cousonant symbols should be used in a more careful way because they indicate different kinds of phonation types or states of the glottis. Moreover, laryngeal settings for phonation types are some what related to pitch mechanisms. To support this view, the interaction between pitch and phonation type in some register Mon-Khmer languages has been studied instrumentally by Theraphan L-Thongkum (1987,1988,1989,1990, and 1991). The results obtained from this kind of investigation can (lead to a better understanding of tonogenesis and the other aspects of sound change.(4) The confusion will continue if there are no clear concepts and adequate symbols for sonorants, and if linguistic students have never been trained to hear and produce the sounds in question. We can no longer take for granted that some types of sonorants have never been in opposition or contrast, then, there is no need to distinguish them. We might risk missing some important clues for solving the linguistic problems of SEA, an area where language resources are rich.

Secondly, there is no explicit phonetic explanation for the pitch raising effect of voiceless sonorants; and the fact that voiceless sonorants or aspirated sonorants affect the pitch of the following vowel the same way as voiceless aspirated obstruents and voiceless sibilants in many SEA languages even adds more puzzles to the problem. All of the theories we have at present, i.e.

vertical largnx tension (laryngeal tension, supraglotta configurations) and aerodynamic theories (subglotta pressure, Bernouilli effect), seem to focus mostly o the effect of obstruents on the pitch of the followin vowel. (See Bell-Berti, 1975; Gandour,1974; Halle an stevens, 1971; Hombert et al, 1979; Ledefoged, 1967 Painter, 1978; Ohala, 1978; Riordan, 1980; Titze an Talkin, 1979; Westbury, 1983.)

There is a need for an adequate theory of consonan effects on pitch that is able to explain the SE phenomena -- a unified theory that can explain things i terms of the integration of articulatory settings laryngeal mechanisms for the production of phonatio type and pitch, amount and velocity of air-flow, and s on. All of these features seem to have a large or smal share in pitch raising and lowering.

Notes

(1) Ross (1991), cited in Edmondson (1991), has reporte that Yabem, Bukawa, and Kela, the three Austronesia languages of North Huon Gulf of Papua New Guinea possess tone. Michael D. Larish also says that Moklen i becoming a tonal language through language contact wit Southern Thai dialects (Larish,presonal communication) However, in this paper, the Austronesian languages wil not be taken into account, since the majority of the are non-tonal and I have never had any first han experience in working on any Austronesian languages.

(2) A register language may be viewed as a language tha has contrastive phonation types.

(3) In Baise Kim Mun, a dialect of the Yao branch voiceless sonorants have been lost (*m̥ > m,*l̥ > l) however, each of the high series tones has split int two tones: *T1> /T1.1/=/[354],and /T1.2/=[13]; *T3 /T3.1/=[45'] and /T3.2/=[35]; and *T5> /T5.1/=[354] an /T5.2/=[33]. As a result, words that used to hav voiceless sonorant initials have voiced sonorants wit /T1.1/,/T3.1/,or /T5.1/, at present. A case of tona flip-flop occurs in Jinxiu Kim Mun : /T1.1/ and /T5.1 are lower than /T1.2/ and /T5.2/. (See more details i L-Thongkum, 1991)

(4) For example,

	Initial consonant			*Tone*
*bh > b	*mh > m	*lh > l	*zh > z	/High/
*ph = ph	*m̥h = mh	*l̥h = lh	*sh = sh	
				/High/ >
*p = p	*m̥ = m̥	*l̥ = l̥	*s = s	
*ʔb > b	*ʔm > m	*ʔl > l	*ʔz > z	/Mid/
*b > p/ph	*m > m̥,m̥h	*l > l̥,l̥h	*z > s,sh	/Low/ > /Low/

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