Muji's mirrored merger: correlative redistribution of checked tone classes in a newly defined Burmic cluster*

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Abstract

The Muji cluster is a newly defined series of Burmic languages affiliated with Phula and spoken in the Sino-Vietnam borderlands. The cluster is defined by unusual phonological, morphological and lexical innovations as described in Pelkey (2006, forthcoming). Among the shared innovations that set Muji apart as an insular subgrouping is a 'mirrored', or correlative, redistribution of tonal values in proto-checked tone classes conditioned by initial manner of articulation. This paper provides a glimpse of Muji phonology, focused on tone, and then presents Muji's most salient tonal innovation considering data from eight Muji varieties and an unaffiliated neighboring Phula language, Phupa.

1. Introduction

The Muji cluster is comprised of a series of nine or so closely related languages belonging to the Ngwi branch (formerly Loloish) in the Burmic group of the Tibeto-Burman family (cf. Pelkey 2006, forthcoming). These languages are spoken in nine counties of southeast Yunnan province, China, and four provinces of northern Vietnam. The cluster has an estimated 67,000 speakers out of an ethnic population of some 90,000—97% of which live in Yunnan (Pelkey forthcoming). Muji speakers are classified under the Yi nationality in China and under the Phula nationality in Vietnam. One of Muji's defining innovations as a distinct genetic subgrouping is an apparent two-way split and mirrored redistribution of Proto-Ngwi checked-syllable tone classes, *H and *L, into tonemes /33/ and /21/ primarily conditioned by correlative proto-environments as discussed in Section 3, below.

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The general geographic location of the Muji varieties considered in this paper is illustrated in Figure 1 using three-letter abbreviations (see key posted at the end of the paper for information on variety and location).

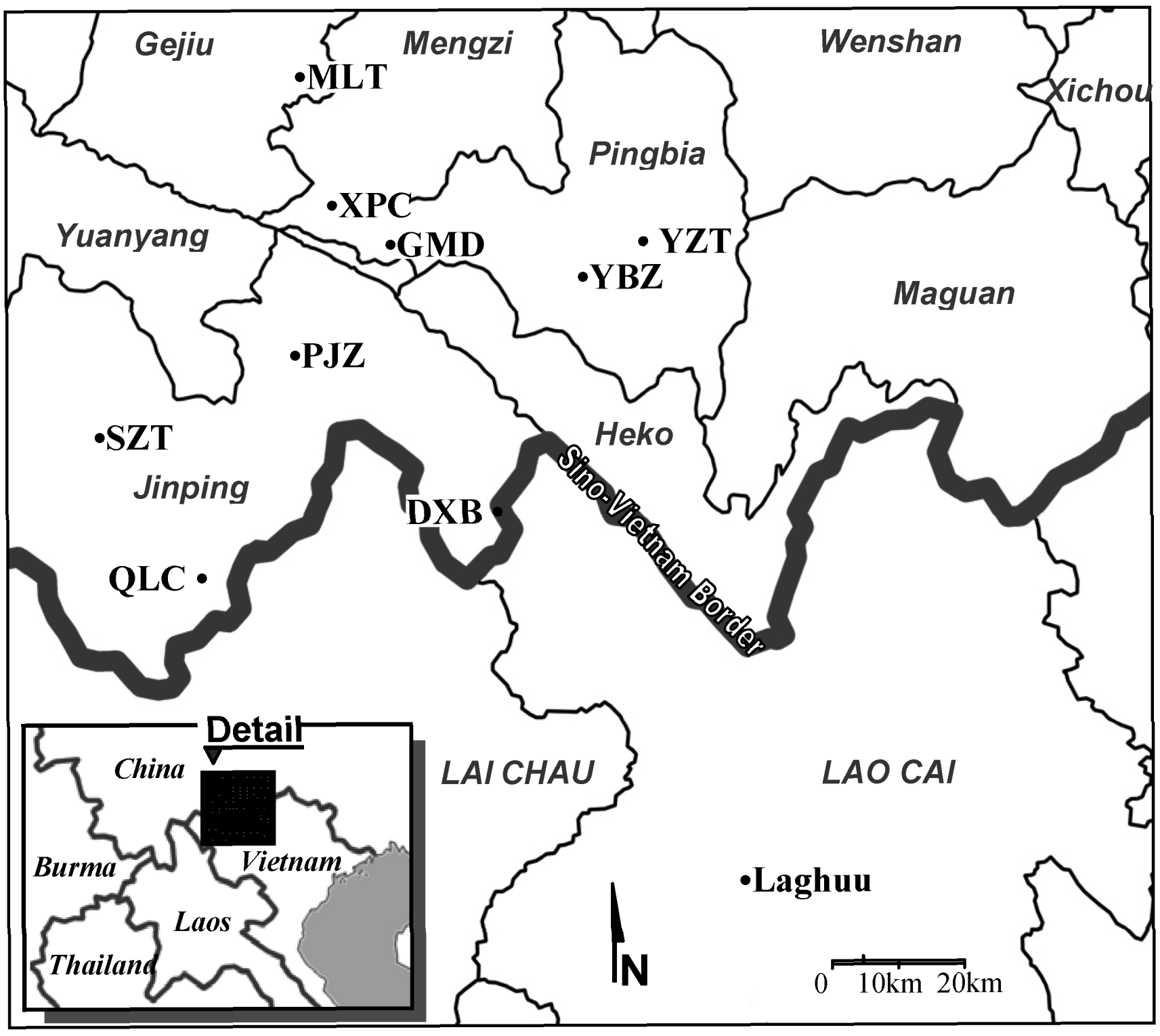

Figure 1. Location of Muji and Phupa varieties considered in this paper.

With the exception of Maguan County, speakers of various Muji varieties inhabit each of the counties and provinces labeled in Figure 1. Laghuu was first introduced to the English linguistic literature by Edmondson & Ziwo (1999) and Edmondson (2003), but its genetic status as a Muji variety has only recently come to light. GMD (Phupa) was first introduced to the Chinese linguistic literature by Bai (1994) along with a suggestion that the variety is affiliated with Muji. Although Phupa is surrounded by Muji varieties and seems to have been influenced by Muji contact in certain respects, it is missing the key Muji innovations, including the checked-tone redistribution pattern discussed in Section 3; as a result, Phupa should not be classified as a member of the Muji cluster genetically.

Although this paper is concerned with Muji's foremost tonal innovation, other major innovations that validate the cluster as an insular subgroup include the following: 1) the unusual development of PNg rhyme *iŋ into the back vowel /o/ in environments conditioned by [+sonorant] *initials, 2) a re-introduction of nasal finals via a syllable-level conditioning

process that adds a nasalized (or in a few varieties, tense voice) quality, or nasal final, to vowels preceding stop initials in certain compounds concomitant to lexicalization, 3) coalescence of the negative adverbial and the affirmative/equational copula, 4) a unique diminutive that has evidently grammaticalized along an alternate path of cognitive metaphor from the usual 'MOTHER-SON' cognate pairs found elsewhere in Ngwi, 5) numerous lexical and tonal paradigm innovations. These and other defining innovations are discussed in more detail in Pelkey (2006, forthcoming).

After a brief introduction to the phonology of a representative Muji variety, this paper will examine Muji's correlative tonal innovation and then present the data behind the analysis.

2. Sample phonology sketch

The Muji variety chosen here to represent the phonological features of the cluster is PJZ; a centrally located language relative to other Muji cluster varieties, PJZ is also moderately conservative phonologically. Since this paper is focused on a particular tonal innovation as a characteristic of the Muji cluster in general, more attention will be given in this sketch to tone than to other features of Muji phonology.

Syllable. PJZ syllable structure is C(V)VT in which V may also be filled by a syllabic nasal or a non-phonemic bilabial fricative and (V) represents various vowel or glide segments, the most common being [j]. In several Muji varieties the consonant template should be modified to C(V)V(N)T in which (N) represents contrastive vowel nasalization or an optional nasal final. The seeds of this change are in fact sown in PJZ phonetic processes, but they do not modify the phoneme template itself.

Consonant initials. PJZ features 34 initial consonants at seven places of articulation as can be noted in Table 1.

Table 1. Muji-PJZ consonant initials

p	t	ʦ	ʨ	ʨɬ	k	q
pʰ	tʰ	ʦʰ	ʨʰ		kʰ	qʰ
b	d	ʣ	ʥ	ʥʓ	g	
m	n		ȵ	l	ŋ	
f	s		ɕ	ɬ		χ
v	z		ʑ		ɣ	ʁ

A few Muji varieties retain a retroflexed initial series in addition to the alveopalatal series, and some varieties also retain an aspirated lateral-cluster contrast as well. The uvular voiceless fricative /χ/ has [x] as an allophone in the environment of high vowels. Some other Muji varieties also feature contrastive glottal-cluster stops and fricatives.

Vowel finals. The Muji vowel space is heavily loaded with a fine gradience of front, close and central allophones. This is especially true of cardinal vowels [e] and [ɨ] which are split between three phonemes each. Nine monophthong and nine diphthong phonemes are currently proposed:

Table 2. The PJZ vowel system

Monophthongs					Diphthongs			
i	ɪ	ɿ	ɯ	u	ji	jɪ		ˈɯ
		ə						
	ɛ			o	jɛ		jo	ʷo
		a				ja ʷa		ao

The rhoticized [ˈɯ] phoneme is a reflex of an earlier retroflexed initial distinction and occurs more frequently in other Muji varieties. In PJZ, the segment is usually realized with the phonetic shape [ɨɯ].

Tone. Muji-PJZ has five contrastive tones 55, 33, 13, 21, 52—illustrated in Figures 2 and 3 below with nasal and stop initial contrasts respectively. Transcriptions are intended to indicate allotonic pitch values relative to the F0 increments to the left of the pitch plots:

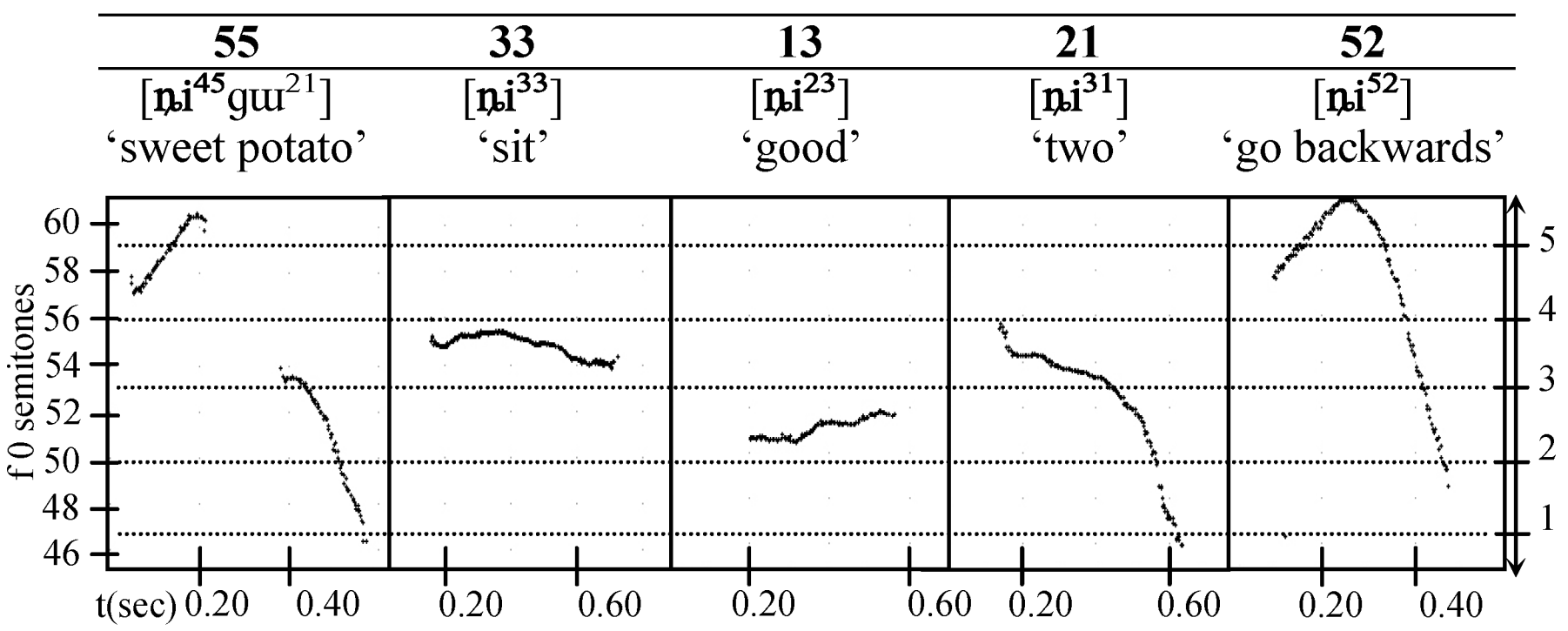

Figure 2. PJZ pitch plots and tonemes: nasal initial environment

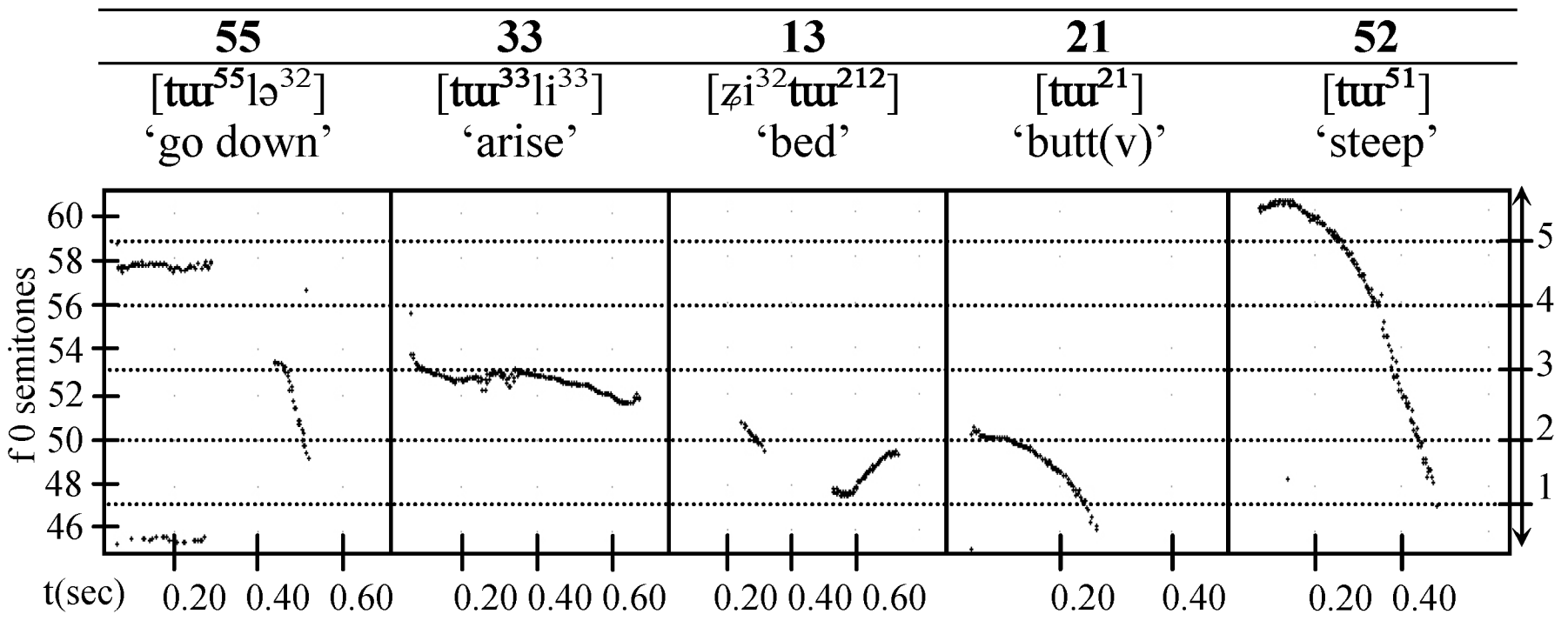

Figure 3. PJZ pitch plots and tonemes: stop initial environment

Of these four tonemes, 52 is the most marginal. Muji varieties often feature this pitch as an allotone of the low falling toneme 21, the high-level toneme 55, and/or the low-rising toneme 13—via sandhi induced phenomena. Accordingly, in PJZ this pitch value can also be spotted masquerading as toneme 21 or 55 via sandhi rules: /21/ > [52]: / __ 55; /21/ > [52] ~ [31]: /__ 13; /55/ > [52]: / __ 21 + 52. Contrastive environments are well-established, however, and include cases of tonemic fusion. The lexeme 'day before yesterday' as realized in the more conservative Muzi-SZT, for instance, is [ɕɪ^{55}ɣɯ^{21}t^{h}a^{55}], but in PJZ the middle syllable has been deleted, and its tone fused with the first syllable to become [ɕɪ^{52}t^{h}a^{55}].

Regarding other Muji tonemes, the 13 tone class in PJZ (and in many other varieties) is often realized with contour shapes such as [213] [212] and [313]. This can be noted occurring mildly in the Figure 4 pitch plot for this toneme. Some varieties possibly feature a 22 contrast, but this pitch value usually only surfaces due to sandhi in Muji: /21/ > [22] / __ 21 unless three 21 tones are in succession in which case /21, 21, 21/ > [22, 21, 21] or [21 22 21] depending on the variety. MLT /a^{33}nɯ^{21}ma^{21}/ 'monkey', for example, is pronounced [a^{33}nɯ^{22}ma^{21}], and QLC 'weave' /jɛ^{21}k^{h}ə^{21}/ is pronounced [jɛ^{22}k^{h}ə^{21}] until preceded by another /21/ tone such as the 3S pronoun /ɛ^{21}/; this combination is then pronounced [ɛ^{22}jɛ^{21}k^{h}ə^{21}] 's/he weaves'. A variation on this sandhi pattern is found in YZT, e.g., /ɑ^{21}tsɯ^{21}mɯ^{21}/ 'be angry' is pronounced [ɑ^{21}tsɯ^{22}mɯ^{21}].

As in other Muji varieties, phonation does not function contrastively on the syllable in PJZ but often occurs as a feature of tones 21 and 13 and seems to have contributed to the development of nasal finals in certain environments.

3. Muji's mirrored merger

As I have noted of four other Phula-affiliated languages in Pelkey (2005), assuming the Phula varieties examined to date are, in fact, Ngwi languages—an assumption for which there is much lexical, phonological, and morphological evidence—the nature of their *H and *L tone classes developing from the iconic PNg *tone *split of proto-checked syllables is highly opaque. Muji tonal developments are no exception—neither demonstrating convincing evidence of the classic tonal flip-flop associated with Northern Ngwi nor patterning like Central or Southern Ngwi varieties which usually have analogous pitches to the proto tone in both classes with one (or both) classes split into an *additional* alternate tone (or tones) based on a proto-conditioning environment (cf. Matisoff 1972:11, Bradley 1977, etc).

Currently, two subgrouping scenarios must be considered for Phula languages such as those in the Muji cluster: 1) they belong on a genetic node parallel to PNg, analogous to Burmic or 2) they belong to distinct sub-branch of Ngwi which, after having undergone the iconic PNg split in proto-checked syllables, then redistributed these tones in a variety of complex patterns, retaining some distinctive laryngealized feature as a reflex of *consonant

*codas to keep them distinct from other tone classes. A significant reflex pattern in support of this latter scenario surfaces in Muji proto-checked syllables. The pattern can be characterized as a correlative, or 'mirrored,' redistribution of *H and *L into /33/ and /21/ conditioned by *initial manner as illustrated in Figure 4.

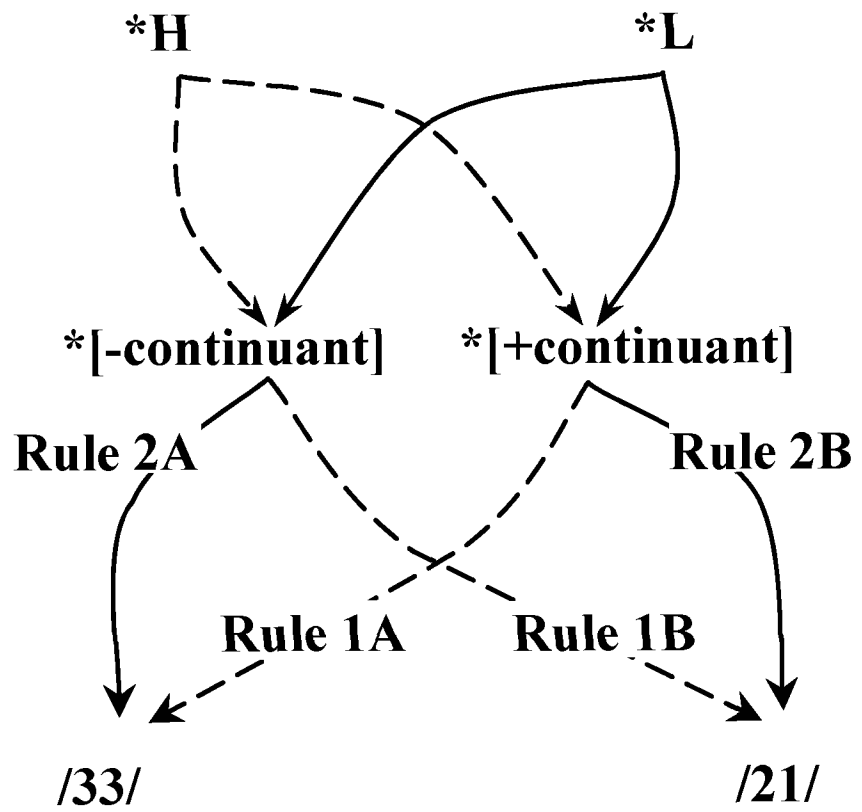

Figure 4. Correlative redistribution of checked tone classes in the Muji cluster

The dominant surface reflex pattern in the Muji cluster is *H > /33/ and *L > /21/. This pattern on its own is not unusual and can be observed in numerous other Ngwi languages as diverse as Hani, Nisu, Lalo, and Axi. Each of these languages simply maintain tone values analogous to the original PNg pitches for these classes (cf. Bradley 1977). Most Muji languages, however, redistribute these two tone classes in an inverse pitch pattern such that the predominant *H reflex /33/ splits to /21/ and the predominant *L reflex /21/ splits to /33/. The most significant motivation supported by the data for this redistribution strongly suggests that these splits both mirrored each other in pitch value and were themselves motivated by inverse conditioning environments. Tense voice phonation is assumed to have been intact at the PM stage in order to keep these tone classes distinct from tone classes *1, *2 and *3, but phonation has been lost as a contrastive feature by present day. The dominant Muji cluster checked tone reflex pattern can be summarized as follows (note the reflex chiasmus):

- Rule 1A: *H *[+continuant] *syllables > /33/ (Table 3)
- Rule 1B: *H *[-continuant] *syllables > /21/ (Table 4)
- Rule 2A: *L *[+continuant] *syllables > /21/ (Table 5)
- Rule 2B: *L *[-continuant] *syllables > /33/ (Table 6)

Exceptions to these rules are presumably the result of PNg *[-continuant] *syllables being re-interpreted as *[+continuant] at the Proto-Muji stage as evidence preserved in numerous Muji languages suggests. Compared to the otherwise random exceptions noted in Pelkey (2006), this point provides a much more efficient solution for dealing with most of the residual data.

Since the data itself is a more adequate illustration of this complex innovation, Tables 3-6 supply the datasets underlying these rules. Exceptions are listed in Table 7. Loans and obviously non-cognate lexemes in all five tables are placed in parentheses, and not all transcriptions are fully phonemicized since analysis is ongoing. Laghuu data in Tables 3-7 is based on Edmondson (2002). Ngwi proto-forms are from Bradley (1979), and all remaining data is from my personal fieldwork.

The PNg protoforms in Table 3 mainly feature *initial *clusters composed of an *obstruent + *medial. With few exceptions, the tonal reflexes for these syllables are /33/. Three notable exceptions are XPC 'fear' and QLC 'hard' and 'cold' all of which feature a /52/ reflex. Whether due to fossilized sound symbolism or some other diachronic motivation, these reflexes may be preservations of the original PM pitch value for tone class *H—a contour pitch that is present on almost all *H reflexes in the peripheral Muji variety (cf. Pelkey forthcoming).

In Table 4 *H reflexes generally yield /21/, and all are reflexes of *obstruent or *nasal *initial syllables ([-continuant]). Most of the few exceptions (e.g., XPC 'beard') can be attributed to lexicalized tone sandhi.

In Table 5 *L reflexes consistently yield /33/ in [-continuant] environments, but in Table 6 reflexes in the same tone class consistently yield /21/ in [+continuant] environments. MLT and XPC present the only two exceptions (both from 'kill')—likely a minor tone split conditioned by the uvular shift of the fricative initial (cf. Phuma 'bird' in Table 3).

Residual exceptions are listed in Table 7 with *H *syllables on the left and *L syllables on the right. Note that both *H and *L tone classes in this category are restricted to PNg *[-continuant] *syllables (i.e., *obstruent or *nasal *initials without *medials). Presumably, then, these syllables were treated as *[+continuant] syllables at the Proto-Muji stage after the addition of medial glides or fricatives. In most cases, various varieties of Muji preserve evidence of an intervening medial segment on these otherwise irregular lexemes. The clearest cases supporting a PM re-interpretation of *[-continuant] > *[+continuant] are 'ascend' and 'black in tone class *H and 'vomit' and 'squeeze' in tone class *L. Note that /p^hji^{21}/ 'vomit' is phonetically realized [p^hɕji^{21}] and /ɲi^{21}/ 'squeeze' is phonetically realized [ɲji^{21}]. In both cases, most Muji varieties support the reconstruction of a PM *[+continuant] *initial.

Comparing the Muji cluster pattern in Tables 3-7 with the Laghuu and GMD tone correspondences yields mixed results. Edmondson's (2002) Laghuu data shows some evidence of the Muji innovation, but the pattern is only clearly present in *L syllables (Tables 5 and 6). As demonstrated in Pelkey (2006, forthcoming), Laghuu has a strong affiliation with the Muji cluster genetically; thus, the checked-tone data suggests that this correlative innovation did not occur simultaneously in both checked tone classes. The Laghuu data suggests that TC-L was the first to innovate—after which time the Laghuu language itself split from the rest of Muji.

The GMD data shows virtually no evidence of incorporating the Muji cluster innovation. Instead, most GMD reflexes in both tone classes merge to /55/—a distinct pattern characteristic of a much more distantly related Phula cluster (detailed in Pelkey, forthcoming).

4. Conclusion

Establishing an insular language cluster is essentially analogous to establishing a genetic subgrouping. The process involves the identification and matching of unusual, preferably systematic, shared innovations that are phonological, morphological, lexical, semantic or paradigmatic in nature. Provided that shared innovations are relatively unique in context, and provided that language contact and/or natural internal drift can be reasonably ruled out as the cause of the innovation, the subgrouping may be validated (cf., Matisoff 1978, Hock 1991:578, Trask 1996:182, Nichols 1996, Dixon 1997).

Muji's mirrored checked-tone merger and other similar innovations meet these criteria and thus provide ample evidence for the recognition of a new language cluster in the Sino-Vietnam borderlands. The cluster excludes Phupa but incorporates the Laghuu language of Vietnam along with eight languages spoken in southeast Yunnan Provice, China.

Table 3. Muji correlative redistribution Rule 1A

	Rule: *H > 33 / *[+CONTINUANT]_											
Gloss	chicken	tree	shake	scratch	arrive	fear	sweep	Mill(v)	cold	exit	bird	hard
PN	***k-rak^{H}**	***sik^{H}**	***k-lup^{H}**	***m-krak^{H}**	***(k)-rok^{H}**	***(sə)-grok^{H}**	***sut^{H}**	***m-krit^{H}**	***C-grak^{H}**	***ʔ-dwök^{H}**	***s-ŋyak^{H}**	***krok^{H}**
MLT	ʑɛ^{33}	sɻ^{33}ma^{21}	lɯ^{33}	ka^{33}	ke^{33}	tsɻ^{33}	sɻ^{33}	dʑɻ^{33}	dʑi^{33}	dɯ^{33}	a^{55}m̩^{21}	gɯ^{33}
XPC	ʑɛ^{33}	ɕi^{33}ma^{21}	liɯ^{33}	ka^{33}	kẹ^{33}	tɕɪ^{33}	ɕɪ^{33}	dʑɪ^{33}	ᵑga^{33}	dɯ^{33}	χa^{33}mjɛ̣^{55}	q^{h}o^{21}
PJZ	ʑɛ^{33}	ɕi^{33}ma^{21}	ɬɯ^{33}	ka^{33}	kə^{33}	tɕi^{52}	ɕi^{33}	dʑɪ^{33}	ga^{33}	dɯ^{33}	χa^{33}mjɛ^{55}	q^{h}a^{33}
SZT	je^{33}	sɻ^{33}mɑ^{21}	lɯ^{33}	kɑ^{33}	kɬ^{33}	tsɻ^{33}	sɻ^{33}	dʑɻ^{33}	ᵑgɑ^{33}	dɯ^{33}	hɑ^{33}mjɛ̣^{55}	q^{h}a^{33}
QLC	jɛ^{33}mjɛ^{55}	ɕɪm^{33}pɑ^{21}	kɬ^{h}ɯ^{33}	tɕa^{33}tị^{55}	kə^{33}	tɕi^{33}	ɕi^{33}	tɕɛ^{33}	tɕɑ^{52}tə^{55}	dɯ^{33}jɪ^{33}	(ɑ^{55}pə^{21}tɕi^{33})	tɕ^{h}a^{52}
YBZ	ʑɛ^{33}	ɕi^{33}mɑ^{21}	(bi^{33}lɑ^{33})	kjæ^{33}	kɬ^{33}lɑ^{33}	tɕi^{33}	ɕi^{33}	dʑɪ^{33}	gi^{33}	dɯ^{33}	χɑ^{33}mjɛ^{55}	k^{h}jɛɑ^{33}
YZT	ʑɛ^{33}	ɕi^{33}ma^{21}	ɬɯ^{33}	(ˈʒu^{33})	kɬ^{33}	tɕi^{33}	ɕɪ^{33}	ʔdʑi^{33}	ⁿtɕɛ^{33}	ʔⁿdɯ^{33}	χa^{55}	tɕ^{h}ɛ^{33}
GMD	ɣa^{55}	ɕi^{55}ma^{21}	ɬɯ^{55}	k^{h}ɨ^{55}	(tʂ^{h}ə^{21})	dzˌˈɨɯ^{55}	sɻ^{55}	dzɻ^{55}	dzạ^{55}	ⁿdɨ^{55}	a^{33}mi^{55}	q^{h}a^{55}
Laghuu	zɛ^{54}mɛ^{55}	si^{44}ma^{33}	ND	ND	kɯ^{33}la^{33}	tʃɛʔ^{55}	ND	ND	gɯʔ^{44}	ND	ha^{33}mɛ^{55}	k^{h}ɯ^{33}

Table 4. Muji correlative redistribution Rule 1B

	*H > 21 / *[-CONTINUANT]_								
Gloss	pinch	beard	DAtomorrow	cook	stir	be angry	medicine	hoe	break
PN	***tsit^{H}**	***ʔ-tsit^{H}**	***pak^{H}**	***C-dzak^{H}**	***m-kok^{H}**	***ʔ-(d)zup^{H}**	***C-nak^{H}tse^{2}**	***ʔ-guk^{H}**	***cit^{H}**
MLT	$ts^{h}ɿ^{21}$	$ɳ̊^{33}tɕ^{h}a^{21}$	$p^{h}ji^{21}ɳ̊i^{21}$	ge^{21}	$(tɕo̤^{21})$	$ts^{h}ɯ^{13}$	$na^{21}ts^{h}ɿ^{33}$	$tse^{21}k^{h}ɯ^{21}$	$(dzɿ^{33})$
XPC	$tɕ^{h}i^{21}$	-	$p^{h}i^{21}ɳ̊ɛ^{21}$	$tɕɛ^{21}$	$vɯ^{33}ka^{21}$	$ˌzɨɯ^{21}ta^{21}$	$na^{21}tɕ^{h}i^{33}$	$ts^{h}e^{21}k^{h}ɯ^{21}$	$ge^{21}tɕ^{h}a^{21}$
PJZ	$tɕ^{h}i^{21}$	$ɳ̊ɛ^{21}tɕ^{h}ɛ^{21}$	$p^{h}a^{21}ŋ^{33}tɬɛ^{55}$	$tɕɛ^{21}$	$ɣɨ^{21}ka^{21}$	$tso^{21}tɕi^{33}$	$na^{21}tɕ^{h}i^{33}$	$ts^{h}ə^{21}k^{h}ɯ^{21}$	$(ɕɪɛ^{55}ɣjɛ^{21})$
SZT	$ts^{h}ɿ^{21}$	$ɳ̊e^{33}tɕ^{h}ɛ^{21}$	$p^{h}a^{21}ŋ^{21}tɬɛ^{33}$	$tɕɛ^{21}$	$fɯ^{33}ka^{21}$	$(mɳ̊^{13}tɯ^{33})$	$na^{21}ts^{h}ɿ^{33}$	$ts^{h}ə^{21}k^{h}ɯ^{21}$	$ts^{h}ɿ^{21}a^{13}$
QLC	$tɕ^{h}i^{21}$	$ɳ̊ɪɛ^{33}m̩^{33}tɕ^{h}i^{21}$	$p^{h}a^{21}ɳ̊i^{21}$	$tɕɛ^{21}$	$(və^{33})$	$(ni^{55}mɑ^{21}t^{h}ɪɛ^{22}tə^{33})$	$i^{21}tɕ^{h}i^{33}$	$tɕi^{21}k^{h}ɯ^{21}$	$tɕ^{h}i^{13}$
YBZ	$tɕ^{h}i^{21}$	$ɳ̊ɛ^{21}tɕ^{h}o^{33}$	$p^{h}ɑ^{21}ɳ̊i^{21}$	$tɕɛ^{21}$	$kɑ^{21}$	$ɑ^{21}tsɯ^{21}mɯ^{21}$	$nɑ^{21}tɕ^{h}i^{33}$	$ts^{h}ɯ^{33}kɯ^{33}$	$(ɕɛ^{55}jɪɛ^{21})$
YZT	$tɕ^{h}i^{21}$	$ɳ̊ɛ^{21}tɕ^{h}ɛ^{21}$	$p^{h}a^{21}ɳ̊i^{21}$	$tɕɛ̤^{21}$	$(fɯ^{21})$	$ˌzu^{21}$	$na^{21}tɕ^{h}i^{33}$	$ts^{h}ɯ^{21}kɯ^{21}$	$tɕ^{h}ɛ^{21}$
GMD	$tɕ^{h}i^{55}$	$ɲɛ^{33}ts^{h}ɯ^{33}mɯ^{13}$	$p^{h}ɑ^{55}ɲi^{21}$	$tʂa^{55}$	$(jæ^{33}ŋɨ^{13})$	$ɲi^{55}tsˌɨɯ^{21}$	$na^{33}tɕ^{h}i^{55}$	$tsə^{33}k^{h}ɨ^{55}$	$tɕi^{55}$
Laghuu	-	$ŋe^{33}$ $tɕ^{h}i^{33}$	pha^{33} $hɯ^{53}ʔ$	$dʒa^{21}tɕe^{21}va^{44}$	$(ɣɯ^{33}ba^{44})$	ND	$e^{21}tʃ^{h}i^{55}$	ND	ND

Table 5. Muji correlative redistribution Rule 2A

	*L > 33 / *[-CONTINUANT]_							
Gloss	sambar deer	this evening	hang	shoes	suck	vulva	board	demon
PNg	***(k)-tsat^{L}**	***ʔ-kut^{L}**	***ʔ-kuk^{L}**	***(ʔ)-nap^{L}**	***C-cut^{L}**	***bat^{L}**	***C-m-bak^{L}**	***C-nat^{L}**
MLT	-	ɪ^{21}k^{h}ɯ^{33}t^{h}a^{55}	(k^{w}a^{33})	ts^{h}ɳ^{21}nɯ^{33}	gɛ^{33}	də^{21}bi^{21}	(sɨ^{33}p^{h}e^{21})	ts^{h}e^{21}na^{33}
XPC	(ma^{33}lɯ^{21})	i^{21}k^{h}ɯ^{33}t^{h}a^{55}	ŋɯ^{33}	tɕɪ^{21}nɛ^{33}	gɨɛ^{33}	də^{21}bi^{33}	ɕi^{33}bi^{33}	ts^{h}e^{21}na^{33}
PJZ	ts^{h}ə^{33}kɨ^{33}	i^{21}k^{h}ɯ^{33}t^{h}a^{55}	ŋɯ^{33}	tɕ^{h}i^{21}nɛ^{33}	gə^{33}	^{n}də^{21}bi^{33}	ɕi^{33}bjɛ^{33}	ts^{h}ə^{21}nɑ^{13}
SZT	ts^{h}ɳ^{33}kə^{33}	ɛ^{21}k^{h}ɯ^{33}t^{h}a^{55}	ŋɯ^{33}	ts^{h}ɳ^{21}nɯ^{33}	gə^{33}	ND	(sɳ^{33}p^{h}ə^{21})	ts^{h}ə^{21}nɑ^{33}
QLC	tɕ^{h}ɛ^{33}kɨ^{33}ba^{21}	i^{21}k^{h}ɯ^{33}t^{h}ɑ^{55}	ʔvɯ^{33}	tɕ^{h}i^{21}nɯ^{33}	gə^{33}	(də^{21}tɬ^{h}ɛ^{33})	ɕi^{33}pɛ^{33}	ts^{h}ə^{21}nə^{33}mɑ^{21}
YBZ	(nej^{22}pɯ^{33}pɑ^{21})	i^{21}k^{h}wa^{33}	ʔvɯ^{33}	tɕ^{h}ɛ^{21}nɯ^{33}	gɨ^{33}	le^{21}pjɛ^{33}	ɕi^{33}pjɛ^{33}	ts^{h}əj^{33}na^{33}
YZT	a^{21}tɕ^{h}i^{33}pa^{21}	jɛ^{21}k^{h}wa^{13}	ʔɣ^{33}	tɕ^{h}i^{21}nɛ^{33}	jɛ^{21}kɨ^{33}	^{n}do^{21}pɛ^{21}	lo^{21}pɯ^{33}	tsɨ^{21}na^{33}
GMD	ɲɛ^{33}ts^{h}æ^{55}	ɛ^{21}k^{h}ɨ^{55}	ŋɨ^{55}	tɕ^{h}i^{21}ɲo^{55}	^{w}vɯ^{55}	bi^{33}	ɕi^{33}ba^{55}	(ts^{h}ɔ^{21}nɑ^{33})
Laghuu	a^{33}tɕ^{h}i^{44}	(mɯ^{33}ti^{21}t^{h}a^{44})	ND	tɕhi^{33}nɔ^{33}hue^{33}	ND	ND	ND	a^{33}ne^{33}

Table 6. Muji correlative redistribution Rule 2B

	Rule: *L > 21 / *[+CONTINUANT]_					
Gloss	pig	monkey	leech	hand/arm	hungry	lick
PNg	***wak^{L}**	***myok^{L}**	***k-rwat^{L}**	***lak^{L}**	***C-mwat^{L}**	***m-lyak^{L}**
MLT	vji^{21}	a^{33}nɯ^{21}ma^{21}	(ma^{33}χwa^{21})	li^{21}	(ʁuo^{24})	nej^{21}
XPC	vjɪ^{21}	a^{33}nɯ^{21}	(ma^{21}χwa^{21})	li^{21}	ɲɪ^{21}	ne^{21}
PJZ	ve^{21}	a^{33}nɯ^{21}	a^{33}vi^{21}	lje^{21}	ȵi^{21}	nə^{21}
SZT	vej^{21}	a^{33}nɯ^{21}	χa^{33}vi^{21}	lɪɛ^{21}	ȵɪ^{21}	kɑ^{21}mȵ^{21}
QLC	vɛ^{21}mɪɛ^{55}	a^{33}nɯ^{33}pɑ^{21}	a^{33}vi^{21}	ɛ^{33}lɛ^{21}	ȵi^{21}	nə^{21}
YBZ	vjɛ^{21}	ɑ^{33}nɯ^{21}	nɑ^{33}vɪɛ^{21}	ə^{21}lɪɛ^{21}	ȵi^{21}	nej^{21}
YZT	vjɛ^{21}	a^{33}nɯ^{21}	na^{33}vi^{21}	lɪɛ^{21}	ȵi^{21}	nɛə^{21}
GMD	va^{55}	a^{22}nə^{33}	a^{33}vi^{55}	la^{55}	ɲi^{55}	nɛ^{13}
Laghuu	(v)ɯ^{21}mɛ^{55}	(bɔm^{214}pa^{33})	(pa^{33}sɛ^{33} ma^{33})	le^{21}k^{hl}a^{35}	ND	ND

Table 6. (Continued) Muji correlative redistribution Rule 2B

	Rule: *L > 21 / *[+CONTINUANT]_						
Gloss	six	eight	kill	weave	breath	needle	thirsty
PNg	***C-krok^{L}**	***C-yet^{L}**	***C-sat^{L}**	***rak^{L}**	***C-sak^{L}**	***g-rap^{L}**	***C-sip^{L}**
MLT	$k^{h}ɯ^{21}$	$ʑi^{21}$	$(χa^{55})$	$ʑej^{21}$	$ʔɛ^{21}ɕi^{21}$	$gɯ^{21}$	$sɳ^{21}$
XPC	$k^{h}ɯ^{21}$	e^{21}	$(χa^{55})$	$ʑɛ̱^{21}$	$ɕi^{21}gɛ^{33}$	$gɯ^{21}$	$ɕi^{21}$
PJZ	$k^{h}ɯ^{21}$	$xjɛ^{21}$	$ɕi^{21}$	$ʑɛ^{21}$	$ɕɛ^{21}gɨ^{33}$	$kɯ^{21}lɯ^{21}$	$ɕi^{21}$
SZT	$k^{h}ɯ^{21}$	xi^{21}	$ʃɨ^{21}$	$ʑɛ^{21}$	$(gɨ^{33})$	$kɯ^{21}lɯ^{21}$	(fji^{33})
QLC	$k^{h}ɯ^{33}$	$ɛ^{21}$	$ɕi^{21}$	$jɛ^{21}k^{h}ə^{21}$	$ɛ^{21}ɕɛ^{21}$	$kɯ^{21}mɑ^{21}$	$(də^{33})$
YBZ	$kɯ^{21}$	$ʑɛ^{21}$	$ɕi^{21}$	$ʑɛ^{21}$	$ʔə^{21}ɕɛ^{21}gɨ^{33}$	$kɯ^{21}lɯ^{21}$	$ɕi^{21}$
YZT	$k^{h}ɯ^{21}$	$ʔʑɛ^{21}$	$ɕi^{21}$	$ʑɛ^{21}$	$ɕɛ^{21}kɨ^{33}$	$kɯ^{21}ɮɯ^{21}$	$ɕi^{21}$
GMD	$(tʂ^{h}ɭ^{55})$	ji^{13}	$sɛ^{55}$	$ʁa^{55}$	$sa^{55}go^{21}$	$(dzọ^{13})$	$sɭ^{55}$
Laghuu	$k^{h}u^{21}$	$ʔe^{21}$	$(ze^{33}me^{44}di^{33})$		ND	ND	ND

Table 7. Intermediate rule for synchronic exceptions to *L and *H redistribution

	*H > 33 and *L > 21/ *[-continuant] > PM *[+medial]_				
Gloss	ascend	jump	banana	black	blow(on)
PNg	***ʔ-dak^{H}**	***ʔ-bok^{H}**	***s-ŋak^{H}**	***C-nak^{H}**	***s-mut^{H}**
MLT	ti^{33}	ɬi^{33}	(ɕæ^{55}tɕo^{55})	ȵ^{33}	mi^{33}
XPC	ti^{33}	bɪ^{33}; ɬi^{33}	ŋa^{55}ɕɪ^{55}	ȵi^{33}	mɪ^{33}
PJZ	tjɛ^{33}	bi^{33}	ŋa^{33}χə^{52}ɕi^{55}	ȵɛ^{33}	mi^{33}
SZT	tjɛ^{33}	(ts^{h}ə^{55})	ŋɑ^{21}ɬɯ^{22}sʅ^{33}	(lo^{55})	mɪ^{33}
QLC	tjɛ^{33}	kɬ^{h}jɛ^{33}	ni^{33}ɕi^{55}pa^{21}	(no^{55}ko^{21})	mi^{33}
YBZ	tjɛ^{33}	ɬi^{33}	ɑ^{33}ɕi^{33}pɑ^{21}	ȵɛ^{33}	mi^{33}
YZT	(lə^{22})	(tɕi^{21})	njɛ^{33}pə^{21}ɕi^{33}	ȵɛ^{33}	mi^{33}
GMD	ta^{55}	(tʂʅ^{55})	ŋa^{55}sæ^{33}	nɑ^{55}	mɯ^{13}
Laghuu	ND	ND	ŋɯ^{33}bɯ^{21}	nɯ^{33}	mi^{33}ba^{44}

Table 7. (Continued) Intermediate rule for synchronic exceptions to *L and *H redistribution

	*H > 33 and *L > 21/ *[-continuant] > PM *[+medial]_						
Gloss	brains	squeeze	return	vomit	ashes	bite	skin
PNg	***(C)-nok^{L}**	***s-nit^{L}**	***gok^{L}**	***C-pat^{L}**	***C-kap^{L}**	***C-kuk^{L}**	***C-guk^{L}**
MLT	ɛ^{55}nɯ^{21}	ts^{h}ɯ^{33}tɕ^{h}i^{21}	(tɬa^{21})	p^{h}ji^{21}	mi^{13}k^{h}ɯ^{21}	k^{h}ɯ^{21}	ɛ^{21}kụ^{21}lia^{33}
XPC	e^{33}nɯ^{21}	ɲi^{21}tɛ^{21}	go^{21}; (ta^{21})	p^{h}jɪ^{21}	mi̱^{21}k^{h}ɯ^{21}	k^{h}ɸɯ^{21}	i^{21}kọ^{21}lja^{33}
PJZ	ɪ^{33}nə^{21}ɬi^{55}	ȵi^{21}	go^{21}	p^{h}ji^{21}	mi^{13}k^{h}ɯ^{21}	k^{h}ɯ^{21}	jɛ^{21}ko^{21}
SZT	ɛ^{13}nɯ^{21}ɬi^{55}	ts^{hɹ}ɯ^{33}tə^{21}	(tɬa^{21})	p^{h}jɪ^{21}	mȵ^{13}k^{h}ɯ^{21}	k^{h}ɸɯ^{21}	ɛ^{21}k^{w}o^{33}ljɛ^{55}
QLC	(ɯ^{21}kɬɯ^{21})	ʔni^{21}	(kɬa^{21}lɪɛ^{33})	p^{h}i^{33}ɕa^{52}	mi^{55}k^{h}ɸu^{21}	k^{h}ɸɯ^{21}	i^{21}gɮi^{21}ko^{55}
YBZ	ej^{33}nɯ^{21}ɬi^{33}	ȵi^{21}	g^{w}o^{21}	p^{h}ji^{21}	mi^{13}k^{h}ɯ^{21}	k^{h}ɯ^{21}	e^{21}ko^{21}pjɛ^{33}
YZT	ə^{55}nɯ^{21}ɬi^{33}	ʔȵi^{21}	ʔŋguo^{21}	p^{h}ji^{21}	mjɛ^{21}k^{h}ɯ^{21}	k^{h}ɯ^{21}	ɛ^{21}k^{w}o^{21}
GMD	wɯ^{13}nə^{55}	tɯ^{33}k^{h}ɨ^{55}	ʔŋgo^{33}	p^{h}ji^{55}	k^{h}u^{33}p^{h}æ^{21}	tʂ^{h}o^{55}	ʤi^{21}k^{h}ɨ^{55}
Laghuu	(ʔe^{21}u^{44}k^{h}u^{44}k^{h}u^{44}i^{35})		ND	p^{h}i^{21}p^{h}i^{21}	mi^{44}k^{h}u^{33}	ge^{21}	ND

Abbreviations

DA	day after: e.g., 'DAtomorrow' = 'Day after tomorrow'
GMD	Phupa: *Gamadi* village, Shuitian district, Mengzi county, Yunnan, China
MLT	Muzi: *Malutang* village, Laochang district, Gejiu county, Yunnan, China
ND	No data
PJZ	Muji: *Pujiazhai* village, Adebo district, Jinping county, Yunnan, China
PNg	Proto-Ngwi (formerly Loloish, cf. Bradley 2005 for rationale)
PM	Proto-Muji (or 'common' Muji)
QLC	Muji: *Qila* village, Jinshuihe district, Jinping county, Yunnan, China
SZT	Muzi: *Shizitou* village, Tongchang district, Jinping county, Yunnan, China
XPC	Muji: *Xiepo* village, Shuitian district, Mengzi county, Yunnan, China
YBZ	Bokha: *Yibaizu* village, Dishuiceng district, Pingbian county, Yunnan, China
YZT	Phuma: *Yanzitou* village, Baihe district, Pingbian county, Yunnan, China

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