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Chapter 58: Vowel harmony in Sino-Tibetan languages

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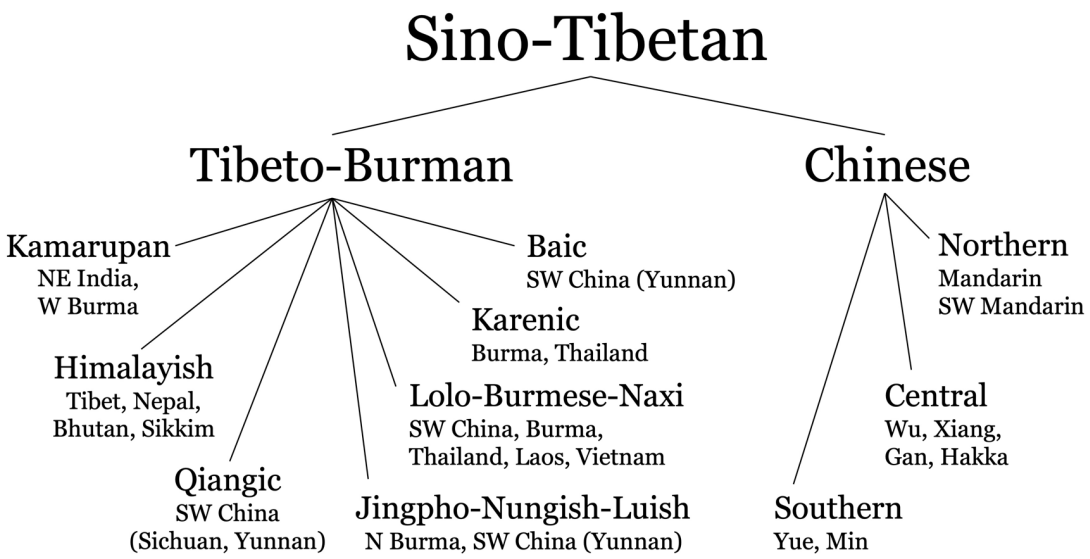
58.1 Introduction

This chapter provides an overview of vowel harmony (VH) systems, as reported for some languages of the Sino-Tibetan [ST] language family (also known as Tibeto-Burman [TB] or Trans-Himalayan) (see Chart 58.1, adapted from Matisoff 2003: 3).

Chart 58.1: Sino-Tibetan languages



VH is marginal in ST, especially in view of the extensive distribution of this language family (from Northeast India to the Southeast Asian peninsula) and the large number of ST languages (approximately 250, see Matisoff 2003: 3). VH is consistently reported only for Qiangic, a small subgroup in Southwest China, and a few isolated cases have also been reported for languages of two more subgroups: (i) Na (aka Naxi) languages of the Lolo-Burmese-Naxi subgroup, which are located immediately south of Qiangic languages, and (ii) Tibetic languages of the Himalayish subgroup,[1] spoken in West China, which are more remote neighbors of both Qiangic and Na languages.[2]

[1] The term "Tibetic" refers to a group of languages derived from Old Tibetan, which was spoken in the Yarlung valley at the time of the Tibetan empire (7-9 centuries) (Tournadre 2014).

[2] In addition, throughout TB languages there are sporadic examples of fossilized processes of vowel assimilation (such as complex allomorphy patterns of nominal prefixes in Tani languages, Post & Sun 2017: 326), and some

VH in Tibetic languages, particularly in the *lingua franca* Lhasa Tibetan, has been systematically investigated (see Sprigg 1961; Chang & Shefts Chang 1964: 46-53, 1968; Dawson 1980: 59-87, 1985; Denwood 1999: 78-84, 304-306; Tournadre & Dorje 2003: 401-402; DeLancey 2017: 387), and is already incorporated in cross-linguistic studies on VH (see Salting 1998, 2005; van der Hulst 2018: 271-274). Conversely, information about VH in Qiangic and Na languages is mostly limited to descriptive statements in reference grammars, and is virtually unknown in literature on VH. VH in these two groups is therefore the main focus of this chapter.

58.2 Qiangic and Na

The grouping of little-studied TB languages of Southwest China as "Qiangic" is based on exploratory work by Chinese linguists between the 1960s and the 1990s (H. Sun 1983, 2001; Huang 1991). Qiangic comprises twelve languages that are still spoken (Qiang or Rma, rGyalrong, Lavrung, Horpa, Muya, Pumi or Prinmi, Queyu or Choyo, Zhaba, Guiqiong, Ersu [comprising Ersu, Lizu, and Duoxu], Shuhi or Shixing, Namuyi), and one extinct language (Tangut). The genetic classification of Qiangic languages is controversial, because the supporting evidence is limited to typologically common features (such as the presence of numeral classifiers) (cf. Chirkova 2012). In the last two decades, important progress has been made in the exploration of the complexity of different Qiangic varieties. New clusters have been identified on the basis of morphological criteria, such as (i) rGyalrongic, including rGyalrong proper, Lavrung, and Horpa (J. Sun 2000a, 2000b); and (ii) Qiang (see Evans & Sun 2015, Sims 2016). At the same time, some southern Qiangic languages (such as Shuhi and Namuyi) have been argued to have a closer affinity to Na languages (see Jacques & Michaud 2011), which are traditionally seen as transitional between Qiangic and Lolo-Burmese groups (e.g., Bradley 1997; Matisoff 2003).

Qiangic languages are phonetically and phonologically complex. They are characterized by (i) large consonant inventories, including uvular consonants; (ii) large vowel inventories, typically including eight to ten vowels, which may be lengthened, nasalized, and rhotacized; and (iii) complex prosodic systems, ranging from stress languages in the north to tone languages in the south. Morphemes in Qiangic languages are generally monosyllabic,

productive patterns of VH (as in Dolakha Newar, Genetti 2007: 58-61). However, they appear to be subject to considerable inter-speaker variation, and are not considered in this chapter.

but words are mostly disyllabic and composite. Tonal Qiangic languages commonly have two contrastive tones on free morphemes, whereas in disyllabic words, there is tone reduction in non-initial syllables, resulting in a limited number of possible tone patterns (see Evans 2008, 2018: 245-249 for overviews).

Overview studies of Qiangic languages describe VH as a characteristic feature of the Qiangic subgroup (e.g., H. Sun 2001: 166). However, while surface patterns of vowel assimilation are readily attestable in various Qiangic languages, individual harmony systems differ rather markedly throughout the area of their distribution. Mixed systems with several distinct harmony types per language are found in northern Qiangic languages, which are stress-timed, and simpler systems with oftentimes just harmony type have been reported for southern Qiangic languages, which are tonal. Despite this diversity, VH in various Qiangic languages is associated with the same set of these three domains:

1. verbs with affixal morphemes, including:
(a) several types of ST derivational affixal morphology, such as the preverbal negative particle **ma-j*, the prohibitive particle **ta* or **da* (cf., LaPolla 2017)
(b) independently innovated derivational affixal morphemes, such as directional prefixes[3]
2. kinship terms formed with the ST kinship prefix **a-*
3. combinations of the numeral 'one' with numeral classifiers[4]

Harmonic domains are typically equal to or shorter than a (phonological and morpho-syntactic) word. VH is root-controlled in affixal structures and regressive in combinations of the numeral 'one' with classifiers. VH reported for some adjacent Na languages, which are tonal and typologically close to southern Qiangic languages, is broadly similar to that in southern Qiangic languages in terms of harmony types and domains.

The following case studies illustrate variation in VH systems across Qiangic and adjacent Na languages. The Yadu variety of Qiang, a northern Qiangic stress language, boasts one of the most complex VH systems in the area. As analyzed in Evans & Huang (2007), Yadu has five VH processes: Front, Low, ATR, Round, and Rhotic (see chapters 4-7,

[3] Qiangic languages typically have three to nine directional verbal prefixes. They mark the direction of the action, denoted by the verb, and are also used to convey perfectivity.
[4] Numbers are mostly bound morphemes in Qiangic and Na languages, which are only used in combination with a classifier.

10).[5] In addition to the aforementioned three harmonic domains, VH in Yadu also occurs in compounds. Front, Low, ATR harmonies are found in root-affix combinations and those of the numeral 'one' or the demonstratives and a classifier, whereas Round and Rhotic harmonies are typically found in compounds.

Yadu has eight basic vowels: /i y e a ə u o ɑ/. All vowels except for the schwa show a phonemic contrast in length; and all vowels may be rhotacized. Table 58.1 (adapted from Evans & Huang 2007: 154) summarizes feature specifications for the vowels of Yadu:

Table 58.1 Feature specifications for the basic vowels of Yadu (unary features "Round" and "Rhotic" are marked by "•")

	i	y	e	a	ə	u	o	ɑ	rhotic vowel
Front	+	+	+	+	-	-	-	-	
Low	-	-	-	+	-	-	-	+	
ATR	+	+	-	-	+	+	-	-	
Round		•				•	•		
Rhotic									•

Front and Low harmonies are argued to the most basic of the five VH processes. Vowels in affixes, such as the first singular suffix in example (1) (Evans & Huang 2007: 155), agree with the root vowel for the specification for [front]:

(1) a. 'pʰi-a [pʰja] (< pʰi 'sow')
sow-1SG
'I am sowing'

b. 'pʰu-ɑ [pʰwɑ] (< pʰu 'run, flee')
run-1SG
'I am running'

Front harmony further interacts with Low harmony. Vowels in some morphemes, such as the numeral 'one' in example (2) (Evans & Huang 2007: 156), take on values that combine the features [front] and [low] of the root vowel. Accordingly, 'one' has four allomorphs, including (i) [e] with the features [+front]/[-low], (ii) [a] with the features [+front]/[+low], (iii) [o] with the features [-front]/[-low], and (iv) [ɑ] with the features [-front]/[+low].

[5] Similar patterns, presented more descriptively, have also been reported for other varieties of Qiang, including Mawo (Liu 1998: 67-73), Ronghong (Yadu) Qiang (LaPolla & Huang 2003: 35-36), and Yonghe Qiang (Sims 2014: 44-46).

(2) a. e-'pi b. a-'kwa c. o-'tsu d. ɑ-'lɑ
one-dollar one-place one-group one-CLF.elongated
'one dollar' 'one place' 'one group of' 'one stick-like thing'

Yet some other morphemes (such as directional prefixes) are inherently specified for ATR (see Table 58.1). When such morphemes undergo VH, the morpheme's specification for ATR combines with the features [front] and [low] of the root vowel. Vowels belonging to the [+ATR] set have the realizations [i~ə~u], whereas vowels belonging to the [-ATR] set have the realizations [e~a~o~ɑ], as illustrated in example (3) (Evans & Huang 2007: 157-158):

(3)	Gloss	'push'	'enclose'	'drive'	'face'	'chase'	'run, flee'
+ATR	upward	ti-ˈɕtɕi	ti-ˈtɕʰy	ti-ˈwaʁ	ˈtə-lə	tə-ˈdzɑ	tu-ˈpʰu
-ATR	downward	ɦe-ˈɕtɕi	ɦe-ˈtɕʰy	ɦa-ˈwaʁ	ˈɦɑ-lə	ɦɑ-ˈdzɑ	ɦo-ˈpʰu

Rounding harmony operates bidirectionally so that vowels across syllable boundaries agree in terms of [round]. It is commonly observed in morphemes with the vowel [ə], such as /pə/ 'do' in example (4) (Evans & Huang 2007: 162). Evans & Huang (ibid.) note that /ə/ does not become Front after /i e a/ (as in 4b), which shows that it has a negative specification [-front].

(4) a. /ʁwɑ.'kʰu-pə/ [ʁwɑ.'kʰu-pu] 'be sarcastic'
b. /tsun.'tɕin-pə/ [tsun.'tɕin-pə] 'respect' (from Chinese 尊敬 *zūnjìng* 'respect')

Finally, rhotic harmony occurs before a rhotic vowel, as in (5) (Evans & Huang 2007: 165):

(5) a. /ʁuɑ/ 'five' + /kʰeˇ/ 'hundred' > [ʁuɑˇ.'kʰeˇ] 'five hundred'
b. /me-/ 'not' + /weˇ/ 'reduce' > [meˇ-'weˇ] 'unceasingly'

The tonal southern Qiangic languages Guiqiong and Ersu exemplify simpler VH systems. Guiqiong (based on Rao 2015: 63-67; see also Jiang 2015: 58-60) has eight basic vowels: /i y ɯ u ə ɛ ɔ ɑ/. All vowels but /y/ and /ɔ/ have nasal counterparts. In addition, there is one nasal vowel without an oral counterpart, /æ̃/. In Rao's analysis, all vowels can be divided into three classes, characterized by the features [±front] and [±high]. The primary division is based on the feature [±front]; non-front vowels are further differentiated on the basis of the feature

[±high]. Depending on the feature(s) of the stem vowel, the vowel of the prefix or that of the numeral 'one' may have one of the following realizations: [ɛ~ə~ɑ]. Table 58.2 summarizes the three vowel classes in Guiqiong, their features, and the corresponding alternant realizations. These are exemplified by combinations of the negative prefix with verbs (based on Rao 2015: 85). Monosyllabic verbs in Guiqiong have two tones: 35 and 55. The tone of the prefix shows some variation depending on the tone of the verb, but the underlying processes are not yet fully understood (Rao 2015: 72-73, 83-86).

Table 58.2 VH in Guiqiong

Feature		**Vowel set**	**VH form**	**Example**
[+front]		i, ɛ, y, ĩ, ɛ̃, æ̃	ɛ	mɛ^{35}-dæ̃^{55} 'not hit' (< dæ̃^{35} 'hit')
[- front]	[+high]	u, ə, ɯ, ũ, ə̃	ə	mə^{35}-pɯ^{55} 'not move' (< pɯ^{55} 'move')
	[-high]	ɔ, ɑ, ɑ̃	ɑ	mɑ^{33}-ʐɔ^{55} 'not help' (< ʐɔ^{35} 'help') mɑ^{33}-ʂɑ^{55} 'not stew' (< ʂɑ^{55} 'stew')

Ersu presents an even simpler system with only one process: Low harmony (e.g., Chirkova et al. 2015 for the Ganluo variety of Ersu). Ganluo Ersu has eight vowels, of which four are plain (/i ɛ o a/), two are fricativized (/ʐ̩ ʏ̩/), and two are rhotacized (/ə˞ a˞/). All vowels can be divided into low (/a a˞/) and non-low (all remaining vowels). Corresponding vowel realizations in verbal prefixes and the numeral 'one' are [a~ɛ], as detailed in Table 58.3 (ibid., p. 204).[6] Ganluo Ersu monosyllabic words have two contrastive tones: H(igh) and L(ow). In combinations of verbs with prefixes or those of the numeral 'one' and classifiers, the tone of the prefix or the numeral 'one' assimilates to the tone of the verb or the classifier. It is H, if the tone of the verb or the classifier is H; and L, if the tone of the verb or the classifier is L.

Table 58.3 VH in Ganluo Ersu

Feature	**Vowel set**	**VH form**	**Example**
[-low]	i, ɛ, o, ʐ̩, ʏ̩	ɛ	tɛ́ pʰó 'one set (of clothing)' nɛ̀-ndzɛ̀ 'have soaked' (< ndzɛ̀ 'soak')

[6] /ə˞/ mostly occurs in isolation and is not found in harmonic domains.

[+low]	a, a˗	a	tá ká ‘one strip’ nà-ɖʐà ‘fall down’ (< ɖʐà ‘drop’)

Finally, Yongning Na has a mixed VH system, where front-back harmony and height harmony are differentiated by affix (Lidz 2010: 96-105). Yongning Na has 10 basic vowels: /i ɛ æ æ̃ ə ɯ u ɣ ɤ, ɔ ɑ/ (ibid., p. 37). It is described as having two basic tones (33 and 13) and a complex tone sandhi system (ibid., pp. 14, 109), the workings of which have yet to be precisely discovered. The interrogative prefix *a³³*- has two allomorphs, which agree with the root vowel for the specification for [front], as illustrated in (6) (Lidz 2010: 99):

(6) a. [æ³³-tsʰɛ³³] ‘what, how’ b. [ɑ³³-tsɔ³³] ‘what’

The accomplished prefix *lə³³*-, on the other hand, harmonizes based on height. It has three allomorphs, of which [lɛ³³-] is used with verb stems with a high vowel (/i ɯ u ɣ/); [lə³³-] is used with verbs with mid-vowels (/ɛ ɤ ɔ/), and [læ³³-] attaches to verb stems with low vowels (/æ ɑ/). This is illustrated in (7) (Lidz 2010: 100-101):

(7) a. [lɛ³³-ɲi³³ zɛ³³] ‘be full’ (< [ɲi³³] ‘be full’)
b. [lə³³-sɛ³³] ‘finish’ (< [sɛ¹³] ‘complete, finish’)
c. [læ³³-qæ¹³] ‘burn up’ (< [qæ³³] ‘burn’), [læ³³-bɑ³³] ‘open up’ (< [bɑ³³] ‘open’)

The case studies above represent a diverse set of harmonic patterns, all of which share a common set of domains. At first blush, the set of patterns does not relate straightforwardly to conventionally well-known types of VH, as presented in Part I of this Handbook. One noteworthy development in this regard is the recent reanalysis of vowel systems in some varieties of northern Qiangic languages (rGyalrong, Lavrung, Horpa, Qiang), which are phonologically and morphologically the most conservative among Qiangic languages. This reanalysis may provide a missing link to tie the diverse set of harmonic patterns together and link it to a cross-linguistically identifiable type.

In this reanalysis, all vowels in a language fall into two paired or harmonic sets, of which one is plain (hereafter Set 1) and the other is marked, and associated with auxiliary articulatory gestures involving a constriction in the vocal tract (hereafter Set 2). Vowels in

Set 2 have been variably described as velarized, uvularized, and pharyngealized.[7] While the exact location of a constriction requires further study, vowels in Set 2 in all described cases share the same set of acoustic correlates. Specifically, they are characterized by raised F1 and lowered F2 values, as compared to their counterparts in Set 1 (Evans 2006; Lin et al. 2012; J. Sun & Evans 2013; Evans et al. 2016; Van Way 2018: 103-127; Chiu & J. Sun 2020), hence suggesting a greater retraction and lowering of the tongue for vowels in Set 2.

In relation to different varieties of the Qiang language, where this phenomenon has been most extensively studied, the contrast may have escaped earlier descriptions, because vowels in Set 2 are acoustically quite distant from their counterparts in Set 1 (e.g., Evans et al. 2016: 18). This is illustrated in Table 58.4 in relation to the eight basic vowels in the Mawo variety of Qiang. The table combines phonetic transcriptions, which correspond to the inventory of basic vowels in Mawo, as presented in the first description by Liu Guangkun (1998: 38), and phonological transcriptions, which are based on the reanalysis of the Mawo vowel system in J. Sun & Evans (2013: 139) (see also Evans 2006: 938-939):

Table 58.4 Plain (Set 1) and uvularized (Set 2) vowels in Mawo Qiang

Set 1	i [i]	u [y~ui]	ə [ə]	a [a]
Set 2	iᵡ [e][8]	uᵡ [u]	əᵡ [ɤ]	aᵡ [ɑ]

Important phonological evidence for the underlying contrast comes from phonotactic constraints, whereby vowels from Set 2 tend to occur in contexts with a uvular consonant. For example, in Yunlinsi Qiang (Evans et al. 2016: 19-20), in syllables with simple (not cluster) onsets, a uvular onset can only be followed by a vowel from Set 2, e.g., /qəᵡ-/ ‘head’, /quᵡ/ ‘fear’; whereas a velar onset is mostly followed by a vowel from Set 1, e.g., /kə/ ‘go’, /ku/ ‘turnip’, but /kaᵡχuᵡ/ ‘koklass pheasant’. Vowels from both sets occur with labial and

[7] Vowels in Set 2 are analyzed as velarized in Zbu rGyalrong (J. Sun 2000b: 215) and Puxi Lavrung (J. Sun 2004: 272; Lin et al. 2012); as pharyngealized in Hongyan Qiang (Evans 2006) and two Northern Horpa varieties Rtsangkhog and Yunasche (Chiu & J. Sun 2020); and as uvularized in several varieties of Qiang (Evans & Sun 2015; Evans et al. 2016) and Nyagrong Minyag (Horpa) (Van Way 2018). In the three languages, where the contrast has been investigated using ultrasound imaging—Yunlinsi Qiang (Evans et al. 2016), and Rtsangkhog and Yunasche (Chiu & J. Sun 2020)—the highest point of the tongue is said to be retracted toward a target in the uvular region in Yunlinsi, whereas in Rtsangkhog and Yunasche, the production of pharyngealized vowels involves different types of tongue movements, including retraction, backing, and double bunching, depending on the inherent tongue positions for each vowel.

[8] J. Sun & Evans (2013: 139) note that /iᵡ/ has multiple correspondences in Liu’s (1998) data, most notably [e] (see also J. Sun 2003: 233-235).

coronal initial consonants. In syllables with cluster onsets (C1C2), the nucleus agrees in uvularity with C1, if C1 is velar or uvular, and C2 is not an oral stop or affricate. Examples include: /gzə/ ‘set out’, /ʁzəᵡ/ ‘fish’. VH, found in the common set of harmonic domains (as above), is said to be an important aid in the identification of vowel pairs. For example, in prefix-verb combinations, prefix vowels alternate between Set 1 and Set 2 in agreement with the vowel of the root. This is illustrated in Table 58.5 with examples from Yunlinsi and Mawo (Evans 2006: 946; J. Sun & Evans 2013: 142; Evans et al. 2016: 22):

Table 58.5 VH in Yunlinsi and Mawo Qiang

Set 1	Gloss	Set 2	Gloss
/nu-ˈla/	‘bring (in upstream direction)’	/nuᵡ-ˈstaᵡ/	‘pull out (in upstream direction)’
/tu-ˈlu/	‘come up’	/tuᵡ-ˈqsuᵡ/	‘jump up’
/da-ˈsu/	‘have studied’	/daᵡ-ˈsuᵡ/	‘have hibernated’

In most studies, it is argued that the marked property associated with Set 2 is a property of vowels rather than consonants (e.g., Evans et al. 2016: 21-22). However, in a few cases, an unambiguous assignment is problematic. Nyagrong Minyag (a variety of Horpa) (hereafter Nyagrong), as described in Van Way (2018), is a case in point. Uvularization in Nyagrong exists in two forms. As a consonantal feature, uvular segments pass the feature of uvularization to neighboring vowels in both directions, as in [kaᵡχtɕʰiᵡ] ‘good’, [ʁzaᵡbuᵡ] ‘insane’ (Van Way 2018: 97). As a vowel feature, some vowels have properties of uvularization in contexts where no uvular consonant is present, as in [zyᵡ] ‘appearance’, [laᵡwaᵡ] ‘lungs’ (ibid., p. 101). As a result, in some cases, it may be difficult to decide whether a certain uvularized vowel is a phoneme or an allophone. In addition to uvulars, other consonants that play a role in VH by blocking the spread of uvularization include velars and /j/, as in [qwaᵡɣwa] ‘rake’, [qʰaᵡji] ‘boiled flour’ (ibid., p. 99). Inventories of plain and uvularized vowels in Nyagrong are provided in Table 58.6 (based on Van Way 2018: 101):

Table 58.6 Plain (Set 1) and uvularized (Set 2) vowels in Nyagrong

Set 1	i	y	ɛ	ə	u	ɔ	a
Set 2	iᵡ	yᵡ	--	əᵡ	uᵡ	--	aᵡ

The analyses of Nyagrong and the varieties of Qiang above primarily focus on the phonetic and phonological opposition in vowels and only evoke VH as an aid in the identification of vowel pairs. Interestingly, the analysis of Stau (Horpa) by Gates & Won (2018), which concentrates on VH, reveals a similar organization of vowels in harmonic pairs, with one vowel being more retracted and lowered than the other (see Table 58.7, Gates & Won 2018: 263).

Table 58.7 Two sets of vowels in Stau

Set 1	i[9]	e	u	æ
Set 2	ə	ɛ	o	ɑ

Gates & Won (2018) notice that lexicalized words in Stau show a strong tendency toward harmonic forms with identical vowels (such as [əCə], [eCe], [ɛCɛ] or [ɑCɑ], as in /veqe/ 'rabbit', /rnɛmɛ/ 'finger', /fɛoro/ 'scrape', /nc^{h}æræ/ 'play', ibid., pp. 268-269), and lacking disharmonic forms (such as [*əCi], [*ɛCe], [*oCu], or [*ɑCe]). A similar tendency is also found in compounds and combinations of verb stems with negative, prohibitive and directional prefixes, as in [mæ-rgæ] NEG-like.3 '[he] did not like [it], [mɑ-ʁɑ] NEG-problem 'no problem' (ibid., pp. 270-271). Similar to other northern Qiangic languages with two sets of vowels, the occurrence of vowels in Set 2 is correlated with the presence of uvulars. Specifically, the high vowels /i u/ (Set 1) do not occur after uvular consonants. Hence, VH involving the pairs /i-ə/ and /u-o/ is blocked if the onset of the first syllable is uvular. Examples include: [ʁəci] 'top' (instead of *[ʁici]), [ʁoɲu] 'behind' (instead of *[ʁuɲu]) (ibid., p. 277). Other consonants blocking VH include affricates and consonant clusters in the middle of the root, as in [k^{h}ə-tsi] 'conduit' (instead of *[k^{h}i-tsi]), [pə-xsi] 'bladder' (instead of *[pi-xsi]) (ibid., p. 278)

Assuming that all languages analyzed as having harmonic pairs of vowels represent one and the same type of contrast, the related harmony pattern is one in which vowels from each harmonic pair cannot co-occur within the same domain. This harmony pattern manifests itself in disyllabic words and compounds (Stau, Nyagrong), and it also extends to combinations of roots with prefixes (Yunlinsi, Mawo, Stau), which belong to the set of common Qiangic harmonic domains. This represents a rather prototypical pattern of vowel

[9] As pointed out by Gates & Won (2018: 269-270), evidence for this vowel pair is less straightforward than for the other three vowel pairs, because attested cases of [iCi] are often in free variation with [əCi].

harmony, in which all vowels in a word agree for some feature, with affixes displaying alternations. However, what complicates the analysis of this pattern is that, on the one hand, across the languages with harmonic pairs of vowels, the phonetic nature of the underlying distinction is unclear and, on the other hand, it is uncertain whether the underlying harmonic feature is vocalic (as argued for Mawo and Yunlinsi) or both vocalic and consonantal (as in Nyagrong), and hence, perhaps related to stretches that are larger than one segment (whether vowel or consonant).[10]

The remainder of the section examines how the opposition in vowels (organized in harmonic pairs) and the related harmony pattern, found in some northern Qiangic languages, correspond to vowel systems and diverse VH patterns in other Qiangic languages across the common set of harmonic domains.[11] The goals of the comparison are (i) to seek further evidence on the nature of the feature underlying the opposition between harmonic vowels, and (ii) to examine the role of consonants in harmony processes. The proposed analysis is necessarily preliminary and tentative, because our knowledge of most Qiangic languages is still very incomplete and much information relevant to the comparison is not available.

Across Qiangic languages, correspondences vary depending on whether compared languages have stress or tone. In closely related varieties, which have stress, such as Mawo and Yadu Qiang (see Tables 58.4 and 58.1, respectively), the opposition between plain and marked vowels corresponds to that in vowel quality (across the high-low and front-back dimensions). The harmony pattern based on the spreading of a single marked feature (uvularization in Mawo, see Table 58.5) corresponds to a set of patterns, whereby vowels come to agree across several dimensions (Low, Front, ATR), see examples (1-3). The complexity of vowel agreement patterns and the number of harmonic allomorphs (up to four, see examples 2 and 3) tentatively suggest that all harmonic pairs of vowels that are phonologically contrastive in Mawo likely remain phonologically contrastive in Yadu.[12]

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[10] Another piece of evidence that vowel assimilation patterns in Qiangic languages may relate to both vowels and consonants comes from rhotic assimilation in Qiang. In some varieties of Qiang, such as Yonghe, described in Sims (2014), r-coloring in verbal prefixes occurs not only when they precede a root with a r-colored vowel, but also when preceding a root with a plain vowel and a retroflex consonant initial, as in the following example: (from Sims 2014: 46): /ɦə-/ directional.prefix + /tʂɑ/ 'to draw out' > [ɦɑˤ-ˈtʂɑ] 'to draw out (lots)'.

[11] Given that rounding and rhotic harmony attested in some northern Qiangic languages (such as Yadu Qiang discussed in this section) occur in compounds, which do not belong to the set of harmonic domains found in all Qiangic languages, they are not included in the comparison, and may represent unrelated processes.

[12] A parallel example of the opposition between plain and marked vowels corresponding to that in vowel quality can be found in Stau (see Table 58.7), as compared to Rtsangkhog and Yunasche, whose vowel systems are organized in harmonic pairs of plain and pharyngealized vowels (Chiu & J. Sun 2020).

In more distantly related southern Qiangic languages, which are tonal, the opposition between harmonic pairs of vowels corresponds to a combination of oppositions in vowel quality and tone. The number of features for which vowels agree across harmonic domains reduces and so does the number of allomorphs in affixes (see Tables 58.2-4 for Guiqiong, Ersu, and Yongning Na). This tentatively suggests that some of the original phonological oppositions between paired vowels may be lost. The restructuring of the original system of contrasts and the accompanying reduction of VH patterns may be further correlated with the loss of uvulars. This can be illustrated by comparing Ersu, which does not have uvulars, with its closely related language Lizu, which has phonemic uvulars. Lizu has eight basic vowels: /i y e æ ə u o ɐ/, which in contrast to Ersu, feature a distinction between front *a* (/æ/) and back *a* (/ɐ/). Uvulars in Lizu are only found before back and low vowels (/o/ [ɔ] and /ɐ/ [ɑ]) (Chirkova & Chen 2013). Lizu has no VH, but in verbs and classifiers with the root vowel /ɐ/, the vowel in prefixes and the numeral 'one' commonly assimilates to /ɐ/ in lowness and backness, as in dè-qʰɐ̀ [dɑ̀-qʰɑ́] 'bitter'. To compare, Ersu has Low harmony before /a a˗/ (see Table 58.3), which after the merger of the front and back *a*, found in Lizu, become the only two open vowels in the vocalic system of Ersu.[13] Finally, VH patterns in common harmonic domains are accompanied by tone sandhi or tone assimilation (as in Ersu, see Table 58.3). However, in most cases, underlying patterns are not yet fully understood (as in Guiqiong, Yongning Na).

One mechanism that would account for the diversity of correspondences of the opposition in harmonic pairs (characterized by auxiliary articulatory gestures and more retracted nature of marked vowels), as found in some northern Qiangic languages, in closely and more distantly related Qiangic languages (vowel and tonal quality) is the engagement of the laryngeal constrictor, controlling larynx opening, larynx height, and lingual retraction (Esling 1996, 2005; Esling et al. 2019; Moisik et al. 2021). This complex combination of articulatory events involves sets of correlated phonetic properties associated with vowel, phonatory, and tonal quality, hence providing a viable mechanism for sound change. The underlying feature that would incorporate all laryngeal constrictor events is [+constricted], yielding a binary distinction between two contrastive categories or registers (cf., Esling et al. 2019: 166-178 on the register-type distinction). While vowel and tonal quality are among

[13] A complex correlation between the presence and absence of VH and that of uvulars is also observed in Na languages. Uvulars are only attested in varieties with productive VH, such as Yongning Na (see Lidz 2010: 80-82; Michaud, Zhong & He 2015). Furthermore, in that variety, uvulars only occur before low and back vowels (/æ ɑ ɤ/), and they are contrastive with velars only before /ɤ/ (Lidz 2010: 80-82).

correspondences of the presumably original register-type contrast in various Qiangic languages, phonation is not, which requires an explanation. One possibility is that phonation contrasts have been described in other terms (e.g., tense/lax distinction in vowels in Namuyi and Muya, e.g., Huang 1991: 262-266; for Muya, see H. Sun 1983: 165; Gao 2015: 19-28; Gao & Rao 2016: 88-89; Bai 2020: 52-54), or have been overlooked. The latter possibility is increasingly plausible, as more and more phonation contrasts are being discovered, with more in-depth work now being possible (see J. Sun et al. 2017; Chirkova et al. 2021).

Currently available data are inconclusive as to the implementation of the laryngeal constrictor being primarily vocalic or consonantal. In northern Qiangic languages, various consonants (uvulars, velars, palatal segments, affricates, consonants clusters) appear to play a role in harmony processes, being either affected by or themselves affecting (blocking) VH (on the role of consonants in VH, see chapter 2). In southern Qiangic languages, whose vowel systems may be considerably restructured, uvulars and velars are perhaps the only consonants correlated with VH processes.

Overall, the current state of our knowledge of Qiangic and Na languages leaves many questions unanswered. Future descriptive and analytic work needs to focus in greater detail on the structure of vowel and tonal systems, the possibility of phonation contrasts, the role of consonants in harmony processes in various languages, and the relationship of harmonic processes in Na languages to those in Qiangic. Until that time it can be tentatively concluded that diverse patterns traditionally described as vowel harmony in Qiangic and possibly Na languages likely represent vestiges of an earlier register-type contrast (register harmony).

58.3 Tibetic

Unlike Qiangic and Na languages, VH in Tibetic represents a more canonical VH system, which spreads from vowel to vowel without affecting or being affected by intervening consonants. Seen in the context of Tibetic languages (estimated in number of over 200, see Tournadre 2014), VH is not a typical feature of this group and has only been reported in Lhasa Tibetan (see references above), Balti (Sprigg 1966, 1980), Ndzorge (J. Sun 1986: 73-84), Dingri (Herrmann 1989), and Shigatse (Haller 2012). All but Ndzorge represent similar patterns of regressive raising in the context of high vowels.[14] As there is no clear-cut

[14] Ndzorge (Eastern Amdo) rather displays vowel lowering and dissimilation (J. Sun 1986: iv, 73-84; see also Denwood 1999: 304-306). As analyzed in J. Sun (1986), the nine vowels of Ndzorge (/i e ɛ æ u ɤ o ɔ a/) can be divided into three groups: (a) dominant (or affecting): /i u ɤ/, (b) recessive (or affected): /e æ o/, (c) neutral (non-

evidence of VH in Classical Literary Tibetan (see Miller 1966; Ulving 1972), which has preserved a very archaic orthography, VH is likely an independent development in those varieties where it is attested.

The main type of VH in Lhasa Tibetan, which is in focus of this section, is conventionally described as height harmony (or assimilation of the vowel aperture, Tournadre & Dorje 2003: 201, footnote 174). The basic principle is that all vowels in a harmonic domain should agree in height. The eight basic vowels of Lhasa Tibetan can be divided into two classes: (a) high vowels and (b) non-high vowels, as in Table 58.8 (Haller 2012: 45). Note that the schwa does not have a phonemic status in Lhasa Tibetan, being the result of a raising process.

Table 58.8 High and non-high vowels in Lhasa Tibetan

High vowels	i		y	u	[ə]
Non-high vowels	e	ɛ	ø	o	a

VH applies in sequences of two syllables, which include (i) compounds, (ii) combinations of adjectival roots with positive and superlative suffixes (in the Written Tibetan orthography, hereafter WT, *-pa*, *-mo*, *-po*, *-shos*), (iii) combinations of nouns and verbs with enclitics (analytical case markers, verbal particles). VH is dominant/recessive, applying both progressively and regressively within compounds and from affixes to stems and vice versa. This is illustrated in examples (8-10) (adapted respectively, from Denwood 1999: 79, Dawson 1980: 69, and DeLancey 2017: 387). Examples are provided in the WT orthography, followed by phonetic transcriptions.[15]

(8) progressive VH in compounds
a. *rgya* [gjà] 'Chinese' + *bod* [pʰǿː] 'Tibet' > [gjàbǿː] 'Sino-Tibetan'
b. *dbyin (ji)* [ʔĩ́(dzí)] 'England' + *bod* [pʰǿː] 'Tibet' > [ʔíbýː] 'Anglo-Tibetan'

affecting): /ɛ a ɔ/. VH affects the recessive vowels before a syllable containing either the dominant vowels or a velar coda, converting them into corresponding neutral vowels. Dominant vowels only trigger changes without being subject to change themselves. Recessive vowels only undergo change. Neutral vowels neither cause nor undergo change. Examples include (J. Sun 1986: 75-76): *dred* [ʈʂet] 'brown bear' > *dred phrug* [ʈʂɛtʂʏɣ] 'brown bear cub'; *dred* [ʈʂet] 'brown bear' > *dred mo* [ʈʂemo] 'female brown bear'; *gser zang* [sɛrzaŋ] 'gold-gilt'.

[15] Lhasa Tibetan has two tones: high and low (e.g., Tournadre & Dorje 2003: 35). In disyllabic words, the two contrastive tones are realized on the first syllable, whereas the second syllable is assigned a default high tone.

(9) regressive VH in compounds
a. *bod* [pʰə̀ː] ‘Tibet’ + *lug* [lùː] ‘sheep’ > [pʰỳːlúː] ‘Tibetan sheep’
b. *bsnyal* [ɲèː] ‘sleep’ + *gur* [kʰùː] ‘tent’ > [ɲìːgúː] ‘mosquito tent’

(10) progressive (a-b) and regressive (b) VH in affixal structures
a. *dkar po* [káːpó] ‘white’
b. *zhim po* [ɕi̱mpú] ‘delicious’
c. *'gro* [ʈʂò] ‘go’ > *'gro=gyi yin* [ʈʂù=gì jǐ̀] ‘go=FUT’

VH in Lhasa Tibetan has numerous parallels with ATR harmony, as found in African languages (e.g. Casali 2008, see chapter 7), as several scholars have argued (e.g., Dawson 1980; Salting 2005; van der Hulst 2018). These include: (i) the main vowel opposition being based on vowel height, that is, a consistent difference in F1 between vowels of the two harmonic sets; (ii) dominance of [+ATR] vowels; (iii) presence of dominant [+ATR] suffixes; (iv) an asymmetrical vowel system with a missing phonemic low [+ATR] vowel. However, differences in the length of harmonic domains (VH applying in sequences of two syllables in Tibetan) do not allow to assess the behavior of the unpaired vowel in Tibetan with respect to neutrality (that is, its ability to co-occur word-internally with both [+ATR] and [-ATR] vowels).

58.4 Concluding remarks

Given the general absence of VH in ST, the exceptional presence of VH patterns in some ST languages may have to do with areal rather than genetic factors (see chapters 42, 46). The area where languages with VH systems are attested is historically multiethnic and multilingual (e.g., Chirkova 2012). For centuries it served as a migration corridor for groups belonging to Southeast Asian language families (such as TB, Tai-Kadai, Mon-Khmer, and Hmong-Mien) and Northeast Asian language family (Altaic languages). In addition, speakers of Altaic languages swept through Southwest China during the Mongol conquest of China in the 13th century.

If diverse VH patterns in Qiangic and Na languages indeed reflect an original register-type distinction, as argued in this chapter, then these languages align more closely with other Tibeto-Burman languages with register contrast (such as Yi and Bai spoken in southern China, see Esling 2005: 31-35; Esling et al. 2019: 166-178) and, more broadly, various

Southeast Asian languages with a historical register distinction (such as various Mon-Khmer and Hmong-Mien languages, see Brunelle & Kirby 2016 for an overview). On the other hand, given the widespread nature ATR/RTR systems in Northeast Asia (see chapters 59-61), the presence of VH in some Tibetic languages may be rather attributed to their prolonged contact with various Altaic languages (e.g., Haw 2014 and references therein).

In the vast areas where ST languages are spoken, Southwest China, home to Qiangic and Na, is one of the most complex areas, yet also one of the least explored. More in-depth experimental and instrumental phonetic work on Qiangic, Na, but also Tibetic languages is clearly needed to get a better understanding of their vowel harmony systems and how they relate to other cases of vowel harmony, as discussed in this Handbook. The steady increase in descriptive and analytic work will likely translate into a better understanding of patterns traditionally described as vowel harmony in this language family.

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