

World of Knowledge

Restricted Tone Systems across the World's Languages

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Languages in which at least some units of meaning (morphemes) carry a specification of relative pitch may be termed tone languages. Among such languages, tones may be as frequent as every syllable (e.g., dialects of Chinese), or as sparse as once per phrase (varieties of Japanese). Sparse tonal systems, in which no more than one tone is pronounced per word (or longer phonological unit), are termed 'culminative'. Many types of tonal culminativity are logically possible. This study examines the culminative tone systems of one geographic region where such systems are common, namely the Sichuan province of China, to explore the range of variation that is found there. These culminative tone systems are compared with those found in other locations, and an attempt is made to categorize them in a meaningful way.

One language that is not discussed in these pages is Sichuan Mandarin, with which all of these languages are in contact to varying degrees. Sichuan Mandarin allows multiple tone specifications per phonological word (Yang 1984). The types of tone systems uncovered during this study may be characterized as follows:

1. Languages with maximum of one tone specification per word

Languages whose phonological grammars only permit one tone of any type to be specified per word or phrase represent culminativity in its narrowest sense. This restriction can be realized in two different ways. These can be divided into those in which only a prespecified syllable in each word is “tone-able” – able to receive a tone –versus those in which tone can fall on any syllable of the word.

Within the first type, those languages which only permit tone in particular locations, a further distinction can be drawn: tone can be “local” (confined to a single syllable), or it can be “spreading,” directly affecting more than one syllable. We consider these in turn:

1.1 Tone location is prespecified and local.

In languages where the lexical tone does not spread, all syllables except the overtly toned one(s) are subject to language-specific default pitch patterns. Among the Jiarongic (Tibeto-Burman) languages of Sichuan, several varieties only allow lexical tone to be specified at a location near the right edge of the word/stem. In the Caodeng dialect of Jiarong, lexical tone falls on the stem-penultimate (next to last) syllable. The counting requirement assigns tone as follows (Sun 2008):

kéd- ⁿ dʒev	‘to roll’	kɛ-qǎse	‘to look for’
kɛ-só- ⁿ dʒev	‘to cause to roll’	kɛ-qǎsése	‘to look for each other’

There are numerous languages in which only one position in a word is tone-able. In all of the languages examined for this study, this position is always defined relative to a word edge (i.e., not defined as the middle syllable). For culminative tone languages, Zhuokeji Jiarong (Lin, 2009) is the only one examined here where (in most cases) only the final syllable is tone-able. However, there are other languages where, like Caodeng, tone can only fall on the penultimate tone-bearing unit (TBU). In Chizigula (Bantu, Tanzania), if a verb has a tone, then that tone appears on the penultimate (Kenstowicz and Kisseberth 1990, Yip 2006):

Toneless verbs		Toned verbs	
ku-damɔŋ-a	‘to do’	ku-lombéz-a	‘to request’
ku-damɔŋ-iz-a	‘to do for’	ku-lombež-éz-a	‘to request for’
ku-damɔŋ-iz-an-a	‘to do for each o.’	ku-lombež-ež-án-a	‘to request for each o.’

1.2 Tone location is prespecified and tone spreads.

In addition to the above-described local tone systems, some languages of Sichuan have spreading systems, in which the tone of the first morpheme (element of meaning) determines all or most of the tonal melody of the word. This project has not found spreading tonal systems where the tone is only specified on the right edge of the word and spreads leftward. If such systems exist, they are less common than left-aligned, right-spreading tone systems. A frequently cited case of tone that starts on the left edge and spreads to the right edge is the West African language Mende (Leben 1978, Zoll 2003):

H	kó	‘war’	pélé	‘house’	háwámá	‘waistline’
L	kpà	‘debt’	bèlè	‘trousers’	kpàkàli	‘tripod chair’
HL	mbû	‘owl’	ngilà	‘dog’	félàmà	‘junction’
LH	mbǎ	‘rice’	fândé	‘cotton’	lèlèmá	‘mantis’
					ndävúlá	‘sling’
LHL	mb`â	‘companion’	nyàhâ	‘woman’	nìkìli	‘groundnut’
HLH			ndéwé	‘sibling’	yám̀b̀ẁẁ	‘tree (sp.)’
HLHL					kónùgù	‘centipede’
					dúmb̀è̀k̀k̀	‘star’

In Niuwozi Pumi (Qiangic; on the Southwest border of Sichuan with Yunnan province), specified tones fall on the last syllable of the first morpheme and spread rightward; the last tone in a cluster can link to two syllables. Toneless syllables surface with default L tone (data from Ding, 2006, analysis revised):

H	bi ^H ‘sun’	bi ^H ge ^H ‘as for sun’ tõ ^L pu ^H ‘donkey’	bi ^H ɬi ^H ɹu ^L ‘sunflower stem’ tõ ^L pu ^H k’u ^H ‘donkey head’	bi ^H ɬi ^H pɜ ^L tsi ^L ‘sunflower’ tõ ^L pu ^H mɜ ^H ɬe ^L ‘donkey tail’
HL	bi ^{HL} ‘honey’	bi ^H ge ^L ‘as for honey’	bi ^H b’õ ^L b’õ ^L ‘roasted flour with honey’	bi ^H b’õ ^L b’õ ^L ge ^L ‘as for roasted flour with honey’
LH		ɹə ^L tʃi ^{LH} ‘liquor’	ɹə ^L tʃi ^L ʃõ ^H ‘clean liquor’ dɛ ^L ɹə ^L ɹi ^{LH} ‘concentrate’	ɹə ^L tʃi ^L ʃõ ^H ge ^H ‘as for clean liquor’ dɛ ^L ɹə ^L ɹi ^L si ^H ‘concentrated’
LHL	tʃi ^{LH} ‘dog’	tʃi ^L mɛ ^H ‘dog hair’ dʒjõ ^L dʒi ^{LH} ‘buffalo’	tʃi ^L ni ^H dʒjɛ ^L ‘dog-nose group’ dʒjõ ^L dʒi ^L k’u ^H ‘buffalo head’	tʃi ^L ni ^H dʒjɛ ^L ɹə ^L ‘dog-nose groups’ dʒjõ ^L dʒi ^L mɜ ^H ɬe ^L ‘buffalo tail’

Among the western Tibeto-Burman languages, it is common for the left edge tone to determine the pitch patterns of most syllables, if not the whole word, as in Tibetan dialects and Tamangic languages (Nepal). Culminative spreading tones are also found in Wu dialects of Chinese, where the tone of the metrically prominent first syllable spreads rightward, and tones in non-prominent positions are not pronounced:

se52 + pe52	→	55 21	‘three cups’
se52 + bø23	→	55 21	‘three plates’
sz34 + pe52	→	33 44	‘four cups’
sz34 + bø23	→	33 44	‘four plates’

According to Duanmu (1999), for words of three or more syllables, all syllables after the second

receive default tone assignments. That is, the tone of the initial syllable spreads over one disyllabic foot. The distance that a spreading tone can travel is a variable among these languages. For the tone systems discussed above, Shanghai and Tamang can spread a tone across two syllables, Pumi from two to three syllables, and Mende can spread a left-edge tone all the way to the right edge of the prosodic word (up to four TBU's).

1.3 Tone location not morphologically prespecified.

In some tone systems where only one tone can surface per prosodic word or phrase, the location of the “winning” tone is determined by factors other than locating a particular TBU. A straightforward case can be observed in Tiwa (Tibeto-Burman: Bodo-Garo; Northeast India), where one tone per word is specified, and the specification can fall on any syllable (Joseph & Burling 2001):

Mono-	Disyllables		Trisyllables		
	1 st σ	2 nd σ	1 st σ	2 nd σ	3 rd σ
[H]	[H-H]	[M-H]	[H-H-H]	[M-H-H]	[M-M-H]
ná 'you'	khú-jur 'lip'	kojá 'red'	khú-jur-o 'on the lip'	yaŋ-gúl-o 'at the back'	chor-ri-á 'lime'
[HL]	[H-L]	[M-HL]	[H-M-L]	[M-H-L]	[M-M-HL]
nâ 'come out'	khân-jur 'ear'	paŋ-sî 'flute'	khân-jur-o 'on the ear'	paŋ-sî-na 'for the back'	che-la-râu 'y. sis. Hu'

A much more complex case is found in the Jiarongic language Lavrung, where the location of the pronounced tone is determined by a set of complex interactions among input tones (J. Sun 2008):

- (i) Pronounce the leftmost high (falling) tone.
- (ii) If there are no high tones, then
 - a) Pronounce the rightmost low tone if the accentual domain contains no toneless syllables.
 - b) Otherwise pronounce the leftmost low tone.

Input	Output	Rule
<i>spô</i> 'meadow' + <i>sasə</i> 'wild berry'	→ <i>spôsasə</i> 'strawberry'	i
<i>vəy</i> 'butter' + <i>dzi</i> 'eat'	→ <i>vəy dzi</i>	i
<i>snəur</i> 'broad bean' + <i>c^hɣ^v</i> 'pod'	→ <i>snəur^hɣ^v</i> 'broad-bean pod'	ii.a
<i>vəy</i> 'butter' + <i>u-dzi</i> 'eat [PFV]'	→ <i>vəy u-dzi</i>	ii.b

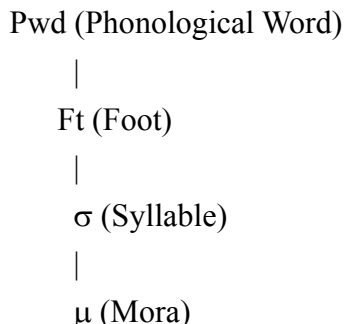
2. Languages with a culminative restriction on some special tone.

The Mianchi dialect of Southern Qiang has /H/ and /L/ tones, as well as contour /HL/ and /LH/, which are lexically rare. Mianchi also has lexically toneless syllables, to which a floating tone can link; if no /H/ is attached to a toneless syllable, it is pronounced with /L/ tone (details in Evans, 2008). The following compounds show that a floating tone attaches to the leftmost toneless syllable, that /L/ syllables have a tone linked to them (b vs. c), and that only one /H/ may be pronounced in a prosodic word (d):

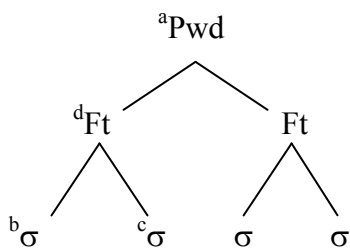
a. 'head'	b. /ŋo/ 'cow' + 'head'
/(L) (H) /	/Ø-(L) (H)/
⋮ ⋮	⋮ ⋮
/qa.bza.tsə/	/ŋo-qa.bza.tsə/
[qà.bzá.tsə]	[ŋò-qá.bzà.tsə]
c. /mè.ŋou/ 'cat' + 'head'	d. /bzǝ/ 'snake' + 'head'
/ L L (L) (H) /	/ LH (L)(H) /
⋮ ⋮	∨ ⋮
/me.ŋou-qa.bza.tsə/	/bzǝ-qa.bza.tsə/
[mè.ŋou-qà.bzá.tsə]	[bzǝ-qà.bzà.tsə]

3. Languages with multiple culminativities.

It is generally assumed that tones are linked to levels of prosodic organization (Yip, 2006); thus, a tone can be linked to a mora (or short syllable, as in Greek and Japanese), a full syllable, or a prosodic foot (pair of TBU's, as in Shanghai and Tamang). We consider the outcome of each level of prosodic organization being able to receive a tone, assuming the following prosodic hierarchy (Selkirk 1980a, 1980b):



A phonological word consists of at least one binary foot, which in turn consists of either two syllables (CVCV) or two morae (CVV or CVC). In such a system, a tone assigned at the level of syllable or mora will not spread over multiple syllables/morae. However, a tone at the foot level will specify pitch on up to two syllables/morae, and tone at the Pwd level will assign pitch to each of its component syllables/morae. If tone can be specified once at any of these levels, the resulting structure is as follows:



In fact, this is the pattern that we observe in the Muka dialect of Southern Qiang:

	Tone	σ	σσ	σσσ	σσσσ
	location				
a.	Pwd	'ŋo [ŋó] 'bovine'	'ŋo-mje [ŋó mjé] 'cow'	'ŋo-lo.kwe [ŋó ló kwé] 'old bovine'	'ra.ko-çi.də [rá kó cí dó] 'sickle'
b.	1 st σ	zɯ* [zú] 'horse'	zɯ*-mje [zú mjè] 'mare'	zɯ*-lo.kwe [zú lò kwè] 'old horse'	me*.gu.mi.dzi [mé gù mì dzì] 'thunder'
c.	2 nd σ		kse.zə* [ksè zé] 'musk deer'	kse.zə* mje [ksè zé mjè] 'musk doe'	kse.zə* se ɲi [ksè zé sè ɲì] 'musk deer liver'
d.	1 st Ft		'lu.ɿa* [lú ɿá] 'Small Heishui' (place)	'lu.ɿa* pə [lú ɿá pè] 'Small Heishui-LOC'	'lu.ɿa* zɯwe pə [lú ɿá zɯwè pè] 'Small Heishui-field-LOC'
e.	∅ (toneless)	i [í] 'chicken'	i-dzɯ [ì dzú] 'pheasant'	i-lo.kwe [ì lò kwé] 'old chicken'	ba.lu.ba.se [bà lù bà sé] 'thing'

Similar, but not identical, tone structure may be observed in the Osaka dialect of Japanese, and in Mawukakan (Niger-Congo, Mande; Côte d'Ivoire and Guinea).

4. Concluding observations.

Among the languages considered in this study, culminative tone systems display the following properties:

Spreading. Tones only spread rightward.

Alignment. In most cases, tones that spread rightward start at the left edge of the prosodic word. In the case of Niuwozi Pumi, the spreading tone starts on the last syllable of the first morpheme. In Garo, non-phonemic [H] begins in the first syllable that ends with a stop. In cases where tone is a property of the phonological word as a whole, assignment and spreading begin with the leftmost TBU. Non-spreading, or local, tones are not left-edge only, and demonstrate a strong tendency for right-edge effects, either in assigning or locating a non-spreading tone.

Complexity. Languages tolerate multiple culminative tone systems. The examples seen thus far permit specification of up to one spreading and one local tone.

There has been a tendency for linguists working on tonal languages of Sichuan and other parts of the “Sino-sphere” to assign a phonemic tonal specification to each syllable. While it is indeed the case that every voiced syllable has a fundamental frequency (rate of vibration of the glottis), this frequency does not imply an indication of tone in the lexical entry for that syllable. Phonetics, phonology, and morphology each yield their clues to the underlying tone system, and its relationship to the surface forms. A careful analysis of the tone properties of languages in this region may turn up more examples of culminativity than have surfaced thus far.

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