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Verb Stem Alternations in Pingwu Baima*

Katia Chirkova (CNRS-CRLAO) & Skalbzang Tshering (Nankai University)

1. Introduction

This paper focuses on verb stem alternations in the Pingwu variety of Baima (ISO-639 *bqh*), a little-studied Tibetic (Tibeto-Burman) language spoken at the border of Sichuan 四川 and Gansu 甘肃 provinces in the People's Republic of China. Baima has approximately 10,000 speakers, who reside in the counties of Pingwu 平武, Songpan 松潘 / Zung chu, Jiuzhaigou 九寨沟 / Gzi rtsa sde dgu in Sichuan Province and in the counties of Wenxian 文县 and Zhouqu 舟曲 / 'Brug chu in Gansu Province (see H. Sun et al. 2007: 1; Suzuki 2015: 120). The area of the distribution of the Baima language lies at the historical Sino-Tibetan border, which is home to diverse varieties of Tibetic,¹ Qiang (or Rma),² Chinese (Mandarin), and Rgyalrong languages.³ Map 1 shows the area of the distribution of Baima and some of its neighboring languages. (Transcriptions for language names follow conventions in their respective descriptions. Tibetan county names are in Wylie's 1959 transcription.)

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¹ The term "Tibetic" refers to a family of languages derived from Old Tibetan, which was originally spoken in the Yarlung valley at the time of the Tibetan empire (7-9th centuries) (see Tournadre 2013). Tibetic languages spoken in China are conventionally divided into three groups: Central (or Dbus-gtsang), Amdo, and Kham, which correspond to the three namesake historical provinces of Tibet (Hu 1991; Gesang Jumian & Gesang Yangjing 2002). The former two groups (Central and Amdo) are internally homogeneous with a high degree of internal intelligibility, whereas the last group (Kham) is internally more heterogeneous. Tibetic languages of the historical Sino-Tibetan border (which runs through the historical Kham province), such as Baima, Kun sngon, Zhongu, Chos.rje, Khalong, Gserpa (see Map 1), are particularly notable for their marked differences from better-studied Tibetic languages in phonology, morphology, and lexicon (see J. Sun 2003, 2014a). At the same time, they show unmistakable hallmarks of Tibetan-ness, including a common core vocabulary and grammar derived from Old Tibetan, regular sound correspondences with orthographic forms, and common phonological and lexical innovations of Tibetic languages. These include (i) palatalization of *ty, *ly, *sy, *tsy (e.g. Baima /tʃi/, WT *gcig* 'one'; Baima /tʃʰə/, WT *chi* 'what'; 'tree, wood', Baima /ʃʰə/, WT *shing*; Baima /zə/, WT *bzhi* 'four'), and (ii) the form *bdun* for 'seven' (Baima /dè/) (see Tournadre 2013 for discussion).

² The Qiang language is spoken in Songpan county and the neighboring Heishui 黑水 / Khro chu, Beichuan 北川, Mao 茂县, Li 理县 / Bkra shis, and Wenchuan 汶川 / Lung dgu counties (see Evans & J. Sun 2015).

³ The Rgyalrong languages are spoken in Ma'er kang / 'Bar khams 马尔康 county and Li county in Aba / Rnga ba 阿坝 prefecture (Japhug, Tshobdun, Zbu, Situ), and in Danba / Rong brag 丹巴 county in Ganzi / Dkar mdzes 甘孜 prefecture (Situ) (see Jacques 2015).



Map 1. Distribution of Baima and some of the neighboring languages

Most previous work on Baima has centered on only one variety (that of Pingwu county) with a focus on the disputed status of Baima as either a dialect of Tibetan (or a member of the Tibetic language family) (see Awang Cuo Cheng & Wang 1988; Zhang 1994a–b, 1997; Huang & Zhang 1995) or an independent Tibeto-Burman language (see H. Sun 1980a–b, 2003; Nishida & H. Sun 1990; H. Sun et al. 2007). Verb stem alternation in Pingwu Baima (hereafter Baima) has been made part of the argument in some more in-depth descriptions. These include, on the one hand, Huang & Zhang (1995) and, on the other hand, Nishida & H. Sun (1990) and H. Sun et al. (2007). Of the latter two studies, H. Sun et al. (2007) is an updated and expanded version of the analysis in Nishida & H. Sun (1990: 230–232). For that reason, H. Sun et al. (2007) is used hereafter as a collective reference to both studies.

Huang & Zhang (1995) and H. Sun et al. (2007) agree in describing verbs in Baima as having up to three different stems associated with TAM categories, specifically:

- (1) one stem that bears a non-past function and may denote prospective, factual, habitual, and present progressive meanings (hereafter non-past);

- (2) one stem that has past-time reference and is predominantly used in the perfective, terminative, and past imperfective (hereafter past);
- (3) an imperative stem.⁴

At the same time, Huang & Zhang (1997) and H. Sun et al. (2007) differ in their presentation of some basic facts (such as the frequency of alternating verbs in Baima) and in their methodological approaches (involving or not comparison with etymologically related WT forms). Remarkably, this results in diametrically opposed interpretations of data from one and the same variety of Baima.

Huang & Zhang (1995: 107) report that only a few Baima verbs are alternating in their data (a list of 2,343 words). They examine alternating verbs in relation to their Tibetan etymologies to conclude that verb paradigms in Baima are similar to those known from Written Tibetan (hereafter WT). Table 1 reproduces the original examples in Huang & Zhang (1995: 107) together with their suggested etymologies.

Gloss	non-past		past		imperative	
	Baima	WT	Baima	WT	Baima	WT
go	ndzi ⁵³	<i>mchi</i>	tɕ ^h æ ³⁵	<i>chas</i>	ndzue ⁵³	'gro
eat	ndza ⁵³	'cha'	ndzø ³⁵	'chos	ndzue ⁵³	'cho~'chos
rob, plunder	ndzue ⁵³	'phrog	tɕ ^h ue ⁵³		<i>phrogs</i>	
dig	ko ⁵³	<i>rko, brko</i>	kø ³⁵		<i>brkos, rkos</i>	
chase	nde ⁵³	'ded	te ⁵³		<i>ded</i>	
look	ta ⁵³	<i>lta, blta</i>	tø ³⁵		<i>bltas, ltos</i>	
sell	ndzu ³⁵	'tshong, btsong	tsu ³⁵		<i>btsongs, tshong</i>	
make	ndzu ⁵³	'grub	tɕu ⁵³		<i>grub</i>	
sit; stay	dy ⁵³	<i>sdod, bsdad, bsdad</i>			de ³⁵ [sic.] ⁵	<i>sdod</i>

Table 1. Alternating verbs in Huang & Zhang (1995: 107)

Huang & Zhang (1995) report only two verbs with three stems in their data ('go' and 'eat'). In verbs with two stems (e.g. 'dig', 'look', 'sell'), the past stem is said to commonly combine the functions of the past and imperative stems in the corresponding WT paradigm. However, other configurations also appear possible, as in 'sit, stay', where one stem is said to combine the functions of the present, future, and past stems in the corresponding WT paradigm, while the other stem is imperative. Based on examples of alternating verbs in their data, Huang & Zhang

⁴ Note that similar to Old Tibetan and modern Tibetic languages, prohibitive imperative in Baima is formed by combining the negator /ma/ with the imperfective stem of the verb. Examples include: /mâ^hdʒ^hâ/ 'do not eat', /mâ^hŋu/ 'do not cry', /mâ^hteâ/ 'don't be afraid'.

⁵ The imperative form of 'sit; stay' should read /de⁴²/, that is with tone 42, as elsewhere in Huang & Zhang (1995).

suggest that the development of the WT patterns of stem formation in Baima is most close to that in Kham Tibetan dialects (ibid., p. 115).

H. Sun et al. (2007: 80–84, 199–201) report a higher frequency of alternating verbs in their data (a list of ca. 3,000 words). In their estimation, approximately one third of randomly selected 100 verbs are alternating. Their analysis distinguishes two types of stem alternation, which they discuss separately, namely: (1) aspectual (with one stem used in the prospective and progressive aspect and the other stem used in the perfect and perfective aspect), and (2) mood (with one base stem and one imperative stem). Table 2 reproduces the original examples in H. Sun et al. (2007: 81–83).

Gloss	Aspect		Mood	
	prospective / progressive	perfect / perfective	Base stem	Imperative
take off	mbi ⁵³	p ^h i ⁵³		
ask	ndzɿ ⁵³	tʂɿ ⁵³		
eat	ndʒɛ ³⁴¹	ndʒø ³⁴¹		
weep	ŋo ⁵³	ŋu ⁵³	ŋo ⁵³	ŋu ⁵³
go	ndzi ⁵³	te ^h ɛ ^[13/53]	ndzi ⁵³	so ¹³
wash (clothes)	ndzo ⁵³	tey ⁵³	ndzo ⁵³	tey ⁵³
look			te ³⁵	tø ³⁵
patch (a garment)			dza ³⁴¹	dzø ³⁴¹
burn (firewood)			ndʒu ⁵³	tʃu ⁵³
harvest (wheat)			ndʒa ⁵³	tʂa ⁵³
gnaw (bone)			ndø ⁵³	tø ⁵³
brew, ferment ⁶			zø ⁵³	tei ⁵³
come ⁷			ue ³⁵	ʃue ⁵³

Table 2. Alternating verbs in H. Sun et al. (2007: 81–83)

H. Sun et al. restrict their analysis to synchronic data to conclude that (i) both types of stem alternation are unpredictable (H. Sun et al. 2007: 82–84) and (ii) their underlying morphology is distinct from that in Tibetic languages. The main argument is that imperative verb stem formation in Baima may be variously expressed through (1) onset alternation (as in ‘wash (clothes)’, ‘burn (firewood)’ in Table 2), (2) vowel alternation (as in ‘weep’, ‘look’), or (3) a combination of onset and vowel alternation (as in ‘patch (a garment)’); whereas in Tibetic

⁶ This verb etymologically reflects the WT verb ‘do; make’ (see Table B.1 in the appendix).

⁷ One of the anonymous reviewers suggests that the suppletion pattern in the verb ‘come’ alone may be enough to prove that Baima is a Tibetic language. That suppletion pattern in Tibetic languages (WT *ongs* – *shog*) is similar to the suppletive pattern in the adjective ‘good’ in Germanic languages (e.g. Fulk 2018: 220–221), which is often cited in textbooks on historical linguistics as a way to prove that a language is Germanic (e.g. Hock 1991: 563–564). We note, however, that Baima /ue/ does not regularly correspond to WT *ongs* (see verb 6 in Table B.1) and, moreover, the etymology of that Baima form is uncertain. For that reason, we prefer to err on the side of caution and do not consider that specific suppletion pattern as diagnostic evidence to prove that Baima is a Tibetic language.

languages, the main form of imperative stem formation is *o* ablaut (H. Sun et al. 2007: 199–200).

As can be glimpsed from the summaries above, with their limited number of mostly non-overlapping examples, differences in methodological approaches, and contradictory findings, the previous in-depth descriptions of Pingwu Baima provide an at-best incomplete picture of stem alternation in that variety. Differences in methodological approaches also inevitably affect some of the conclusions. Most importantly, that H. Sun et al. do not link Baima verbs to etymologically related WT forms obscures the fact that in verbs with two stems (that is, all verbs in Table 2 but ‘eat’, ‘go’, and ‘come’), one single stem serves both past (perfect/perfective) and imperative functions and regularly corresponds with the past stem of classical WT paradigms. This can be illustrated with the verb ‘wash (clothes)’. The past (perfect/perfective) and imperative stems of that verb are manifestly identical, /tɛy⁵³/. Based on regular correspondences between Baima and WT (as in Zhang 1994a–b), the form /tɛy⁵³/ regularly corresponds with the past stem of the classical paradigm for ‘wash’, that is, *bkrus*, rather than with the imperative stem, viz., *khrus*. That being the case, the observed difference between imperative forms in Baima and Tibetan languages is likely *not* the result of differences in the underlying morphology of imperative stem formation, but rather follows from the elimination in many Baima alternating verbs of separate imperative stems of classical paradigms.

The present study takes a new look at verb stem alternation in Pingwu Baima by examining a larger corpus of data than the corpora in previous works, and by consistently applying to the corpus one uniform methodological approach—systematically relating alternating verbs to corresponding classical WT paradigms. Our goals are:

- (1) to systematically elicit all possible verb stems of high frequency Baima verbs in order to independently assess the relative frequency of alternating verbs in this language;
- (2) on that basis, to get a better understanding of the development of the classical patterns of stem formation in Baima.

Our data reveal a relatively high number of alternating verbs in Baima. A systematic comparison of alternating verbs to corresponding classical paradigms confirms that stem alternations in Baima regularly reflect both affixal and ablaut Old Tibetan (hereafter OT) verb

morphology.⁸ Such a comparison also confirms a clear tendency toward elimination in Baima of a separate imperative stem of classical paradigms, as can already be glimpsed from Huang & Zhang (1995) and H. Sun et al. (2007) data. Such a tendency has not been commonly reported in modern Tibetic languages. An examination of Baima verb stem alternation in the context of its neighboring Tibetic and non-Tibetic varieties, such as Rgyalrong, where verb-stem differentiation is a highly visible feature (J. Sun 2014b: 633), suggests language contact as a possible trigger for this development.

The remainder of the paper is organized as follows. Section 2 provides information on the data and methodology of this study. Section 3 analyses alternating verbs in relation to their corresponding WT paradigms. Section 4 discusses the development of verb alternation in Baima in the context of the neighboring languages. Section 5 sums up the major findings and rounds off the paper. Appendix A provides an overview of synchronic and historical phonology of Baima. Appendix B provides a complete list of verbs in our study.

2. Data and methodology

For this study we have selected 250 verbs from the list of the Tibeto-Burman core vocabulary in Dai et al. (1992). The verbs on the list were first recorded in isolation (in citation form) and then as placed in a set of contexts representing major TAM distinctions, modeled on Dahl's (1985) TAM questionnaire, and also including an explicit imperative context.⁹ The data were recorded in July 2019 with one male speaker, Mr. Li Degui 李德贵, the main language consultant of the first author.¹⁰ The elicited verbs include 15 (non-alternating) loan verbs from

⁸ Old Tibetan refers to the phonological system underlying traditional Tibetan orthography, which for the most part can be recovered through a comparison of the modern dialectal reflexes of the orthographic (Written Tibetan) forms.

⁹ Sample contexts include the following:

(13) [A: When you visited your brother yesterday, what he DO after you had dinner? ANSWER:] He WRITE letters.

(16) [Q: What your brother DO when we arrive, do you think? (= What activity will he be engaged in?)] He WRITE letters.

(18) What you brother usually DO after breakfast? A:] He WRITE letters.

(22) [Q: What are you planning to do right now? A:] I WRITE letters.

(25) [A: My brother works at an office. B: What kind of work he DO?] He WRITE letters.

(137) When I COME home (yesterday), he WRITE two letters (=he finished writing them just before I came). Imperative: WRITE letters!

¹⁰ The resulting paradigms were cross-checked for consistency with different verb stems as they occur in a corpus of traditional stories recorded with four elderly Baima speakers between 2003 and 2017. (That corpus is in part available in the Pangloss Collection, see <https://pangloss.cnrs.fr/corpus/Baima?lang=en>). Our main reason to rely on elicitation rather than on the analysis of the verb stems as they occur in that corpus is that traditional narratives tend to rely more heavily on the use of past stems, so that instances of non-past and, in particular, imperative stems are infrequent. As a result, narratives rarely contain complete verbal paradigms. Hence, due to the lack of appropriate contexts, for individual verbs it is often impossible to establish whether they are alternating or not. These points can be illustrated with the verb 'herd' in the story "An orphan and a fox" (see Chirkova 2005; H. Sun

Chinese and 6 periphrastic constructions consisting of a native Baima word followed by the (alternating) auxiliary verb ‘do; make’ (see Table B.6 in Appendix B). Among the remaining 229 native Baima verbs, 168 (or 73% of all native Baima verbs) are non-alternating (that is, with only one stem), while 61 verbs (or 27% of all native Baima verbs) are alternating. Among the alternating verbs, 6 verbs have three stems (non-past, past, imperative), and 55 verbs have two stems (non-past and past/imperative). In contrast to Huang & Zhang (1995) and more in line with H. Sun et al. (2007), our data hence show a relatively high number of alternating verbs (representing over a quarter of all native Baima verbs). Verbs with two stems, of which one bears a non-past function and the other stem serves both past and imperative functions, constitute the absolute majority (90%) of all alternating verbs. Observed stem alternation strategies include, on the one hand, onset and/or vowel alternation and, on the other hand, more marginally, suppletion. Table 3 details the distribution of these strategies in our verb list.

Stem alternation strategy		No. of stems	No. of verbs
onset and/or vowel alternation	onset alternation	two	29
	onset and vowel alternation	two	6
	vowel alternation	three	2
two		19	
suppletion	three	4	
	two	1	
Total			61

Table 3. Stem alternation strategies in the verb list in our study

et al. 2007: 365–374; the sound file is available at <https://pangloss.cnrs.fr/corpus/Baima?lang=en>). Of the six occurrences of the verb ‘herd’ in that story, three make use of the present stem (/ⁿdzê/), as in the following example: (Abbreviations used in interlinear glossing follow the Leipzig Glossing Rules (LGR, <http://www.eva.mpg.de/lingua/resources/glossing-rules.php>). Non-standard abbreviations include: EGO = egophoric.)

nê=rê tsā rê-yê ⁿdzê-nê eē fə
 person=COM vicinity goat-sheep herd.IPFV-person do.PFV PFV.N-EGO
 ‘[The orphan girl] served as a herding girl to other people.’

The remaining three occurrences make use of the past stem (/ⁿdzò/), as in the following example:

nê-rê tsā rê-yê ⁿdzò fə
 person=COM vicinity goat-sheep herd.PFV/IMP PFV.N-EGO
 ‘[She] herded goats and sheep for other people.’

This and other stories in the corpus do not contain examples of the use of that verb in the imperative. Overall, of the 39 verbs that occur in that story, only two verbs occur in the imperative: ‘come’ (/fuê/) and ‘put, place’ (/zâ/).

Onset and/or vowel alternation is hence the dominant strategy in verbs with two stems, while suppletion is the dominant stem derivation strategy in verbs with three stems. The citation stem in verbs with three stems is the imperative stem (e.g. /dzò/ for the verb ‘speak; say’, see verb 5 in Table B.1), and it is the past/imperative stem in verbs with two stems (e.g. /tsÿ/ for the verb ‘prick, thrust’, see verb 29 in Table B.2).

All stems of alternating verbs in our data were supplied with Tibetan etymologies. Given that our list of common verbs overlaps with the list of verbs in Nishida & H. Sun (1990), it was possible in the majority of cases to rely on the Tibetan etymologies proposed by Zhang Jichuan (1994a–b) for that latter word list. Note that the word list in Nishida & H. Sun does not systematically provide different stems of alternating verbs and indicates in most cases only one (citation) stem of a given alternating verb. Accordingly, Zhang (1994a–b) only provides Tibetan etymologies for the listed (citation) forms. Table 4 gives examples of alternating verbs, as elicited in our data, compared to the forms of those verbs in Nishida & H. Sun (1990), and accompanied by the Tibetan etymologies in Zhang (1994a–b).

Gloss	Elicited			Nishida & H. Sun (1990)	Zhang (1994b)
	N-PST	PST	IMP		
speak; say	dzê	dzè	dzò	dzø ³⁵	zlos
prick, thrust	ⁿ dzÿ	tsÿ		tsu ⁵³	btsugs
split open	ⁿ gâ	kê		ke ³⁵	bkas
open (door)	ⁿ dzâ	e ^h â		e ^h a ⁵³	phye

Table 4. Examples of alternating verbs, as elicited in our study, compared to the forms in Nishida & H. Sun (1990), and accompanied by Tibetan etymologies suggested in Zhang (1994a–b)

All Tibetan etymologies were double-checked by the second author, a native Tibetan linguist. In a few cases, new or missing etymologies were provided (e.g. ‘bark (dog)’, ‘be drunk’, see below).

As the next step, the Tibetan etymologies from Zhang (1994a–b) were supplied each with a complete list of all attested stems of that verb, as reported in Tibetan dictionaries. The consulted sources include Skal bzang ye shes et al. (1958), Mkhjen rab 'od gsal (1976), Dpal khang lo tsa ba et al. (1991), Hill (2010), Pad ma dbang grags et al. (2015), and Bielmeier et al. (2018). The attested stems were listed next to the alternating verbs, as elicited in our data, for comparison. Consider examples in Table 5.

Gloss	Baima			Written Tibetan			
	N-PST	PST	IMP	present	past	future	imperative
speak; say	dzê	dzè	dzò	zla, zlo	bzlas , 'das	bzla, bzla', 'da	zlo, zlos
prick, thrust	ⁿ dzÿ	tsÿ		'dzugs , 'dzug , zug	btsug , btsugs , zugs	gzugs, gzug	tshugs
split open	^ŋ gâ	kê		dgas, 'gas, 'ges	bkas	dgas	dgas, khos
open (door)	ⁿ dzâ	ê ^h â		'byed	phye, phyes, phyed	dbye	phye, bye, phyes, phyed

Table 5. Baima alternating verbs next to the attested stems of the corresponding WT verbs. Tibetan etymologies for Baima forms are highlighted in bold. Baima forms that show irregular sound correspondences with the attested stems are highlighted in gray.

A comparison of the alternating verbs in our data with the corresponding WT paradigms suggests that in the vast majority of cases, Baima alternating verbs can be related to the attested stems of WT verbs through regular sound correspondences between Baima and WT (see Appendix A). Furthermore, such a comparison reveals the following tendencies in the simplification of the originally complex OT verb paradigms in Baima.

First, as already noted in Huang & Zhang (1995), Baima reduces the opposition between the present and the future stems of classical paradigms to a single stem. This is a common development in modern Tibetic languages, where the non-past or imperfective stem generally corresponds with the present stem of Written Tibetan (cf. Zeisler 2004: 876–888).¹¹ In our corpus, the non-past stem of Baima alternating verbs regularly corresponds with the present stem of classical paradigms. Examples include: ‘speak; say’: Baima /dzê/, WT *zlo*; ‘prick, thrust’: Baima /ⁿdzÿ/, WT *'dzugs* or *'dzug* (note that in Baima, the developments in consonantal clusters in the coda position, i.e. *-Cs*, are identical to those of a simple consonantal coda, see Table A.4 in Appendix A).

Second, alternating verbs in Baima attest to a consistent elimination of a separate imperative stem of classical paradigms. In the vast majority of alternating verbs with two stems (that is, 53), the originally distinct functions of the past and imperative stems are expressed by a single stem in Baima. That single stem regularly corresponds with the past stem of classical paradigms. Examples include: ‘prick, thrust’: Baima /tsÿ/, WT *btsug* or *btsugs*; ‘split open’:

¹¹ Interestingly, some Tibetic varieties spoken in the border areas between Sichuan, Qinghai, and Gansu provinces exceptionally maintain the WT distinction between a separate present stem and a separate future stem. This is the case in Gserpa (J. Sun 2006: 115). Khalong (J. Sun 2007: 327), on the other hand, evidences WT future stems as sources of imperfective stems in some verbs.

Baima /kē/, WT *bkas*. Only 8 verbs in our corpus appear to retain a separate imperative stem of WT paradigms. Of these, 6 verbs have three stems, that is, including a distinct imperative stem that corresponds with the imperative stem of the classical paradigm. For example, the imperative stem /dzò/ of the verb ‘speak; say’ in Table 5 regularly corresponds with the imperative stem *zlos* of that verb in WT. The remaining 2 verbs, namely ‘look’ and ‘drink’, have two stems. The past/imperative stem of the verb ‘look’ exceptionally corresponds with the imperative stem of the corresponding WT paradigm (Baima /tyū/, WT *ltos*), rather than with the past stem (that is, WT *bltas*), as in most verbs with two stems.¹² The imperative stem of the verb ‘drink’ (/ⁿdù/) is identical with the present stem (also /ⁿdù/) due to regular sound change (the two stems are distinct in WT, respectively, *'thungs* and *'thung*). The past stem of the verb ‘drink’ (/ⁿdỳ/) does not regularly reflect the attested past stems of that verb (*'thungs*, *btungs*), suggesting an underlying form that is not attested.

In 45 verbs (or 74%) out of the total of 61 alternating verbs in our corpus, all stems can be related to the attested stems of corresponding classical paradigms through regular sound correspondences between Baima and WT. In 13 verbs (or 21% of all alternating verbs), one of the stems shows irregular sound correspondences with the attested stems (onset, rhyme or tone), thereby suggesting an underlying form that is at variance with the attested forms. The verb ‘split open’ in Table 5 is a case in point. The past stem of this verb, /kē/, regularly reflects the attested past stem *bkas*. Conversely, the regular would-be source of the present stem of this Baima verb, viz., /ⁿgâ/, is **'ga*, which is unattested for this verb in WT. Finally, in 3 verbs (or 5% of all alternating verbs), namely, ‘open (door)’ in Table 5 (see also verb 22 in Table B.2), ‘sweep’ (see verb 15 in Table B.2), and ‘close, shut (door)’ (see verb 13 in Table B.3), all stems show irregular correspondences with the attested stems of classical paradigms. For example, in the case of the verb ‘open (door)’ in Table 5, the would-be source of the non-past stem is **'bya*, whereas the would-be source of the past/imperative stem is **'phya*, both unattested forms for this verb in WT. Appendix B provides complete lists of verbs in our corpus together with their suggested etymologies. The following section discusses the morphology of verb stem alternation in Baima.

¹² We note that the loss of the past stem of that verb and the usurpation of that stem by the imperative stem is likely a recent development in Baima. Nishida & H. Sun (1990) and H. Sun et al. (2007) record the verb ‘look’ as having three stems, namely, (i) the non-past stem /ta^{13/53}/ (which regularly corresponds with WT *lta*), (ii) the past stem /tɛ³⁵/ (which regularly corresponds with WT *bltas*), and (iii) the imperative stem /tə³⁵/ (which regularly corresponds with WT *ltos*). Conversely, this verb has only two stems in Huang & Zhang’s data (see Table 1) and in our data, namely, (i) the non-past stem /tâ/ (corresponding with WT *lta*) and (ii) the past/imperative stem /tyū/ (corresponding with WT *ltos*).

3. Morphology of verb alternation in Baima

In contrast to the conclusions in H. Sun et al. (2007), our data suggest that the underlying morphology of verb stem alternation in Baima is distinctly that of Old Tibetan.

Recall that classical WT verb paradigms consist of four stems at the most, traditionally labeled present, past, future, and imperative. The four verb stems show a variety of prefixes, suffixes, and ablaut, with sound changes obscuring in some cases the system (see Coblin 1976; Beyer 1992; Hill 2010, 2014, 2019: 9–21, 42–44). An overview of Tibetan verb morphology in Hill (2010: xv–xxi) classifies WT alternating verbs into 12 paradigms, as reproduced in Table 6.

paradigm	present	past	future	imperative
1	'_ _	_ -s		
2	'_ _	b- _ -s	b- _	_ -s
3	'_ _ -d			
4	_ -d			
5	g- _			
6		b- _	d- _	
7	'_ _ -d	b- _ -s		
8				
9	'_ _	bX- _ -s	b- _	X- _ -s
10				
11	'_ _ -d	bX- _	d- _	
12		bX- _ -s		

Table 6. Regular affixal paradigms in OT verbs (adapted from Hill 2010: xix)

As shown in Table 6, the present stem may have the prefixes ' and g-, and the suffix -d. The past stem has the prefix b- in all but one paradigm (1, “weak verbs”) and the suffix -s in most paradigms. The future stem has the prefixes b-, and d- and no suffixes. Finally, the imperative stem has the suffix -s in most paradigms. (“X-” in the past and imperative stems in paradigms 9–12 stands for a devoicing prefix, cf. Beckwith 1996, as in ‘block, obstruct’: the past stem *bXgag > bkag, the imperative stem *Xgogs > khog.) In addition, some verbs with four stems also show ablaut. The regular patterns include a-a-a-o (as in ‘look’: *lta*, *bltas*, *blta*, *ltos*); e-a-a-o (as in ‘do’: *byed*, *byas*, *byas*, *byos*); o-a-a-o (as in ‘put, place’: *'jog*, *bzhag*, *gzhang*, *zhog*).

The irregular ablaut pattern, viz., *a-o-a-o*, is limited to just four verbs, including ‘eat’ (*za, zos, bza, zo*) and ‘chew, gnaw’ (*'cha', 'chos, 'cha', 'cho ~ 'chos*) (Hill 2014: 622).

In spite of the drastic simplification of the original complex OT rhyme structure in Baima (see Tables A.2 and A.4), Baima alternating verbs unmistakably reflect both regular and irregular OT ablaut. Table 7 provides some examples.

Gloss	Baima			WT		
	N-PST	PST	IMP	present	past	imperative
look	tâ	tyū		lta	bltas	ltos
put, place	ⁿ dʒuê	ʒâ		'jog	bzhag	zhog
take out; dredge	ⁿ dʒê	tʂō		'dren	drang	drang
eat	ⁿ dʒ ^ʰ â	ⁿ dʒò	ⁿ dʒ ^ʰ ê	'cha'	'chos	'cho

Table 7. Examples of regular and irregular OT ablaut in Baima alternating verbs. Tibetan etymologies of Baima forms are highlighted in bold.

As shown in Table 7, Baima ‘look’ reflects the *a-a-a-o* ablaut; ‘put, place’ reflects the *o-a-a-o* ablaut; ‘take out, dredge’ reflects the *e-a-a-o* ablaut; while Baima ‘eat’, which represents a semantic extension from the OT verb ‘chew, gnaw’, reflects the irregular ablaut pattern *a-o-a-o*.

On the other hand, most affixal OT morphology is lost in Baima. Regular sound change in Baima leads to the loss of all verbal prefixes but the prefix *ʹ* in the present stem, which is retained in Baima as prenasalization of the root initial (see Table A.1).¹³ The suffixes *-d* and *-s* in the present and past stems are lost, as are all OT consonantal codas in general, transforming all closed syllables into open syllables and generating innovative vowels and diphthongs (see Table A.4). In particular, the suffix *-s* in the past and imperative stems, when added to an open rhyme, leads to the vowel quality and tone change. Examples include: (1) /ɲū/, the past/imperative stem of the verb ‘buy’ (corresponding with WT *nyos*); to compare, the non-past stem of that verb is /ɲê/ (WT *nyo*); (2) /tyū/ the past/imperative stem of the verb ‘look’ (corresponding with WT *ltos*); (3) /tʂê/, the past/imperative stem of the verb ‘cut with scissors’ (WT *dras*), to compare, the non-past stem of that verb is /ⁿdʒâ/ (WT *dra*). However, when added

¹³ The prefixes *g-* and *b-* disappeared irrespective of voicing of the root initial. Before being elided, they acted as a buffer against devoicing of the following root initials, yielding modern voiced obstruents and sonorants. On the other hand, in clusters with the root initial *l-*, the preinitials *g-* and *b-* have likely been lost early in the history of Baima, as their reflexes are the same as that of a simplex *l-* (that is, Baima *j-*). Examples include WT *lag pa* ‘hand’, *gla ba* ‘musk deer’, yielding both Baima /jā/; WT (*yar*) *lang* ‘get up’, *blangs*, the past stem of the verb ‘take, hold’, yielding both Baima /jō/.

to closed rhymes, the suffix *-s* is generally lost without compensation, as in ‘pick, pluck’: the non-past stem /ⁿd^huê/ (WT *thog*); to compare, the past/imperative stem of that verb is /tuê/ (WT *btogs*).¹⁴ Finally, our Baima data provides no consistent evidence for *da-drag* or a postfinal *-d* that could follow the codas *-n*, *-r*, *-l* before the standardization of the Tibetan script in the 9th century (e.g. Beyer 1992: 169, 175; Zhang 1986). The tone of Baima words which historically ended in *-d* are for the most part the same as in words which historically did not end in *-d*. For example, the Baima reflex of the past stem of the verb ‘sleep’, viz., *nyald*, is homophonous with the reflex of *nyal* ‘fish’, both /*ɲē*/.¹⁵

The regular developments above lead to the development of three distinct patterns of stem formation in verbs with two stems, as already identified in H. Sun et al. (2007) (see Table 2) and as also observed in our data (see Table 3). (1) The onset alternation type encompasses those verbs that have, on the one hand, the prefix *ʼ*- in the present stem and, on the other hand, identical (closed) rhymes in both stems (see verbs in Table B.2). In that paradigm, the non-past stem of the verb is prenasalized in Baima, and the past/imperative stem is non-nasalized, while the vowel remains unchanged. (The tones in the two stems may be different depending on the historical onset type, see Table A.3.) (2) The vowel alternation type encompasses those OT paradigms that do not have the prefix *ʼ*- in the present stem or where the addition of the prefix *ʼ*- is impossible for phonological reasons (for instance, in verbs with complex onsets, such as ‘look’: **ʼlta* > *lta*) (see verbs in Table B.3). Vowel alternation in the two stems results from the addition of the suffix *-s* to an open rhyme in the past stem or from the original OT ablaut. (3) The third alternation type, which combines onset and vowel alternation, includes verbs that have the prefix *ʼ*- in the present stem, OT ablaut and/or an open rhyme in the past stem (see verbs in Table B.3).¹⁶ Table 8 schematically presents the related developments.

Paradigm	OT	Baima
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¹⁴ A few exceptions can be noted, for instance, verbs 7-8 in Table B.2 (that is, ‘grind’ and ‘weave, knit’). Tone change in the past/imperative stems of these verbs, both /*tā*/, rather than the regularly expected form /*tâ*/ to correspond with WT *btags*, suggests that *-s* in the past/imperative forms may be analysed as a distinct suffixal element, which conditioned the mid level tone on that form. Additional examples include verbs ‘push down’, ‘press’, ‘build, pile up’, ‘carry on the shoulder’ in Table B.5.

¹⁵ Two possible exceptions are ‘quake (earth)’: Baima /*ʂhâ ɲgî*/, corresponding with WT *sa 'guld*; and /*zô*/ ‘ride (a horse)’, corresponding with WT *bzhond* (respectively, verbs 20 and 110 in Table B.5).

¹⁶ The fourth possible pattern, that is, C1V(V)1/C1V(V)1, where the OT onsets and rhymes in both stems are identical or become identical through regular sound change, obviously leads to the merger of the two stems, hence resulting in verbs with one stem (or non-alternating verbs). Examples include: /*ɲē*/ ‘sleep’, cf. WT *nyal*, *nyal(d)*, *nyal*, *nyol(d)*; /*nā ɲē*/ ‘listen’, cf. WT *rna (m)nyan*, *(m)nyan(d)*, *(m)nyan*, *nyon(d)* / *mnyand*; /*sê*/ ‘kill’, cf. WT *gsod*, *bsad*, *gsad*, *sod*. The fifth possible pattern with two different non-nasalized onsets and/or two different vowels in two stems, that is, C1V(V)1/C2V(V)2, is marginal and irregular, as in as in ‘give’, Baima non-past stem /*ʒê*/, past/imperative stem /*ēi*/, corresponding with WT *sbyin*, *byin*, *sbyin*, *sbyin* (see verb 5 in Table B.4).

	present	past	non-past	past/imperative
1	'_ _	_C-s	NCV(V)1	CV(V)1 CV(V)2
2-3	'_ _(-d)	b-_C-s		
7-8	'_ _-d	b-_C(s)		
9	'_ _	bX-_C-s		
10-12	'_ _(-d)	bX-_C(-s)		
4	_ -d	b-_ -s	C1V(V)1	C1V(V)2
5	g-_	b-_ -s		
6	g-_	b-_		

Table 8. Regular changes to the OT patterns of stem formation in Baima verbs with two stems. Brackets indicate optional constituents.

Table 9 presents some illustrative examples.

Pattern of stem formation	Gloss	OT		Baima	
		present	past	N-PST	PST/IMP
NCV(V)1/CV(V)1	die	'chi	shi	ⁿ dʒ ^h ə̃	ʃə̃
	sell	'tshong	btsongs	ⁿ dzù	tsū
	pick, pluck	'thog	btogs	ⁿ d ^h uê	tuê
C1V1/C1V2	exchange	rje	brjes	ʒê	ʒè
	buy	nyo	nyos	ɲê	ɲū
NCV(V)1/CV(V)2	take out, dredge	'dren	drang	ⁿ dzē	tʂō
	put, place	'jog	bzhag	ⁿ dʒuê	ʒâ
	cut with scissors	'dra	dras	ⁿ dzâ	tʂē

Table 9. Examples of changes to the regular OT affixal paradigms in Baima verbs with two stems

Among the three main patterns of stem formation that result from regular sound change, the first (that is, NCV(V)1/CV(V)1) and the second (that is, C1V1/C1V2) are numerically more common, accounting for 29 and 19 verbs respectively (see Tables B.2–3). The third pattern (viz., NCV(V)1/CV(V)2) is more marginal, accounting for only 6 verbs (see Table B.4).

The few alternating verbs, in which one of the stems is at variance with the attested WT stems, are open to interpretation in terms of analogical changes. Consider the following examples. The verb ‘split open’ (see verb 2 in Table B.4) has /ⁿgâ/ as its non-past stem and /kê/

as its past/imperative stem. The latter stem, /kē/, regularly corresponds with the WT past stem *bkas*, whereas the former stem, /ⁿgâ/, would be the expected outcome if the underlying OT form had been **'ga* rather than the attested present stem of this verb, *'gas*. It is conceivable that the original WT pattern with the coda *-s* in both stems (that is, *'gas*, *bkas*) has been reinterpreted in Baima as one, in which the coda *-s* in the past stem is reanalyzed as the past suffix *-s* (*bka-s*), leading to the back formation of the present stem without *-s* (viz., **'ga*). Another example is the verb ‘weigh with a steelyard’ (see verb 4 in Table B.2) with the *o-a-a-o* ablaut in the classical paradigm (*'gyog*, *bkyags*, *bkyag*, *khyog*). The non-past form of that verb in Baima, /ⁿdzâ/, is at variance with the present stem *'gyog*. It is conceivable that the non-past stem has been reinterpreted on the basis of the past/imperative stem of this verb, Baima /tēâ/, corresponding with WT *bkyags*.

An analogical explanation may also account for the loss of the original suffix *-d* in the present stem of the verbs ‘wash’, ‘divide’, and ‘plough’, reproduced in Table 10.

No.	Gloss	Baima		WT	
		N-PST	PST/IMP	present	past
B.3.4	divide	gê	gò	bgod; *bgo	bgos
B.3.9	plough	mê	mē	rmod; *rmo	rmos
B.4.1	wash	ⁿ dz ^h û	tēy	'khrud; *khru	bkrus

Table 10. Examples of possible loss of the suffix *-d* in the present stem. “No.” indicates the serial number of the verb in Tables B.3–4 in Appendix B. Baima forms that show irregular sound correspondences with attested WT stems are highlighted in gray. The would-be sources of irregular Baima forms are preceded by an asterisk and provided in the corresponding WT slot, separated from the attested stems by a semicolon.

For example, the paradigm of the verb ‘divide’ may have been changed by analogy with the high frequency verb ‘speak’, that is /dzò/ ‘speak’ (IMP) : /dzê/ ‘speak’ (N-PST) :: /gò/ ‘divide’ (IMP) : /gê/ ‘divide’ (N-PST), that is, replacing the form that the attested present stem *bgod* would have yielded regularly.¹⁷

The marginal productivity of the vowel alternation pattern of stem formation is likely observed in the case of the verb ‘ache; be painful’ (see verb 11 in Table B.3). This verb is alternating in Baima (its non-past stem is /ts^hâ/, and its past stem is /ts^hê/), whereas the

¹⁷ We are grateful to the anonymous reviewer for this suggestion.

corresponding WT verb is non-alternating (*tsha*). It can be tentatively proposed that the past stem of this verb is derived from the non-past stem through innovative ablaut (a > e).

Finally, the reasons for the irregular relationship between both stems of the Baima verbs ‘open (door)’ (verb 22 in Table B.2), ‘sweep’ (verb 15 in Table B.2), and ‘close, shut (door)’ (verb 13 in Table B.3) and the attested stems of classical paradigms are more obscure. These Baima verbs cannot be identified with any known Tibetan roots and may have yet unidentified sources.

4. Baima verb stem alternation in the context of the neighboring non-Tibetic varieties

As discussed in the previous section, the patterns of stem formation in Baima unmistakably reflect OT verb morphology. At the same time, they evidence one relatively uncommon tendency in the development of the originally complex OT patterns: that of elimination of a separate imperative stem of classical WT paradigms, whereby the past stem comes to serve both past and imperative functions. Such a tendency has not been commonly reported for modern Tibetic languages and it likely represents an innovative development. We further note that that development may not be limited to Baima, but may be shared with its neighboring Tibetic varieties (see Map 1). A preliminary comparison is possible with Zhongu (a Tibetic variety of Songpan county), for which an extensive vocabulary list of 1,500 common lexical items with their suggested Tibetan etymologies is available (see J. Sun 2003). That list yields a total of 35 verbs that overlap with verbs on our Baima list. The majority of those overlapping verbs (20 in total) have two stems that distinguish, similar to Baima, between one non-past stem, which corresponds with the present stem of classical paradigms, and one stem serving both past and imperative functions, which corresponds with the past stem of classical paradigms. Among the remaining 15 verbs, 6 verbs have three stems in both Zhongu and Baima, including a separate imperative stem (see verbs in Table B.1), while 9 verbs have two stems in Baima and one or three stems in Zhongu. Table 11 provides some examples.

Gloss	Zhongu			WT			Baima		
	N-PST	PST	IMP	present	past	imperative	N-PST	PST	IMP
eat < gnaw	ⁿ tʃʰɛ	ⁿ tʃʰi	ⁿ tʃʰo	'cha	'chas	'chos ¹⁸	ⁿ dʒ ^ç â	ⁿ dʒò	ⁿ dʒ ^ç ê
stay; sit	ⁿ də	dɛ	di	'dug	bsdad	sdod	ⁿ dy	dê	dyû

¹⁸ Note that the major sound correspondences between Zhongu and OT, as described in J. Sun (2003), rather suggest *'cho* as the underlying form for the imperative stem of this verb, as is also the case in Baima. Specifically, according to J. Sun (2003: 790), OT *os* corresponds to Zhongu /i/, while OT *o* corresponds to Zhongu /o/.

put, place	ndzu	za	zu	'jog	bzhag	zhog	ⁿ dzuê	zâ
look	^h tɛ	^h tɛ	^h ti	lta	ltas	ltos	tâ	tyū
shoot, throw	ⁿ p ^h ɛ	ⁿ p ^h ɔ	ⁿ p ^h u	'phen	'phangs	phong	^m bè	^m bò
wash	ⁿ tʃ ^h ə		tʃə	'khru(d)	bkrus		ⁿ dz ^ç ê	tey
plough	ɤmo		ɤmi	rmo	rmos		mê	mē
sweep	ⁿ ts ^h a		ts ^h a	'phyag	phyag		ⁿ dzà	ɛ ^h à
exchange		dze		rje	brjes		zê	zè

Table 11. Examples of alternating verbs in Zhongu together with their Tibetan etymologies in J. Sun (2003), compared to corresponding verbs in Baima

We note that in addition to the tendency to eliminate a separate imperative stem of classical paradigms, Zhongu and Baima also share some other developments. These include the semantic extension from ‘chew, gnaw’ to ‘eat’. Overall, that extension appears to be an areal development in several Tibetic varieties spoken in the neighborhood of Baima, including in addition to Zhongu, also Kun sngon, Chos.rje, and Zhangla or lCang.la (see Hua Kan & Gazangta 1997; J. Sun 2003: 834, footnote 41).

Baima and Zhongu also share the suppletive paradigm of the verb ‘sit; stay’, where the past stem *bsdad* and the imperative stem *sdod* are suppletive for the verb *'dug*. The same suppletive paradigm has also been reported for a few other Amdo varieties of the historical Sino-Tibetan borderlands, including Ndzorge (Sichuan, J. Sun 1993: 974, note 34) and Nangchenpa (Qinghai, Causemann 1989: 93, cited from Zeisler 2004: 564).

The relatively uncommon tendency in Baima and possibly its neighboring Tibetic varieties to eliminate a separate imperative stem of classical paradigms can be further considered in the context of local non-Tibetic languages, some of which, most importantly Rgyalrong, also have complex patterns of stem alternation.

Rgyalrong verbs have a maximum of three stems, conventionally labeled 1, 2, 3, following J. Sun (2004, 2014b). Stem 1 occurs in non-past contexts; stem 2 occurs in past contexts; stem 3 occurs only in some highly specific transitive contexts constrained by number (singular), tense-aspect (non-past, non-progressive), and direction (direct) (e.g. J. Sun 2014b: 633–634, 2016; Jacques 2015, 2021: 493–499). Most Rgyalrong varieties are reported to have only two stems (stem 1 and stem 2), commonly differentiated through (partially productive) ablaut. Put differently, unlike Tibetic languages, Rgyalrong verbs lack a separate imperative stem and commonly distinguish between one stem used in non-past contexts and one stem used in past contexts. In this context, the tendency to eliminate a separate imperative stem in Baima

and its neighboring Tibetic varieties can potentially be interpreted as a type of remodeling of the originally complex OT paradigms to better reflect the stem differentiation in the nearby non-Tibetic (Rgyalrong) languages.

At the same time we note that while such an interpretation is conceivable, it stands in contrast with some reported cases of language contact between Tibetic and Rgyalrong languages in the area. Gserpa and Khalong (see Map 1), two Tibetic varieties in close contact with Showu Rgyalrong (J. Sun 2006: 114–116, 2007, 2016, 2021), are a case in point. Both Gserpa and Khalong have been argued to evidence a Showu Rgyalrong substratum that manifests itself in numerous lexical loans and, most importantly in the context of the present discussion, also verbal morphology. Non-past (or imperfective) stems of alternating verbs in these varieties mostly trace back to WT perfective stems, whereas new past (or perfective) stems have been argued to be created from innovative imperfective stems by means of ablaut, which has clear similarities in form and function with the stem-building ablaut in Showu Rgyalrong. Remarkably, while borrowing morphologically-based phonological alternation from the neighboring Rgyalrong variety, both Gserpa and Khalong appear to retain Tibetic-style verbal paradigms with a distinct imperative stem, which in many cases reflect the imperative stem of the corresponding WT paradigm. Consider the following examples. The imperfective stem of the verb ‘laugh’ in both Gserpa and Khalong corresponds with the perfective stem of the classical paradigm, viz., *bgad* (Gserpa /vga/, Khalong /vgat/). The perfective stem of this verb, on the other hand, is innovated from the imperfective stem via the Rgyalrong-style ablaut (viz., Gserpa /vge/, Khalong /vget/). Finally, the imperative stem corresponds with the WT imperative stem *dgod* (Gserpa /rgot/, Khalong /rgot/).

Unlike Gserpa and Khalong, both Baima and Zhongu contain very few recognizable loanwords from local non-Tibetic languages (e.g. Huang & Zhang 1995: 116–117; Chirkova 2008; J. Sun 2003: 782–783). Yet they evidence an innovative strategy of verb-stem differentiation which is at variance with commonly observed developments of classical Tibetan patterns in Tibetic languages. More detailed work on local Tibetic and non-Tibetic varieties in the historical multilingual Sino-Tibetan borderlands is clearly needed to shed light on the precise developments in the Baima case.¹⁹

¹⁹ One of the anonymous reviewers notes that, although the levelling of verb stem alternations in favor of the etymological past has not often been discussed in the literature, it is by no means rare in Tibetic languages. The reviewer cites Lhasa Tibetan as an example, noting that the most recent sources on that variety, in particular the *Bod rgya tshig mdzod chen mo* [The Great Tibetan-Chinese Dictionary] (1993), offer numerous examples of the levelling of the inflection of some originally complex paradigms in favor of the etymological past. We note that while such a tendency may not be uncommon, no other reported variety shows it to such an extreme extent as

5. Summary and conclusion

In this study we presented a new analysis of verb stem alternation in the Pingwu variety of Baima, based on a small corpus of 250 common verbs. The main findings include:

(1) Baima has a relatively high number of alternating verbs and complex verbal morphology in the sense of stem alternation (affixal, ablaut). In contrast to the conclusion in Huang & Zhang (1995: 115), this is quite unlike Kham Tibetan varieties and more in line with Amdo varieties. In fact, Baima shares several diagnostic developments with its neighboring Amdo varieties, including the semantic extension of ‘chew, gnaw’ to ‘eat’ (see section 3).

(2) In contrast to the conclusions in H. Sun et al. (2007), the morphology of stem alternation in Baima is clearly that of OT, consistently reflecting both regular and irregular OT morphology. Observed irregularities may be largely ascribed to analogical changes.

(3) One potentially innovative development in Baima is a tendency to eliminate a separate imperative stem of classical WT paradigms. That development is likely shared by Baima with its neighboring Tibetic varieties, such as Zhongu. That development may be tentatively attributed to language contact with local non-Tibetic languages. However, the identity of those languages and related mechanisms of borrowing require further investigation, as they appear to be distinct from those in more transparent cases of language contact between local Tibetic and Rgyalrong varieties (Gserpa, Khalong).

Naturally, further work and additional data from more speakers are required to test the robustness of the present conclusions. There is also a need for a comparative study of various Baima varieties (including also those spoken in Songpan, Jiuzhaigou, Wenxian, and Zhouqu counties) so as to allow for a more comprehensive understanding of the evolution of classical patterns of stem formation in this language. Such a comprehensive study has the potential to further our understanding of less common developments in Pingwu Baima. An added bonus is that such a study may shed further light on the dynamics of language contact in small indigenous communities of the historical Sino-Tibetan border areas, which has indubitably played a significant role in the formation of local Tibetic and non-Tibetic varieties alike.

Baima. For that reason, in this particular case we propose to provisionally keep language contact as a possible explanation for the observed developments until more compelling, internal explanations have been found.

Appendix A. Baima synchronic and historical phonology

This study adopts the phonological analysis of Pingwu Baima (hereafter Baima), as detailed in Chirkova et al. (2021) and Chirkova (2021, under review). Compared to the previous phonological analyses of Baima in Nishida & H. Sun (1990), Huang & Zhang (1995), and H. Sun et al. (2007); Chirkova et al. (2021) and Chirkova (2021, under review) (i) additionally recognize phonation contrasts in consonants (non-epiglottalized, epiglottalized) and vowels (tense, modal, lax), and (ii) propose a new analysis of the tonal system, whereby contrastive tonal categories in Baima are described as typified not only by fundamental frequency (pitch height, slope), but also by contrastive phonation.

The structure of the Baima syllable is (C)V(V), where C (which is optional) can be any phonemic consonant, and V stands for vowel. The segmental inventory includes:

- (i) 57 consonant phonemes, of which 35 are non-epiglottalized (/p p^h t t^h k k^h ts ts^h tʃ tʃ^h tɛ tɛ^h tʃ tʃ^h s s^h ʃ ʃ^h ɕ ɕ^h x m^b n^d ŋ^g n^dz^ʰ d^z d^z m n ɲ r j l w/) and 22 are epiglottalized (/b d g dz dʒ dʒ dʒ z ʒ z ɣ m^b n^d ŋ^g n^dz^ʰ d^z d^z m^ʰ n^ʰ ɲ^ʰ j^ʰ l^ʰ/) (note that in non-nasalized voiced obstruents, epiglottalization is contingent on voicing and for that reason, not marked in transcriptions)
- (ii) 15 vowel phonemes, including 11 monophthongs (/i e ε ʊ ə ʉ u o a α/) and 4 diphthongs (iɛ yʉ uɛ uɑ).

Baima has three contrastive tonal categories: high falling, mid, and level, as in /^hguê/ ‘bark (dog)’, /^hguē/ ‘pan’, /^hguè/ ‘downstairs’.

The simple (C)V(V) syllable structure in Baima represents considerable reduction and simplification of the complex OT syllable structure, that is, (b)(C)C(M)V(C)(s/d), where C stands for consonant, M for medial and V for vowel. The main developments of Baima onsets are conditioned by the presence or absence of OT prefixes. Unprefixed voiceless stops and affricates remain unchanged and non-epiglottalized, whereas unprefixed voiceless fricatives become aspirated. Unprefixed voiced obstruents become devoiced and non-epiglottalized. The major trend for oral prefixal consonants (*g-*, *d-*, *b-*, *r-*, *l-*, *s-*) is their disappearance. Before voiced obstruents and sonorants they conditioned a special breathy quality of the initial (hereafter, historically breathy initials). Before voiceless obstruents oral prefixal consonants disappeared without compensation, leading to the development of plain or non-breathy initials. The two nasal prefixal consonants (*m-* and *ʰ-*) conditioned the development of the two types of modern voiced prenasalized stops and affricates: (i) historically breathy, if the original root initial is voiceless aspirated, and (ii) plain or non-breathy, if the original root initial is voiced. The development of distinct epiglottalized onsets in syllables with the high falling tone is likely

a by-product of historically breathy voice, followed by tense voice (laryngealized or creaky phonation of the vowel) (see below). Table A.1 summarizes major trends in the development of Baima onsets.

Historical onset type	OT preinitial	OT initial	Baima	Example		
				Gloss	WT	Baima
breathy	oral	voiced stop, affricate, fricative	D > D	stone	<i>rdo</i>	dê
	nasal	voiceless aspirated stop, affricate	ⁿ D > ⁿ D ^s	fly (v.)	<i>'phur</i>	^m b ^s û
	oral, nasal	nasal, liquid, approximant	Ṣ > S ^s	pus	<i>rnags</i>	n ^s û
plain or non-breathy	∅-	voiceless aspirated stop, affricate	T ^h	hempen cloth	<i>thags</i>	t ^h â
		voiceless unaspirated fricative		tooth	<i>so</i>	s ^h ê
		voiceless unaspirated stop, affricate	T	pillar	<i>ka ba</i>	kâ
	voiced stop, affricate, fricative	poison		<i>dug</i>	tÿ	
	oral	mark, sign		<i>rtags</i>	tâ	
	nasal	voiced stop, affricate	ⁿ D	insect	<i>'bu</i>	^m bû
	∅-	nasal, liquid, approximant	S	forest	<i>nags</i>	nâ

Table A.1. Major trends in the development of Baima consonants. T = voiceless unaspirated obstruent, T^h = voiceless aspirated obstruent, D = voiced obstruent, ⁿD = prenasalized stop or affricate, S = plain sonorant.

The original complex OT rhyme structure has been drastically simplified in Baima. All original consonantal codas were lost, transforming all closed syllables into open syllables. The disappearance of consonantal codas led to the development of the phonation difference in vowels: tense vs. non-tense or lax, with vowel duration and pitch as co-articulated cues. Tense vowels (with shorter duration and higher pitch) evolved from OT open syllables and syllables with codas *-b, -d, -g*,²⁰ whereas lax vowels (with longer duration and lower pitch) evolved from OT coalesced syllables and syllables with codas *-m, -n, -ng, -s, -l*. Table A.2 provides some illustrative examples.

Phonation type Vowel duration F0	OT rhyme	Example		
		Gloss	WT	Baima
tense shorter duration higher pitch	open coda <i>-r</i>	mouth	<i>kha</i>	k ^h â
		four	<i>bzhi</i>	ʒô
		year	<i>lo</i>	jê
	codas <i>-b, -d, -g</i>	needle	<i>khab</i>	k ^h û
		voice; language	<i>skad</i>	kê
		to be hungry	<i>ltogs</i>	tuê
	coalesced syllables	food	<i>za ma</i>	sô

²⁰ OT rhymes with the coda *-r* have the same reflexes as syllables with zero coda, for which reason it is likely that *-r* was lost early in the history of Baima (Huang & Zhang 1995: 99).

non-tense (lax) lower pitch longer duration	codas <i>-m, -n, -ng</i>	snow	<i>kha ba</i>	k ^h à
		to be dry	<i>skam</i>	kō
		bottom part	<i>gdan</i>	dê
	codas <i>-l, -s</i>	lap; bosom	<i>pang</i>	pō
		to sleep	<i>nyal</i>	nē
		rice	<i>'bras</i>	ⁿ dʒrē

Table A.2. Major trends in the development of Baima vowels

The three contrastive tonal categories in Baima likely arose through an overlay of the phonation difference in consonants (historically breathy vs. plain) and the phonation difference in vowels (tense vs. lax). Syllables with tense vowels acquired a high falling, short tone, the relative pitch height of which is predictable on the phonation type of the syllable onset—higher on syllables with non-epiglottalized onsets, and lower on syllables with epiglottalized onsets, and therefore non-contrastive. Syllables with non-tense vowels, on the other hand, acquired a lower, long tone. That lower long tone subsequently split into two contrastive tones, depending on the historical onset type. Syllables with plain onsets yielded a long level tone with modal voice quality (mid tone), whereas syllables with historically breathy and voiceless aspirated onsets yielded a long low falling-rising tone with breathy-like voice quality (low tone) (see Chirkova under review for detailed discussion). Table A.3 summarizes tonal developments in Baima.

Stage 1		Stage 2		Example		
OT rhyme	Phonation	Baima onset	Tone	Gloss	WT	Baima
<i>-b, -d, -g</i> open (<i>-r</i>)	tense shorter duration higher pitch	(historically breathy) epiglottalized	H	village	<i>sde</i>	dê
		(historically plain) voiceless aspirated		lips; beak	<i>mchu</i>	ⁿ dʒ ^s û
		voiceless non-aspirated		mouth	<i>kha</i>	k ^h â
				to dig (IPFV)	<i>rko</i>	s ^h ê
<i>-m, -n, -ng, -s, -l</i> coalesced syllables	lax longer duration lower pitch	voiceless non-aspirated	M	pillar	<i>ka ba</i>	kā
		(historically breathy) voiced obstruent, sonorant	L	bottom part	<i>gdan</i>	dê
		(historically plain) voiceless aspirated		to jump	<i>mchong</i>	ⁿ dʒû
				snow	<i>kha ba</i>	k ^h à
		charcoal	<i>sol</i>	s ^h ê		

Table A.3. Tonal developments in Baima

As a result of these complex developments, depending on the historical onset type, Baima reflexes of OT rhymes may vary from voice quality (tense vs. modal vs. lax) to mixed voice and vowel quality contrasts (in particular for long vowels from OT coalesced syllables and rhymes with the codas *-n, -ng, -m, -l, -s*). Table A.4 summarizes common reflexes of OT rhymes. A slash (“/”) separates reflexes after historically plain initials from those after historically breathy initials, in that order.

	Ø (or -r)	-b(s)	-d	-g(s)	-n	-ng(s)	-m(s)	-l	-s
a	ɑ	ʊ	e	ɑ	ɛ	o	o	iɛ	e / ɛ
i	ə	i	i	i	e	e	i	ə	ə / i
u	u	y, u	i, y	y	e	u	u	ə	y
e	ɛ	e	e	e	e	e	e	e / ɛ	e
o	ɐ	ɐ	e (after labials), ʊ	uɛ	ʊ	u	o	i	e (after labials), yu / ʊ

Table A.4. Baima reflexes of OT rhymes

Appendix B. Baima verbs with their suggested etymologies

This section regroups all verbs in our data. The alternating verbs are organized by the number of stems. Verbs with three stems are listed first (Table B.1), followed by verbs with two stems (Tables B.2-4). Verbs with two stems are further organized by alternation type: onset alternation first (Table B.2), followed by vowel alternation (Table B.3), and by a combination of onset and vowel alternation after that (Table B.4). Non-alternating verbs are listed in Table B.5. Table B.6 lists loan verbs from Chinese and periphrastic constructions with the auxiliary verb ‘do; make’ in our data.

Baima verbs are listed next to their suggested etymologies (attested WT stems). Uncertain origins are indicated by question marks in the corresponding syllable slot. Question marks beside suggested etymons signal that the etyma in question are tentative. Baima forms that are at variance with the attested stems are highlighted in gray. Corresponding WT slots of such forms include the closest matching form among the attested stems, followed by the would-be source of the irregular Baima form, as proposed on the basis of major sound correspondences between Baima and WT. In the tables, verbs are sorted in the order of the Tibetan consonants followed by the order of the vowels.

No.	Gloss	Baima			WT		
		N-PST	PST	IMP	present	past	imperative
1	go	ⁿ dzê	te ^h ɛ̃	s ^h ù	'gro	chas	song
2	eat < gnaw	ⁿ dʒ ^h â	ⁿ dʒò	ⁿ dʒ ^h ê	'cha'	'chos	'cho
3	sit; stay	ⁿ dÿ	dê	dyû	'dug	bsdad	sdod; *sdos?
4	do; make	zê; eê	eē	teī	bzo; byed	byas	gyis
5	speak; say	dzê	dzè	dzò	zlo	bzlas	zlos
6	come	wū	uè	fuê	'ong	?	shog

Table B.1. Baima alternating verbs with three stems

No.	Gloss	Baima		WT	
		N-PST	PST/IMP	present	past

1	spin into yarn	ⁿ qjè	kjē	'khal	bkal
2	freeze, feel cold	ⁿ dʒ ^ʰ â	tʃ ^h â	'khyag	khyags
3	bark (< block, obstruct) ²¹	ⁿ guê	kuê	'gog(s)	bkaɡ; *bkog
4	weigh with a steelyard	ⁿ dʒâ	teâ	'gyog(s); *'gyag(s)	bkyags
5	die	ⁿ dʒ ^ʰ ô	ʃô	'chi	shi
6	fasten (belt)	ⁿ dʒè	tʃè	'ching(s)	bcings
7	grind	ⁿ d ^ʰ â	tâ	'thag	btag-s?
8	weave, knit	ⁿ d ^ʰ â	tâ	'thag	btag-s?
9	wrap up, cover	ⁿ dù	tū	'thum	btum(s)
10	pick, pluck	ⁿ d ^ʰ uê	tuê	'thog	btogs
11	peck at (bird), nibble	ⁿ d ^ʰ uê	tuê	'thog	btogs
12	drive, herd (animals)	ⁿ dê	tê	'ded	ded
13	ask	ⁿ dʒ ^ʰ ô	tʂô	'dri	dri
14	come out (sun, frost) ²²	^m b ^ʰ ê	p ^h ê	'pher / 'phel	'pherd / phel
15	sweep	ⁿ dʒà	e ^h à	'phyag; *'phyag-s	'phyags; *'phyag-s
16	meet	ⁿ dʒ ^ʰ ê	tʂ ^h ê	'phrad	phrad
17	rob, plunder	ⁿ dʒuê	tʂ ^h uê	'phrog	phrog(s)
18	blow	^m bî	pî	'bud	bus
19	take off, remove	^m bî	p ^h î	'bud	phud
20	call, shout, yell	^m bê	pê	'bod	bos
21	lose, mislay	^m bô	pô	'bor	bor
22	open (door)	ⁿ dʒâ	e ^h â	'byed; *'bya	phye; *'phya
23	be drunk (< be moist) ²³	^m bē	p ^h ē	'bran	bran; *'phran
24	hit, beat	ⁿ dʒû	tʂû	'brab	brab(s)
25	write	ⁿ dʒ ^ʰ ô	tʂô	'dri	dri
26	cook, boil	ⁿ dʒ ^ʰ ô	tsô	'tshod	btsos
27	sell	ⁿ dʒù	tsū	'tshong	btsongs
28	kneel, set down	(pê ^m ê) ⁿ dʒy	tsy	(pus mo) 'dzugs	btsugs
29	prick, thrust; give injection	(k ^h û) ⁿ dʒy	tsy	(khab) 'dzugs	btsugs

Table B.2. Verbs with two stems differentiated by onset alternation

²¹ We tentatively propose that this verb may be etymologically related to the WT verb ‘block, obstruct’. That is based on the observation that in a number of Kham dialects (such as the Chaya 察雅 / brag gyab variety of chab mdo Tibetan or the Zhongxinrong 中心绒 / gtsang chen rong variety of ‘ba’ thang Tibetan), a combination of the verb ‘block, obstruct’ with the noun *khyi* ‘dog’ stands for both ‘hold back a dog’ and ‘dog barks’ and is used as an equivalent to the standard expression (*khyi*) *zug* ‘bark (dog)’. We tentatively suggest that a similar semantic development may have taken place in Baima.

²² We tentatively propose that this verb is etymologically related to the verb *'pher* or *'phel* with the meaning ‘raise’, ‘increase’.

²³ The verb ‘be drunk’ is listed in Nishida & H. Sun (1990: 356) as /tʃ^ho⁵³ p^he¹³ nb^o¹³ ʃ^l¹³/, where /tʃ^ho⁵³/ is ‘beer’ (WT *chang*) and /nb^o¹³ ʃ^l¹³/ are verbal enclitics (completive and non-egophoric) (see Chirkova 2017). No etymology for the verb /p^he¹³/ is provided in Zhang (1994a–b). We tentatively propose that this Baima verb may be related to the form *ban*, as found in some Tibetan dialects. For example, in ‘ba’ thang Tibetan, *ban* is used both transitively and intransitively (respectively, ‘moisten’ and ‘be moist’), and its intransitive use is often extended to stand for ‘be drunk’. WT does not have the form *ban* in the meaning ‘be moist’ or ‘moisten’, while it is possible that this form is related to the WT verb *b(r)an* ‘saturate with water, moisten’ (with the inflectional paradigm *'bran*, *bran(d)*, *bran*, *bran(d)/bron*, e.g. Hill 2010: 196).

No.	Gloss	Baima		WT		
		N-PST	PST/IMP	present	past	imperative
1	dig, scoop	kê	kyū	rko	brkos	
2	kick	(dētê) dzâ	dzû	(rdogtho) rgyag	brgyab(s)	
3	mend	(â ^m bâ) dzâ	dzû	(lhanba) rgyag	brgyab(s)	
4	divide	gê	gò	bgod; *bgo	bgos	
5	exchange	ʒê	ʒè	rje	brjes	
6	buy	ɲê	ɲū	nyo	nyos	
7	throw, cast	(ⁿ dê) ^m bè	^m bò	(mda) 'phen(d)	'phangs	
8	cut; mow	tʂâ	tʂē	'breg/breg; *bra?	brengs	
9	plough	mê	mē	rmod; *rmo	rmos	
10	jump	tsê	tsē	rtse	brtses	
11	ache, be painful	ts ^h â	ts ^h ê	tsha	?	
12	herd	ⁿ dz ^h ê	ⁿ dzò	'tsho	'tshos	
13	close, shut (door) ²⁴	zê	zò	bzo?	bzos?	
14	take, hold	jê	jō	len	blangs; *langs	
15	look	tâ	tyū	lta		ltos
16	split firewood	sê	sē	gse	gses	
17	give birth	sê	syū	gso	gsos	
18	rest; dry in the sun	ʃê	ʃyū	sro	bsros	

Table B.3. Verbs with two stems differentiated by vowel alternation

One more verb with two stems, ‘drink’, has identical non-past and imperative forms, both /ⁿdù/, corresponding, respectively to WT *'thung* and *'thungs*. The past stem of this verb, Baima /ⁿdỳ/ does not regularly correspond with the attested past stem of this verb *'thungs*.

No.	Gloss	Baima		WT	
		N-PST	PST/IMP	present	past
1	wash	ⁿ dz ^h û	tey	'khru	bkrus
2	split open	ⁿ gâ	kē	'gas; *'ga	bkas
3	cut with scissors	ⁿ dzâ	tʂē	'dra	dras
4	take out; dredge	ⁿ dzê	tʂō	'dren	drang
5	give	ʒê	eī	sbyin; *sbyi? ²⁵	byin
6	put; place	ⁿ dzue	ʒâ	'jog	bzhag

Table B.4. Verbs with two stems differentiated by a combination of onset and vowel alternation

²⁴ In terms of regular sound correspondences, this verb matches the WT verb ‘do’.

²⁵ The non-past form of this Baima verb, viz., /ʒê/, is homophonous with the numeral ‘four’, WT *bzhi*.

Finally, one verb with two stems, ‘flow (water’), has a suppletive paradigm. The non-past stem of this verb is /ⁿdzê/, likely reflecting WT ‘gro ‘go’. The past stem of this verb is /e^hà/ (homophonous with the past stem of the verb ‘sweep’, see B.2.15). It may be etymologically related, albeit in an irregular fashion, to WT *phyin*, the past stem of the verb *gshar* ‘go successively, again and again, move one after the other, follow in succession’.

Table B.5 lists non-alternating verbs in our data. As can be seen from that table, most non-alternating verbs correspond with verbs that are alternating in OT. In the majority of cases, the originally distinct stems merge in Baima due to regular sound change (see footnote 16). In the table, attested stems forms that match sound correspondences between Baima and WT are highlighted in bold. In one case, ‘cry, weep’ (B.5.37), a non-alternating verb results from an ongoing elimination of stems. That verb is recorded with two stems in H. Sun et al. (2007) (see Table 2), but it has only one stem in our data (viz., /ŋû/).

No.	Gloss	Baima	WT		
		N-PST / PST/ IMP	present	past	imperative
1	borrow (money)	eī	skyi	bskyis	skyis
2	spit	eŷ	skyug	skyugs	skyugs
3	vomit	eŷ	skyug	skyugs	skyugs
4	grow (in height)	eê	skyed	bskyed	skyed
5	stretch out, extend	teō	rkyong	brkyangs	rkyongs
6	fear, be afraid	eâ or teâ	skrag; *skra	skrag(s); *skra	skrags; *skra
7	swell up	eō or teō	skrang	skrangs	skrangs
8	stir	teŷ	dkrug	dkrugs	dkrugs
9	dry up, dry out	kō	skam	bskams, skam	skams
10	smear	kŷ	skud	bskus	skus
11	apply ointment	kŷ	skud	bskus	skus
12	make noodles < boil, cook	kī	skol	bskol	skol
13	lose (a battle) < shrink, recoil?	k ^h ō	'khum?	'khums?	'khums?
14	carry on the back	k ^h û	'khur	khur(d), bkurd	khur(d)
15	fall ill < be subdued, overwhelmed?	k ^h ī	'khul	khul	khul
16	run	teŷ	'khyus	'khyus, khyus	khyus
17	pull, lead	k ^h ī	khrid	khrid	khrid
18	nod (head)	(^h qê) ŋuê	(mgo) 'gug(s)? ²⁶	bkug	khug
19	squat	kū	dgum	bkums	khum(s)
20	quake (earth)	s ^h â ŋgī	sa 'gul	sa 'gul(d)	sa 'gul
21	crack between the teeth (seeds)	kuê	'gog	bkog	gog, khog
22	shell, peel	kuê	'gog	bkog	gog, khog
23	laugh	gâ	dgod, rgod	b(r)gad, rgod; *b(r)ga	dgod, rgod
24	cross (e.g. a river)	gè	rgal	brgal	rgol
25	straddle	kō dzò	(gom) rgyang	brgyang-s?	rgyangs
26	throw, cast	zû	rgyab	brgyab	rgyob
27	transform, change	ⁿ dzŷ	'gyur	'gyur	'gyurd
28	lift, raise (head)	(^h qê) zâtjâ	'gyogs/ ⁿ gyogs	(mgo) yar bkyags	khyogs

26 We tentatively propose that this verb may reflect WT ‘gugs ‘to bend, to cause to bend’. This is based on the observation that the expression *mgo 'gugs* is used in the sense of ‘nod head’ in several Tibetic varieties spoken in the vicinity of Baima. These include the Zhongxinrong / gtsang chen rong variety of ‘ba’ thang Tibetan, Thebo, and the Bola 博拉话 / ‘bo ra variety of bla brang Tibetan.

29	sound (thunder)	(^u dṛū) teâ	('brug) grag	grags	grag
30	bind, tie	gâ	sgag	bsgags	sgogs
31	wait	gô	sgug	bsgug-s?	sgugs
32	bend down, bow down	gô	sgur	bsgur(d)	sgur
33	lower (head)	(^u qê) gô	(mgo) sgur	bsgur(d)	sgur
34	twist (hemp fibers)	gî	sgrim	bsgrims	sgrims
35	push down	lè	gleb	gleb-s?	gleb-s?
36	press	lè	gleb	gleb-s?	gleb-s?
37	cry, weep	ṅû	ngu	ngus	ngus
38	howl (wolves) < weep	ṅû	ngu	ngus	ngus
39	dispatch, send	ṅ ^â	mngag	mngags	mngags
40	hold, grasp	dzô	bcang/'chang	bcangs	chong(s)
41	twist, wring	tṫû	gcu	gcus, bcus	gcu
42	scoop up, ladle out	(eûkÿ) ŷ	(skyur khu) ldug(s)	*lugs	*lug(s)
43	pinch, squeeze	tṫâ	gcer	bcard	gcerd
44	block	k ^h âtṫê	kha gcod/bcod	bcad	chod
45	dye	zê	rje	brjes	brjes
46	listen	nā pē	rna (m)nyan	(m)nyan	mnyan
47	sleep	pē	nyal	nyal	nyol
48	wither, dry up	pî	rnyid	(b)rnyid	(b)rnyid
49	find	n ^â ê	rnyed	(b)rnyed, rnyes	rnyes
50	mince (meat)	(^u â) tÿ	(sha) gtub	gtubs	gtubs
51	cut up, chop (e.g. vegetables)	(ṅ ^â) tÿ	(sngo) gtub	gtubs	gtubs
52	water, irrigate	tô	gtong	btang	thong
53	splash, sprinkle	tê	gtor(d)	btor, gtor(d)	gtor(d)
54	scatter (seeds)	tê	gtor(d)	btor, gtor(d)	gtor(d)
55	fold	tû	lteb	bltabs	ltobs
56	get, obtain	t ^h ê	'thob	thob; *tho	thob, 'thobs
57	gather, assemble	n ^â dû	'du	'du	'dus
58	insert, stick into	dû	rdab	brdabs	rdobs, rdebs
59	sharpen a knife	dâ	rdar	brdar(d)	rdor(d)
60	pound, crush (garlic)	dù	rdung	brdungs	rdungs
61	pestle, pound (rice)	(^u dṫê) dù	('bras) rdung	brdungs	(b)rdung(s)
62	play (a musical instrument)	dù	rdung	brdungs	(b)rdung(s)
63	forge iron	dù	rdung	brdungs	(b)rdung(s)
64	grow (from the ground, e.g. plant)	dî	brdol/rdol	brdol	rdol
65	lick	lâ	ldag/bldag	bldags	ldags
66	chew	lè	bldad	bldad	ldod
67	gather, collect	dÿ	sdu(d)	bsdus	sdus
68	receive	dÿ	sdu(d)	bsdus	sdus
69	gather, accumulate	dÿ	sdu(d)	bsdus	sdus
70	bind, fasten	dô	sdom, sdam	bsdams	sdom(s)
71	reduce < draw together?	duê	bsdog/sdogs	bsdogs	sdoks
72	sew up (clothes)	^u dṫû	'drub	drubs	'drubs
73	exhale, breathe	û ṫrô	(dbugs) 'dren	drangs	drongs
74	add	nè	snon	bsnan	snon(d)
75	fill up	nè	mnan	mnan	non
76	suck	nû	nu	nus	nus
77	bury < press down	nē	gnon	mnan, gnana	(g)non(d)
78	smell	n ^â ÿ	snom	bsnams, bsnom	bsnom, snoms
79	move	pâ	spag	spags	spogs
80	print	pâ	dpar	dpar	dpord
81	plant (seeds)	pâ	spor	spar	sbor
82	drop, fall	eô	dpyong	dpyangs	dpyongs
83	fish (= drop)	eô	dpyong	dpyangs	dpyongs
84	use	eû	spyod	spyad	spyod
85	gamble	p ^h û	'phongs	phongs	phongs
86	weed	(tsâ) ^m biè	(rtswa) 'bal	'bal	'bol
87	leak	^m bi	'big	'bigs='phigs	phugs
88	sway (hand)	(jâ) zÿ	(lag pa) dbyug	dbyugs	dbyug
89	fall over	dṫê	'brul	brul	'brul

90	run < escape, disappear	^m bâ	'bros?	'bros?	bros, phros?
91	marry	jē	blang/len	blangs	longs
92	pour into a pot, fill with water	ÿ	*lug	*lugs	*lugs
93	put in (salt)	(ts ^h â) ŷ	(tshwa) *lug	*lugs	*lugs
94	ruminant (e.g. cow)	dê	ldad	ldad	ldod
95	soak	uō	sbong	sbangs	sbongs
96	steep	uō	sbong	sbangs	sbongs
97	become mad	ŋ ^f ê	smyo	smyos	smyo(s)
98	peck (with the beak, bird)	tsâ	brtsag	brtsags	btsog
99	chop (trees)	tsû	gtsab, btsab(s)	btsabs, gtsabs	gtsobs
100	build, pile up	tsō	rtsig	brtsig-s	rtsigs
101	squeeze	tsô	gtsir	btsir(d)	tshir(d), gtsird, tshir
102	squeeze (for milk)	(nènē) tsô	(nunu) 'tshir	btsir	tshir
103	fry, roast	tsē	btso/tshod	btsos	tshos
104	go to war, battle < compare?	ts ^h ê	tshad	tshad	tshod
105	search, look for	ts ^h i	'tshol	btsol	tshol
106	drench	dzê	brdzad	brdzad	rdzod
107	close, shut (eyes)	tsū	'dzum	btsum(s)	tshum(s)
108	forbid, avoid	ⁿ dzê	'dzem	'dzems	'dzems
109	melt, dissolve	zû	bzhu	bzhus	bzhu
110	ride (a horse)	zô	zhon	bzhond?	zhond?
111	filter, strain	zâ	zags	gzags	zags
112	borrow (tools)	zâ	g.yar	g.yar	g.yor
113	shake one's head no	(^u qê) zÿ	(mgo) g.yug	g.yugs	g.yug
114	forget	kêzâ	? g.yel	? g.yel	? g.yel
115	brush, comb	jê	(g)shad, gshod	(b)shad	shad, shod
116	wipe (a table)	jê	(g)shad, gshod	(b)shad	shad, shod
117	slip	ÿ	shud ~ bshud	bshud	shud
118	tear up, rip	sê	gsil	bsil	gsil
119	chop (firewood)	(^h ê) sê	(shing) gsed	bsed	sed
120	draw out, extract	sē	sel	bsal	sol
121	choose, select	sē	sel	bsal	sol
122	kill	sê	gsod	bsad	sod
123	breast feed	sê	gso	gsos	gsos
124	weave (a basket)	jê	slas	bslas	slos
125	weave (a plait)	jê	slas	bslas	slos
126	arrive	tsê	sleb	slebs	sleb
127	teach	tsû	slob	bslabs	slobs
128	burn (firewood)	ÿ	sreg; *srag	bsregs	sregs
129	rot, decay	rê	hrul	hrul	hruld
130	like; love	gâ		dga'	
131	want	gê		dgo(s)	
132	wear, put on (clothes)	(kū) teō		(gos) gyon	
133	wear, put on (hat, belt)	(jâ) teō		(zhwa) gyon	
134	blow (wind) ²⁷ < be cold	teō		grang	
135	win	ⁿ dzê		rgyal	
136	lean on	ŋê		bsngas	
137	growl, snarl (tiger)	ŋâ		nger	
138	know (egophoric)	t ^h â zâ		cha yod	
139	know (non-egophoric)	t ^h â nô		cha snang	
140	snap (thread)	kât ^h â		? chad	
141	open (eyes)	(nī ⁿ djē) t ^h ê		(mig 'bras) 'then	
142	pull, tug	t ^h ê		'then	
143	smoke (tobacco)	(te ^h ê) t ^h ê		(?) 'then	
144	carry on the shoulder	t ^h ê		theg-s	
145	carry (a gun, a bag)	t ^h uê		thogs	
146	see	nī ndù		mig mthong	
147	hear	nâ t ^h ò		rna ba thos	
148	shiver, tremble	ⁿ dâ		'dar	

²⁷ This is based on a similar shift from *grang* 'be cold; become cold' to 'blow (wind)' in the Tibetic varieties neighbouring Baima, including 'bo ra (/lang cca/ is 'the wind blows; to blow (wind)'), Thebo (/cca/ or /tea/ 'to blow (wind)'), and Cone (/lu:^h tea:^l/ 'the wind blows; to blow (wind)').

149	grow (a boil)	(mârâ) di	(?) rdol
150	undo a knot	ˢdỳ	mdud
151	exist (non-egophoric)	nò	snang
152	hug, embrace	pō	pang
153	heap, pile up	pū	spung(s)
154	fly	ᵐbʰû	'phur
155	expand, go up, rise (water)	ʈrû	brug/brubs
156	ripen	ɲỳ	smin
157	swallow	ɲí	myid
158	measure	tsʰê	tshad
159	itch	sâ	za
160	hammer in (a nail)	zê	gzer
161	exist (egophoric)	zû	yod
162	be torn (clothes)	rê	ral
163	know (how to do smth), understand	ʃʰê	shes
164	know, recognize	ŋêʃê	ngo shes
165	understand	ákê	ha ko
166	remember	(pʰê nô) nô; (pʰê nô) kʰû	(pho ba nang) snang?(pho ba nang) khur?
167	throw, toss	nâ	?
168	crawl, climb	pâ	?

Table B.5. Non-alternating Baima verbs with their suggested etymologies

Table B.6 verbs lists the 15 non-alternating verbs that are borrowed from Chinese and the 6 periphrastic expressions that consist of a noun or a verb followed by the (alternating) auxiliary verb ‘do; make’.

No.	Gloss	Baima		Standard Chinese	
		N-PST / PST / IMP			
1	transform, change	pjē		变 <i>biàn</i>	
2	apply ointment	tsʰà		擦 <i>cā</i>	
3	shave (mustache)	(mârâ) kuâ		(sma ra) 刮 <i>guā</i>	
4	hang	kuâ		挂 <i>guà</i>	
5	think, reflect, recall	xuâsuê		划算 <i>huásuàn</i>	
6	pick up with chopsticks	ʈjâ		夹 <i>jiā</i>	
7	count	suē		算 <i>suàn</i>	
8	shave (head)	(ˢgê) thī		(mgo) 剃 <i>tì</i>	
9	preserve in salt	jē		腌 <i>yān</i>	
10	castrate	jē		阉 <i>yān</i>	
11	feel dizzy, giddy	(ˢgê) zỳᵐdzi		(mgo) 晕 <i>yùn</i>	
12	deep fry	tʂâ		炸 <i>zhā</i>	
13	steam	ʈjē		蒸 <i>zhēng</i>	
14	warm oneself by the fire	kʰô:		烤 <i>kǎo</i> ?	
15	compensate for losses	pʰù		赔 <i>péi</i> ?	
Periphrastic expressions				WT	
1	treat illness	mè	ê /	sman	byed /
2	chant, recite incantation	nâ		mna	
3	cough	ÿpâ	ê /	glo ba	byas /
4	nestle, make a nest	tsʰò		tshang	
5	sing	thúkê	teī	?	gyis
6	steal	kû		rku	

Table B.6. Loan verbs and periphrastic expressions with the auxiliary verb ‘do; make’ in our data

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