

A TONAL TAXONOMY OF CHUNGLI AO VERBS*

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This paper presents an analysis of the tonal behaviour exhibited by verb stems in Chungli Ao, a Tibeto-Burman language of north-east India. A taxonomy of three verb classes is established based on their stem tones and their tonal interactions with certain suffixes: Class 1: H(.)L; Class 2: M(M); Class 3: M.M which raises to H.H when combined with a L-bearing suffix. Verb stems in Classes 1 & 3 also undergo tonal alternations when concatenated with any of three “trigger-suffixes,” necessitating the further division of these stems into subclasses. In examining the behaviour of these verb stems, we posit tonal processes for Chungli Ao and develop tonological derivations of various verb forms using the representations of Autosegmental Phonology (Goldsmith 1976a, 1976b). Not all tonal phenomena in the Chungli Ao verb system fit neatly into this analysis, but the descriptive presentation is intentionally comprehensive to allow for the development of alternative analyses.

Keywords: Tibeto-Burman, Naga, Chungli, Ao, tone, verb, morphology, taxonomy, classification, linguistics

1. INTRODUCTION

1.1. Purpose

The purpose of this paper is to present an investigation of tonal phenomena in the verbal morphology of Chungli Ao and to formulate a taxonomy of verbs based on their tonal behaviour. Representations are couched in the framework of Autosegmental Phonology (Goldsmith 1976a, 1976b) and some constraints are proposed, though the approach taken here is motivated by a desire to produce a comprehensive description and a workable analysis of the data rather than vindicate any particular theory.

Background information on Chungli Ao can be found in the next subsection (1.1). Section 2 presents a sketch of the phonological inventory of Chungli Ao, while Section 3 introduces the basic segmental & tonal properties of its verb morphology. Section 4 constitutes the bulk of the paper, presenting a proposal for three verb stem classes and describing their respective tonal behaviour. A discussion of the special tonal properties of vowel-final stems is found in Section 5, and the paper is concluded in Section 6. Appendix A contains a short glossary of specialized terms introduced in this paper, and Appendix B includes tables

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summarizing the tonal taxonomy developed here. The corpus of 204 verb with their stem classifications can be found in Appendix C.

1.1. Chungli Ao

Chungli Ao is the prestige dialect of Ao, a Tibeto-Burman language spoken in Nagaland, a hill state in north-east India. Chungli Ao speakers number around 90,000, while the related dialect of Mongsen Ao has approximately 70,000 speakers (Coupe 2008). Although genetic classification of the so-called “Naga” languages is far from settled, a recent tentative attempt categorizes these two dialects of Ao with the languages of Yacham-Tengsa, Sangtam, Yimchungrü, and Lotha to form the “Ao Group” (Burling 2003).

Most of the linguistic work on the Chungli variety of Ao is from the late 19th–early 20th century, consisting of a missionary grammar (Clark 1893), a voluminous (977pp.) Ao-English dictionary (Clark 1911), and a short (23pp.) grammatical description (Avery 1886). None of these publications, however, depicts tone. More recent works by Gowda include a phonetic reader designed for non-native speakers and a sketch grammar (Gowda 1972, 1975). Both of these works include indications of three tone levels, but lack a detailed analysis of tonal phenomena.

The previously-neglected Mongsen variety has received more attention in recent years with the publication of Coupe’s phonetic and phonological description of Mongsen Ao as spoken in Waromung village (Coupe 2003), which contains detailed phonetic measurements of segmental and tonal phenomena. Coupe’s most thorough work, however, is a 526-page grammar of Mongsen Ao as spoken in Mangmetong village (Coupe 2007). This publication contains a short chapter devoted to prosody, describing lexical & morphological tone, tone sandhi, and intonation in Mongsen Ao. Although Coupe presents a few examples of internal tone sandhi triggered by verbal morphology, he concludes with the disclaimer that a detailed analysis of these patterns “lies outside the scope of the present work” (2007: 72).

2. PHONOLOGICAL INVENTORY

For the purpose of familiarizing the reader with the language discussed here, the following sections present the phonological inventory of Chungli Ao.

2.1. Consonants

Table 1 displays the consonant inventory of Chungli Ao:

	<i>Bilabial</i>	<i>Dental/Alveolar</i>	<i>Postalveolar</i>	<i>Palatal</i>	<i>Velar</i>	<i>Glottal</i>
<i>Nasal stops</i>	m	n			ŋ	
<i>Oral stops</i>	p, p ^h	t, t ^h			k, k ^h	ʔ
<i>Affricates</i>		ts	tʃ			
<i>Fricatives</i>		s, z	ʃ			(h)
<i>Approximants</i>	w	ɹ, l		j		

Table 1. Chungli Ao consonants

The glottal stop phoneme is contrastive (e.g. *a³-ŋu¹* ‘saw’ vs. *a³-ŋu¹ʔ¹* ‘bit’) but has limited distribution and only appears word-finally, disappearing with the addition of suffixes (e.g. *a³-ŋu¹-taŋ¹* ‘while biting’).

Although aspirated stops are included in Table 1 for the sake of completeness, aspiration in Chungli Ao is marginal and is contrastive on very few words (e.g. *taŋ³* ‘now’ vs. *t^haŋ³* ‘only’).

The voiceless glottal fricative /h/ is restricted to syllable onsets and appears only in *hau^{ʔ1}* ‘yes’, *hai^{ʔ1}* ‘okay’, *ha³tʃi¹* ‘sneezed’, and some loanwords.

2.2. Vowels

Table 2 lists the vowel phonemes:

	<i>Front</i>	<i>Central</i>	<i>Back</i>
<i>High</i>	i		u
<i>Mid</i>		ə	
<i>Low</i>		a	

Table 2. Chungli Ao vowels

The central vowel phoneme /ə/ has numerous allophonic realizations in the vowel space from [ɛ], to [ʌ], to [i], depending on the surrounding phonetic environment¹.

The only monosyllabic diphthongs that appear are /ai/, /au/, and /ui/.

¹ The exact details of these allophones are still being worked out, but the most obvious allophonic variation is the expression of /ə/ as [i] after /ts/ or /z/.

2.3. Syllable structure

The following table displays the attested syllable structures in Chungli Ao:

<i>Structure</i>	<i>Example</i>	
CV	<i>ma²ma²</i>	‘breast’
CVV	<i>kui³¹</i>	‘how many?’
CVC	<i>rəp²raŋ²</i>	‘looked at’
V	<i>u²</i>	‘word’
VV	<i>ai²</i>	‘went in’
VC	<i>ən²tuk²</i>	‘threw’
VVC	<i>aun²</i>	‘curry’

Table 3. Chungli Ao syllable structures

2.4. Tones

Chungli Ao exhibits a register tone system². The tone-bearing unit is the syllable, and three tone levels exist: high (H), mid (M), and low (L). The H tone has a limited distribution among bare stems, and usually appears before a L tone in a disyllabic H.L pattern³ or monosyllabic HL contour. The only underlying contour tones on monosyllables are HL (e.g. *am³¹* ‘held’) and LM (e.g. *pəi¹²* ‘snake’), while derived HM contours can surface when underlying HL is followed by a syllable bearing M or H (e.g. *am³²-aŋ²* ‘hold!’).

Among all word classes, the most common tone patterns for disyllables are M.M and H.L, with L.L, L.M, & M.H attested but less common. M.L and H.H patterns are very rare and/or marginal⁴. These facts are summarized in Table 4:

² See Hyman 2007 for a description of another register system in the contour-saturated area of Southeast Asia.

³ Throughout this paper, periods represent syllable boundaries, while dashes indicate morpheme boundaries.

⁴ For more on lexical tone in Chungli Ao, see Rhodes 2009.

	<i>Pattern</i>	<i>Example</i>	
common	M.M	$a^2tən^2$	‘sang’
	H.L	$a^3zə^1$	‘blood’
less common	L.L	$u^1zə^1$	‘bird’
	L.M	$ka^1kət^2$	‘book’
	M.H	sa^2ju^3	‘taught’
rare/marginal	M.L	tij^2la^1	‘marrow’
	H.H	$u^3zə^3$	‘our (exclusive)’

Table 4. Disyllabic tone patterns across word classes

Surface tones are indicated in this paper by superscripted tone numbers that appear after each syllable, where 3 is high and 1 is low, e.g. $.ɬəp^2.ɬaŋ^2-taɪ^3$ (M.M-HL) ‘is now watching’⁵. Underlying tones, where not depicted with autosegmental notation, are represented with superscripted M, H, and L, e.g. $/-tsə^L/$ (irrealis suffix).

3. VERB MORPHOLOGY

3.1. Segmental

Chungli Ao verbs lack person and number marking, and the agglutinative verbal morphology conforms to the scheme shown in Table 5, in which the stem is the only obligatory element⁶:

PREFIX	–	STEM	–	LEXICAL SUFFIX	–	DERIV. SUFFIX(ES)	–	INFLEC. SUFFIX
$mə$	NEG			$-maʔ$ ‘completely’		$-tsəʔ$ BEN		$-tsə$ IRR
$tə$	PROH			$-ət$ ‘persistently’		$-təp$ RECIP		$-əɪ$ PRES
				etc.		etc.		etc.

Table 5. Chungli Ao verbal morphology

Verb stems fall into two major types: *B-stems*, consisting of a bare verb root (e.g. $/tʃa^M tʃa^M/$ ‘walk’), and *A-stems*, composed of a verb root with a semantically-empty *a*-prefix (e.g. $/a^M-sə^M/$ ‘die’)⁷. This verbal prefix, which does not appear in Mongsen Ao, appears to be a reflex of the Proto-Tibeto-Burman glottal prefix $*ʔa-$, whose reflexes in various languages have a number of

⁵ Since Chungli Ao verbs lack person or number marking, glosses that illustrate a tense-aspect-mood (TAM) inflection with the 3rd person singular should be interpreted as extending to the entire person/number paradigm.

⁶ This diagram holds for both finite and non-finite forms.

⁷ It may be helpful to think of A-stems as “*a*-prefixed roots” and B-stems as “bare roots.”

semantic functions (Matisoff 2003, p.c.). In Chungli Ao, however, the *a*-prefix serves no apparent semantic function.

The *a*-prefix disappears upon the addition of certain verbal morphemes, such as the present-perfect suffix /-u^Hku^M/ (e.g. *a*²-*ɬəm*² ‘buried’ but *-ɬəm*²-*u*³*ku*² ‘has buried’). With respect to this *a*-stripping behaviour, the verbal suffixes that appear in this paper are categorized as follows⁸:

<i>a</i> -Preserving		<i>a</i> -Stripping	
<i>-tsə</i>	IRREALIS	<i>-aŋ</i>	IMPERATIVE
<i>-əɪ</i>	PRES	<i>-taɪ</i>	IMMED.PRES
		<i>-uku</i>	PRES.PERF

Table 6. Relevant *a*-preserving and *a*-stripping verbal suffixes

Finally, verb stems are predominantly disyllabic, although there are a few monosyllabic stems and even fewer trisyllabic stems (e.g. /a^Msəŋ^Mtaŋ^M/ ‘ask’). The monosyllabic stems typically consist of single-vowel roots prefixed with *a*- (e.g. /a^M-u^M/ ‘go’) or unprefixed monosyllabic roots with coda consonants (e.g. /aɪ^M/ ‘sew’⁹).

3.2. Tonal

The aforementioned *a*-prefix undergoes a particular tonal alternation, surfacing as H before a L verb root but M before a M root, as illustrated with the following preterite forms¹⁰:

- (1) *a*³-*ləp*¹ ‘cut’
- (2) *a*²-*kuŋ*² ‘crowed’

This tonal alternation suggests the existence of a word-internal, dissimilatory *upstep* process in which a syllable bearing underlying M is realized as H when concatenated (through some morphological process) with a following syllable bearing L¹¹. This upstep may be motivated by a general constraint against ML tone patterns in Chungli Ao, given that disyllabic M.L patterns are extremely marginal and monosyllabic ML contours are non-existent across all word classes. For reasons that will become clear later (see Section 4.5), it is preferable to treat this process not as a surface phonetic effect, nor as a simple phonological rule, but as an automatic repair driven by a constraint against M-L sequences that is active at every step in the tonological derivation. Upstep can thus be

⁸ Other *a*-stripping affixes not discussed here include: prohibitive *tə*-, sequential converb *-əɪ*, simultaneous converb *-a*, permissive *-ti*, causative *-taksəʔ*, desiderative *-nəɪ*, benefactive *-tsəʔ*, and various lexical suffixes.

⁹ The [a] in /aɪ^M/ never drops out, and thus is not an *a*-prefix.

¹⁰ The preterite form of a verb is simply the surface form of the unsuffixed stem.

¹¹ Upstep in Chungli Ao mimics a similar process in the Engenni language of Nigeria (Niger-Congo; Thomas 1974, 1978), with the exception that upstep in Chungli Ao is strictly word-internal and does not operate across phrases.

conceptualized as a magnetic force: When a M tone is concatenated with a following L tone by some process during the derivation of a word, an opposing force automatically activates to “push” M up to H.

The following table portrays the Chungli Ao tone system as hypothesized here¹²:

<i>Underlying tones</i>	<i>Automatic repair</i>	<i>Surface tones</i>
L, M, H	M → H / __ L (upstep)	L, M, H

Table 7. Chungli Ao tone system

The behaviour of the *a*-prefix can now be captured by positing an underlying M tone on /a-/ , which surfaces as H before a monosyllabic verb root bearing L (due to upstep), but retains M before M. This is illustrated as follows:

- (3) /a^M-ləp^L/ → (upstep) → a³-ləp¹ ‘cut’
 (4) /a^M-kuŋ^M/ → a²-kuŋ² ‘crowed’

The upstep process developed here also proves useful in analysing other tonal phenomena in Chungli Ao, as we will see shortly.

4. STEM TONE CLASSES

4.1. Base of Classification

If one focuses on verb **roots**, there are a multitude of different classes that could be formed based on root size, tone, and the type of verb stem to which the root belongs (A-stem/B-stem)¹³:

<i>Root size</i>	<i>Root tone</i>	<i>Stem type</i>	<i>Example</i>		<i>Stem tone</i>
σ	L	A-stem	/a ^H -ləp ^L /	‘cut’	H.L
σ	HL	B-stem	/a ^{HL} /	‘earn’	HL
σ.σ	H.L	B-stem	/ki ^H lak ^L /	‘tickle’	H.L
σ	M	A-stem	/a ^M -sə ^M /	‘die’	M.M
σ.σ	M.M	B-stem	/pu ^M ʃi ^M /	‘search for’	M.M
σ.σ	M.H	B-stem	/sa ^M ju ^H /	‘taught’	M.H
σ.σ	L.M	B-stem	/ka ^L zə ^M /	‘spend time’	L.M
σ	LM	B-stem	/a ^L r ^M /	‘sew’	LM
σ.σ.σ	M.M.M	B-stem	/a ^M səŋ ^M taŋ ^M /	‘ask’	M.M.M

Table 8. Partial classification based on roots

¹² One might also analyse this type of system as consisting of underlying L, H, and Ø, with Ø realized as H before L and defaulting to M elsewhere (cf. the treatment of Engenni in Hyman 2001). At the present, however, the introduction of a zero tone into the current analysis of Chungli Ao would appear to be an unnecessary complication with little explanatory advantage.

¹³ Recall that for A-stems, stem = a-prefix + root; while for B-stems, stem = root.

A less unwieldy and more practical approach, however, takes as its starting point the stem patterns shown in the rightmost column, which show a greater similarity to each other than do the roots. In addition, for most of the tonal morphology, verb stems formed from *a*-prefixed roots (A-stems) pattern with those consisting of bare roots (B-stems). For these reasons, it is more productive to develop a taxonomy of verbs based on **stems** rather than roots, establishing subclasses as necessary to deal with any tonal behaviour that distinguishes among members of a single stem class.

Accordingly, the following table presents a list of all the stem tone patterns in Chungli Ao with their rate of occurrence in a corpus of 204 verbs (see Appendix C). (Note that the rates of occurrence add up to more than 100% because certain verbs exhibit more than one stem tone pattern.)

<i>Tone pattern</i>	<i>Occurrence</i>
H.L, HL	42%
M.M, M	55%
M.H	2.5%
L.M, LM	2.5%
M.M.M	1.5%

Table 9. Stem tone patterns

Of the five possible stem classes in Table 9, the two most common are those bearing the patterns H(.)L and M(.M)¹⁴. However, an examination of the tonal behaviour of these two main patterns with the addition of suffixal morphology yields **three** types of verb stems, dividing the M(.M) class in two. This separation into three classes based on tonal morphology is illustrated with the irrealis suffix *-tsə* in the following table (note that stem tone patterns are illustrated here with unsuffixed preterites):

¹⁴ The notation H(.)L is meant to represent both the disyllabic H.L pattern and the monosyllabic HL contour, while M(.M) denotes both disyllabic M.M and monosyllabic M.

<i>Stem tone pattern</i>	<i>Irrealis pattern</i>	<i>Class</i>
H(.)L <i>am</i> ³¹ ‘held’ <i>pi</i> ³ <i>ləm</i> ¹ ‘thought’	H(.)L-L <i>am</i> ³¹ - <i>tsə</i> ¹ ‘hold-IRR’ <i>pi</i> ³ <i>ləm</i> ¹ - <i>tsə</i> ¹ ‘think-IRR’	1
M(.M) <i>ar</i> ² ‘sewed’ <i>a</i> ² - <i>ləm</i> ² ‘buried’	M(.M)-H <i>ar</i> ² - <i>tsə</i> ³ ‘sew-IRR’ <i>a</i> ² - <i>ləm</i> ² - <i>tsə</i> ³ ‘bury-IRR’	2
<i>phu</i> ² <i>a</i> ² ‘charmed’ <i>a</i> ² - <i>tfəp</i> ² ‘cried’	H.H-L <i>phu</i> ³ <i>a</i> ³ - <i>tsə</i> ¹ ‘be charmed-IRR’ <i>a</i> ³ - <i>tfəp</i> ³ - <i>tsə</i> ¹ ‘cry-IRR’	3

Table 10. Stem classes based on tonal behaviour

As Table 10 shows, the two main verb stem patterns can be distributed into three classes based on stem and suffix tones¹⁵: Class 1, with an unvarying H(.)L stem tone pattern and L tone on the irrealis suffix; Class 2, with an unvarying M(.M) stem tone pattern and H tone on the irrealis suffix; and Class 3, with a M(.M) bare stem tone pattern that changes to H(.H) upon attachment of the irrealis suffix, which itself bears a L tone.

The rare¹⁶ stem types from Table 9 also pattern with these major classes, as shown:

<i>Stem tone</i>	<i>Irrealis pattern</i>	<i>Class</i>
L.M	L.M-H	2
LM	LM-H	2
M.M.M	M.M.M-H	2
M.H	M.H-L	3

Table 11. Rare stem type patterning

With these three verb stem classes established, the following sections examine each class from an autosegmental perspective, presenting explanations for tonal behaviour manifested in the context of various verbal suffixes and establishing subclasses as necessary.

¹⁵ In the verb corpus, Class 1 verbs constitute 42%, Class 2 verbs 38%, and Class 3 verbs 20%.

¹⁶ “Rare” means 1-3 tokens of each.

4.2. Class 1 (H.L, HL)

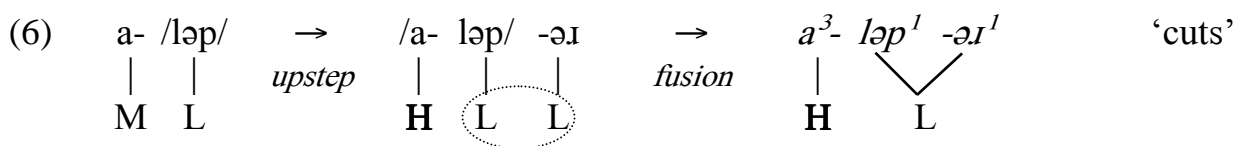
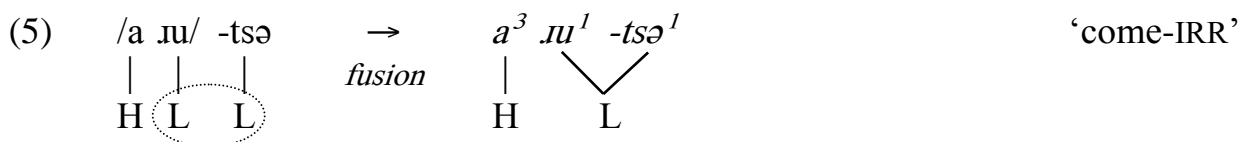
4.2.1. Stem, irrealis, & present

Class 1 is composed of verb stems bearing disyllabic H.L tone patterns and monosyllabic HL contours. Any Class 1 verb stem is either 1) an A-stem, formed by the M-bearing *a*-prefix combined with a L root, or 2) a B-stem, consisting of a bare root bearing a H(.)L tone pattern. While both types surface with the same H(.)L tone pattern, the A-stems differ in bearing an underlying M-L pattern, which activates the upstep process to yield surface H-L:

Stem type	Underlying form	Surface form (preterite)
1A (A-stem: <i>a</i> -prefixed root)	M-L e.g. $a^M\text{-}/l\text{əp}^L/$	H -L (upstepped) $a^3\text{-}l\text{əp}^1$ ‘cut’
1B (B-stem: bare root)	H(.)L e.g. $/a^Hru^L/$ $/ts\text{ək}^{HL}/$	H(.)L $a^3\text{.}ru^1$ ‘came’ $ts\text{ək}^{31}$ ‘fell’

Table 12. Class 1 stem subtypes based on *a*-prefix

Upon suffixation of irrealis $/\text{-ts}\text{ə}^L/$ or present $/\text{-}\text{ə}\text{ɪ}^L/$ (which are both assumed to bear an underlying L tone), the adjacent L tones fuse to satisfy the Obligatory Contour Principle (OCP). This process is illustrated below with a B-stem in (5) and an A-stem in (6)¹⁷:



4.2.2. Trigger-suffixed A-stems

The tonal behaviour of Class 1 verbs becomes more complex when the immediate-present $/\text{-ta}\text{ɪ}^{HL}/$, imperative $/\text{-a}\text{ŋ}^M/$, and present-perfect $/\text{-u}^H\text{ku}^M/$ suffixes are considered. For an A-stem, concatenation with any of these triggers loss of the *a*-prefix. In addition, these three suffixes cause the verb stem to undergo various tonal alternations. (The term *trigger-suffix* will be used from this point on to refer to any one of these suffixes.)

¹⁷ An upstepped tone is represented by a boldfaced **H** in the examples throughout this paper.

When a Class 1 A-stem is combined with a trigger-suffix and is stripped of its *a*-prefix, the resulting de-prefixed root emerges with either 1) its underlying L tone unchanged, or 2) a M tone¹⁸. This tonal behaviour is illustrated in the following table¹⁹:

Stem type	Alternate stem tone	Example:	
		stem	trigger-suffixed
1A1	L	/a ^H -mən ^L /	-mən¹-tar³¹ ‘is now sitting’
		‘sit down’	-mən¹-aŋ² ‘sit!’
			-mən¹-u³ku² ‘has sat’
1A2	M	/a ^H -lət ^L /	-lət²-tar³¹ ‘is now scalding’
		‘scald’	-lət²-aŋ² ‘scald!’
			-lət²-u³ku² ‘has scalded’

Table 13. Class 1 A-stem subclasses

Most 1A stems belong unambiguously to a single subclass (e.g. the two example verbs in Table 13), but a few exhibit what might be called “chimeric” behaviour. For example, when the verb stem /a^H-saŋ^L/ ‘bark’ is trigger-suffixed, the tone on its de-prefixed root emerges as L, M, or L depending on the trigger-suffix:

- (7) **-saŋ¹-tar³¹** ‘is now barking’
 (8) **-saŋ²-aŋ²** ‘bark!’
 (9) **-saŋ¹-u³ku²** ‘has barked’

A verb stem such as /a^H-saŋ^L/, therefore, cannot be said to belong to any single subclass, as the tones that appear on its de-prefixed root are not identical across all three trigger-suffixed forms. (See the list of verbs in Appendix C for more chimeras.)

4.2.3. Trigger-suffixed B-stems

When a trigger-suffix is concatenated with a Class 1 B-stem, there is no *a*-prefix to be lost. The verb stem does undergo a tonal alternation, however, emerging as L(.)L, L(.)M, M(.)M, H(.)L, or H(.)M. This collection of five tone patterns seems rather unwieldy at first, but it can be collapsed into a more manageable set of three based on the following observation: If a stem is disyllabic or bears a tone contour, the second tone of the stem appears particularly susceptible to

¹⁸ It is interesting to note that, based on the corpus of verbs collected for this research, more Class 1 de-prefixed roots surface with a M tone than with their underlying L intact.

¹⁹ The classification of a particular verb stem is indicated by a sequence such as 1A2, where the first character is a number indicating the major class, the second is the letter A or B (signifying A-stem/B-stem), and the third is a number indicating the subclass.

coarticulation effects. For example, the 1B stem /zə^Hlu^L/ ‘write’ surfaces as L.L when suffixed with immediate-present /-tar^{HL}/ (10) or imperative /-aŋ^M/ (11), but as L.M when suffixed with present-perfect /-u^Hku^M/ (12):

- (10) zə¹lu¹-tar³¹ ‘is now writing’
 (11) zə¹lu¹-aŋ² ‘write!’
 (12) zə¹lu²-u³ku² ‘has written’

Given the consistent L.L stem patterns in (10) & (11), the stem pattern in (12) is likely also an underlying L.L that has been phonetically “pulled up” to L.M next to the suffixal H in the environment of vowel hiatus.

Another example of this stem-final tone variability involves a 1B stem such as /in^Hjak^L/ ‘work’, which can surface in its trigger-suffixed form as either H.L or H.M:

- (13) in³jak¹-tar³¹ / in³jak²-tar³¹ ‘is now working’

Due to the prevalence of such coarticulation effects, it is difficult to distinguish true phonological H(.)M and L(.)M stem tone patterns (if they exist) from H(.)L and L(.)L patterns that surface phonetically as H(.)M and L(.)M next to a suffix. For this reason, it is most expedient to combine apparent H(.)M patterns with H(.)L, and L(.)M with L(.)L. The aforementioned five B-stem trigger-suffixed tone patterns thus simplify into three subclasses, illustrated in the following table:

<i>Example:</i>			
<i>Stem type</i>	<i>Alternate stem tone</i>	<i>stem</i>	<i>trigger-suffixed</i>
1B1	L(.)L / L(.)M	/a ^H jak ^L / ‘choke’	a¹jak¹-tar³¹ ‘is now choking’ a¹jak¹-aŋ² ‘choke!’ a¹rak²-u³ku² ‘has choked’
1B2	M(.)M	/mə ^H səp ^L / ‘suck’	mə²səp²-tar³¹ ‘is now sucking’ mə²səp²-aŋ² ‘suck!’ mə²səp²-u³ku² ‘has sucked’
1B3	H(.)L / H(.)M	/mə ^H su ^L / ‘lift up’	mə³su²-tar³¹ ‘is now lifting up’ mə³su¹-aŋ² ‘lift up!’ mə³su¹-u³ku² ‘has lifted up’

Table 14. Class 1 B-stem subclasses

As was the case with the A-stems, a few 1B stems are chimera verbs which act like members of multiple subclasses, such as /mə^Hsə^L/ ‘comb’:

- (14) mə²sə²-tar³¹ (M.M, 1B2) ‘is now combing’
 (15) mə³sə¹-aŋ² (H.L, 1B3) ‘comb!’

(16) $m\theta^3s\theta^1-u^3ku^2$ (H.L, 1B3) ‘has combed’

Three anomalous 1B stems are also worth mentioning: The 1B1 verbs (with L(.)L/L(.)M alternate stem tone patterns) /a^Hlu^L/ ‘come down’, /a^H.lu^L/ ‘come’, and /a^Htu^L/ ‘come up’ all appear in the imperative suffixed with [-ŋ²] instead of [-aŋ²]:

(17) a¹lu-ŋ² ‘come down!’

(18) a¹.lu-ŋ² ‘come!’

(19) a¹tu-ŋ² ‘come up!’

All other /u/-final stems form the imperative by suffixation with [-aŋ²] (e.g. $z\theta^1lu^1-a\eta^2$ ‘write!’), so the loss of suffix-initial /a/ here cannot simply be attributed to a constraint against /u-a/ vowel hiatus. The fact that these three verbs exhibit identical behaviour is likely due to some synchronic or diachronic relationship, given the unquestionable similarities among their glosses and forms. However, a reasonable explanation for their omission of suffix-initial /a/ cannot be posited based on the existing data.

Thus far, the treatment of Class 1 verbs here is long on description and short on analysis. Given the tonal alternations exhibited by Class 1 verb stems (not to mention the chimera verbs!) and the fact that collection of additional data continues to yield more verbs with erratic tonal behaviour, a synchronic analysis that goes beyond mere stipulation is not possible at this time, no matter the theoretical framework. It may be the case that these tonal phenomena cannot be truly understood without a diachronic investigation – a venture that must await better historical analyses of the “Naga” languages.

4.3. Class 2 (M.M, M)

4.3.1. Stem

If Class 1 is the bizarre “Mr. Hyde” of the Chungli Ao verb system, then Class 2 is its Dr. Jekyll. Verb stems in this class bear disyllabic M.M or monosyllabic M and are uniform in their tonal behaviour under trigger-suffixation, undergoing no stem tone alternations whatsoever. (Class 2 therefore has no subclasses.) A-stem and B-stem examples are shown in the following table:

<i>Example:</i>			
<i>Stem type</i>	<i>stem</i>	<i>trigger-suffixed</i>	
2A	/a ^M -ləm ^M / 'hand out'	-ləm²-taɪ³¹	'is now handing out'
		-ləm²-aŋ²	'hand out!'
		-ləm²-u³ku²	'has handed out'
2B	/ɪəp ^M .ɪaŋ ^M / 'watch'	ɪəp²raŋ²-taɪ³¹	'is now watching'
		ɪəp²ɪaŋ²-aŋ²	'watch!'
		ɪəp²raŋ²-u³ku²	'has watched'

Table 15. Class 2 verb stems

With that said, it should be noted that a few 2B stems exhibit ambiguity²⁰ between a M(.)M and a L(.)M tone pattern (e.g. a^2ki^2 / a^1ki^2 'took' and $aɪ^2 / aɪ^{12}$ 'sewed'). In each of these stems, the nucleus of the first syllable is /a/, which is the lowest vowel phoneme in the Chungli Ao inventory. The appearance of L on this syllable may therefore be related to the phenomenon of *intrinsic F₀*, given that low vowels show a tendency to have a lower pitch than high vowels (see e.g. Meyer 1896-1897 and the extensive references in Whalen & Levitt 1995). This is not a deterministic connection in Chungli Ao, however, since the Class 2 verbs that exhibit this ambiguity comprise only a small subset of all verbs with /a/ in the initial syllable. It may therefore be the case that the appearance of this limited M(.)M/L(.)M alternation is the result of some current phonologization process which takes intrinsic F₀ as its starting point.

An additional quirk of the otherwise-normal Class 2 is the existence of two verbs that show free variation between A-stem and B-stem types. When combined with a trigger-suffix, loss of the initial /a/ from the verbs $a^2laŋ^2$ 'cut in half' and $a^2səm^2$ 'ran' is surprisingly **optional**. This is depicted in the following table. (Note that the B-stem types show the M(.)M/L(.)M pattern ambiguity discussed in the previous paragraph.)

²⁰ "Ambiguity" is perhaps the best way to describe tonal behaviour that, depending on the particular elicitation session, is: 1) clearly L.M, 2) clearly M.M, 3) in free variation between L.M and M.M, or 4) somewhere between L.M and M.M in pitch levels.

<i>Verb</i>	<i>Stem</i>	<i>Trigger-suffixed</i>	
$a^2laŋ^2$ 'cut in half'	A-stem: /a ^M -laŋ ^M /	-laŋ ² -aŋ ²	'cut in half!'
	B-stem: /a ^M laŋ ^M /	a ¹ laŋ ² -aŋ	'cut in half!'
$a^2səm^2$ 'ran'	A-stem: /a ^M -səm ^M /	-səm ² -aŋ ²	'run!'
	B-stem: /a ^M səm ^M /	a ¹ səm ² -aŋ ²	'run!'

Table 16. A/B-stem ambiguous Class 2 verbs

This optionality may be evidence of morphological reanalysis in progress, in which some /a/-initial B-stems are being reanalysed as A-stems, or vice versa.

4.3.2. Irrealis, present, & preterite

While the idiosyncrasies of the Class 1 verb stems involved the trigger-suffixes, the most interesting behaviour of Class 2 stems concerns suffixation of irrealis /-tsə^L/ and present /-əɪ^L/ . These two suffixes both surface as L when affixed to Class 1 verb stems (as shown previously in examples (5) and (6)). In concatenation with Class 2 stems, however, the irrealis suffix bears a H tone and the present suffix bears a HL contour:

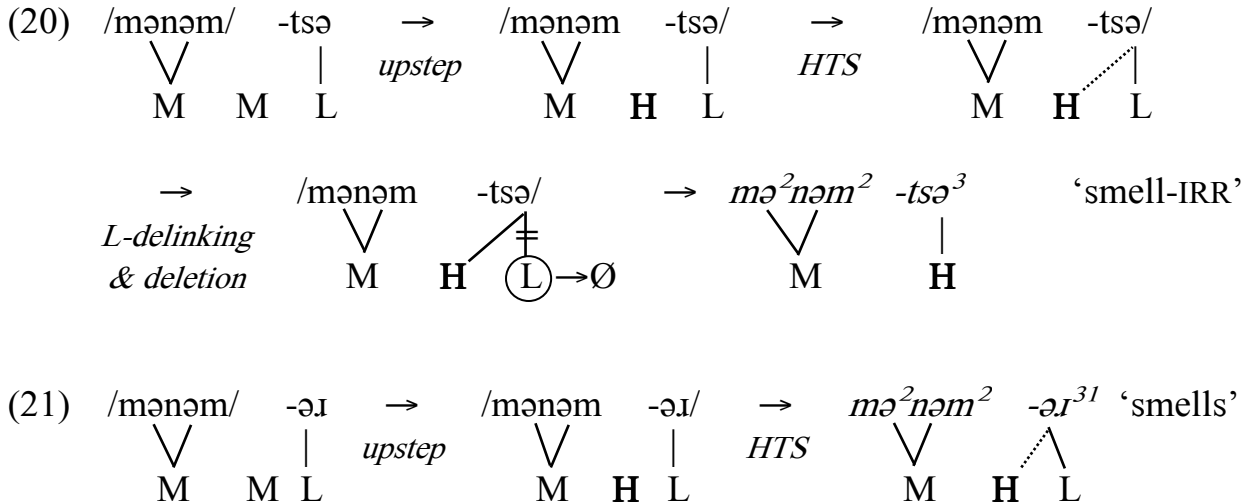
<i>Underlying suffix</i>	<i>Stem class</i>	<i>Surface tone</i>	<i>Example</i>
/-tsə ^L / (irrealis)	1	L	$a^3jak^1-tso^1$ 'choke-IRR'
	2	H	$a^2maŋ^2-tso^3$ 'believe-IRR'
/-əɪ ^L / (present)	1	L	$a^3jak^1-əɪ^1$ 'chokes'
	2	HL	$a^2maŋ^2-əɪ^{31}$ 'believes'

Table 17. Irrealis and present suffixes with Class 1 vs. Class 2 stems

If the irrealis and present suffixes indeed both bear underlying L (as assumed), then the manifestation of H and HL on their surface forms, respectively, is good evidence for the existence of a floating H tone to the right of all Class 2 verb stems. Through High-tone spreading (HTS), this floating H would delink the L of /-tsə^L/ to yield -tsə³ but combine with the L of /-əɪ^L/ to form -əɪ³¹.

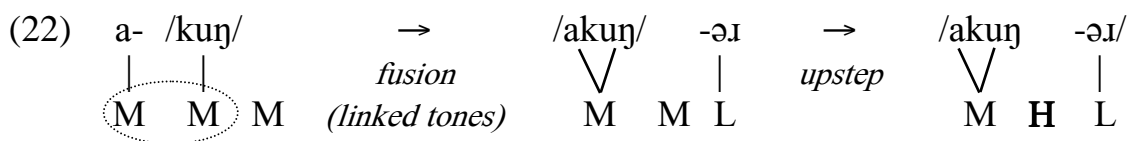
The problem with this analysis is that it cannot explain what happens to the alleged floating H when the verb stem is suffixed with the imperative /-aŋ^M/, surfacing as M(.M)-M with no H in sight (e.g. $ɪəp^2laŋ^2-aŋ^2$ 'watch!'). For this

reason, it is preferable to treat the floating tone that accompanies Class 2 verb stems as M, which is upstepped to H before the L of /-tsə^L/ and /-əɪ^L/. HTS then occurs to link the floating H with the suffix. These processes are illustrated in the following examples, with the irrealis suffix in (20) and the present suffix in (21):



In (20), the delinking of L from /-tsə^L/ (rather than the formation of a HL contour) is likely due to a requirement that derived contours be linked to a syllable which is minimally bimoraic²¹, thus prohibiting *-tsə³¹*. This hypothetical constraint is supported by the total lack of derived contours on other monomoraic syllables in Chungli Ao.

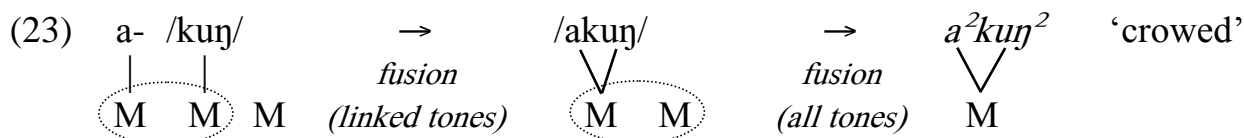
Because upstep is activated at any step in the derivation containing a M-L sequence, upstep bleeds tone-fusion in (20) & (21) when the suffix is introduced into the input. Otherwise, the floating M would fuse with the linked M of the verb stem (to satisfy the OCP) before it could undergo upstep to H. With A-stems, however, an initial stem-level fusion process takes place to fuse the M tone of the prefix with that of the root, **before** the stem is concatenated with a suffix. To prevent the stem-final floating M tone from fusing with the linked tones at this stage, we stipulate that the stem-level tone-fusion process only affects tones **linked to segments**, leaving floating tones alone. As a result, the floating M tone is still present in the input to the suffixation-cycle (or word-level cycle), allowing it to undergo upstep when concatenated with a L-bearing suffix. The derivation of a present-suffixed 2A stem, which includes this stem-level fusion process, is illustrated below:



²¹ It may be the case that the only apparently-monomoraic HL verb (*a³¹* 'earned') actually contains a long vowel (making it bimoraic *aa³¹*), which would make bimoraicity a condition for underlying contours as well.



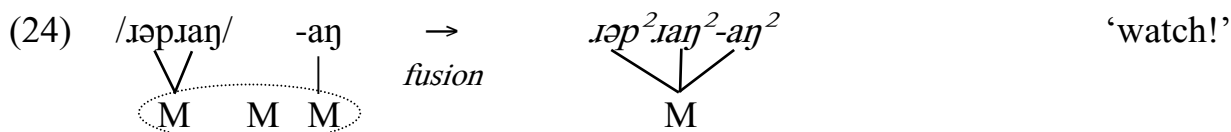
In deriving the preterite, which is simply an unsuffixed stem, the floating M undergoes application of tone fusion during the word-level cycle:



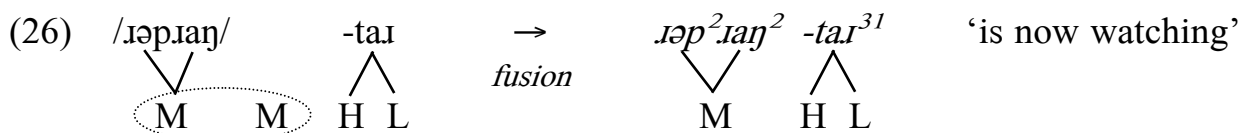
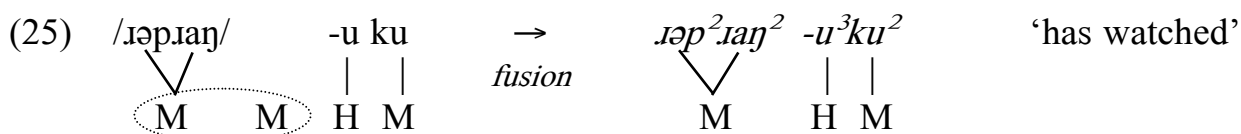
Class 2 is thus unique among the classes, because the fusion of the stem-final floating M tone results in the tonal structure of Class 2 preterite forms being distinct from that of the bare stems.

4.3.3. Trigger-suffixes

When a Class 2 verb stem is concatenated with the imperative suffix /-aη^M/, the floating M is simply fused with the underlying M tones of the stem and /-aη^M/, respectively:



When the verb stem is concatenated with present-perfect /-u^Hku^M/ or immediate /-taɿ^{HL}/, the floating M cannot delink the suffixal H²², and consequently fuses with the stem tone:



4.4. Class 3 (M.M ~ H.H)

4.4.1. Stem, irrealis, & present

Class 3 consists of disyllabic verb stems and shares the M.M tone pattern of Class 2. A few Class 3 stems bear M.H patterns (e.g. *sa²ju²* ‘taught’), but this

²² Perhaps due to a lack of MTS (Mid-tone spreading) in the language or a disinclination for H tones to delink.

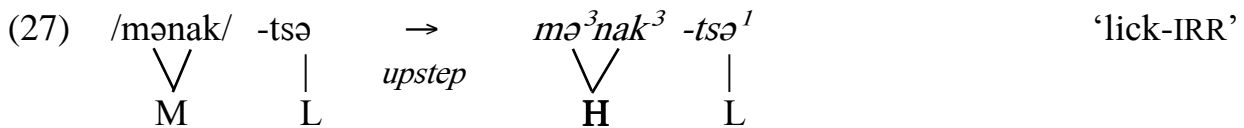
rise in pitch may be a phonetic effect of the increased tension in the vocal folds due to a stem-final glottal stop (cf. Halle & Stevens 1971; Abramson 2004).

Class 3 stems differ from Class 2 in that the underlying M.M pattern surfaces as H.H when the stem is concatenated with the irrealis $/-tsə^L/$ or present $/-əɪ^L/$ suffix, as exemplified in the following table:

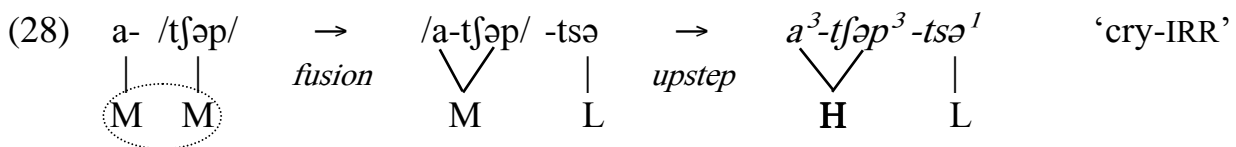
<i>Stem</i>	<i>Preterite (M.M)</i>	<i>Irrealis & present (H.H-L)</i>	
$/a^M lən^M/$ 'tie'	$a^2 lən^2$ 'tied'	$a^3 lən^3 - tsə^1$ 'tie-IRR'	$a^3 lən^3 - əɪ^1$ 'ties'
$/mə^M nak^M/$ 'lick'	$mə^2 nak^2$ 'licked'	$mə^3 nak^3 - tsə^1$ 'lick-IRR'	$mə^3 nak^3 - əɪ^1$ 'licks'

Table 18. Class 3 verb stem examples

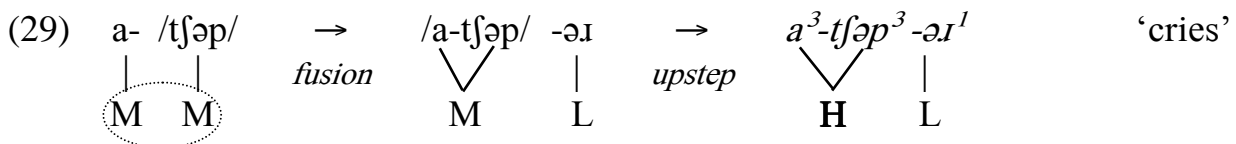
This appearance of H.H on the suffixed stem is likely a result of upstep activated by the adjacency of M with the suffixal L, as illustrated below.



A-stems, such as $/a^M - tʃəp^M/$ 'cut' in the following example, undergo an initial stem-level cycle in which the *a*-prefix combines with the root to form the stem, fusing their respective M tones. The output of this derivation is then concatenated with the L-bearing irrealis suffix, and both syllables of the stem undergo upstep to H, since they are linked to the same M tone at that point in the derivation:



The tonological sequence depicted for the irrealis $/-tsə^L/$ above is identical to that for the present $/-əɪ^L/$, illustrated below:



One complication observed in Class 3 is the fact that, while most of the irrealis and present forms are H.H-L, some verbs show variability between M.M-L and H.H-L tone patterns. This variability essentially boils down to whether or not upstep applies where expected.

The presence of non-upstepped M.M-L forms suggests that the factors which activate upstep are more complicated than a simple M-L tone sequence.

According to our consultant, whether irrealis/present forms are produced as M.M-L or H.H-L can depend on the village from which the speaker hails. There is some evidence from his own speech, however, that this alternation is related to the final tone of an immediately-preceding word: A tonally-variable irrealis or present form bears M.M-L after a word ending in a L tone, shown in examples (30) & (31), but bears H.H-L after a word ending in M ((32) & (33)):

- | | | | |
|------|--------------------------------|----------------------------------|---|
| (30) | M | L | <u>M.M-L</u> |
| | pai ² | tʃi ¹ | mə ² tʃak ² -tsə ¹ |
| | 3SG.M | rice | chew-IRR |
| | ‘He will chew rice.’ | | |
| | | | |
| (31) | M | M | L <u>M.M-L</u> |
| | la ² | ku ² | ka ¹ a ² -tak ² -əɿ ¹ |
| | 3SG.F | basket | one weave-PRES |
| | ‘She weaves one basket.’ | | |
| | | | |
| (32) | M | M.M | <u>H.H-L</u> |
| | pai ² | mən ² ti ² | mə ³ tʃak ³ -tsə ¹ |
| | 3SG.M | corn | chew-IRR |
| | ‘He will chew corn.’ | | |
| | | | |
| (33) | M | M | <u>H.H-L</u> |
| | la ² | ku ² | a ³ -tak ³ -əɿ ¹ |
| | 3SG.F | basket | weave-PRES |
| | ‘She weaves baskets/a basket.’ | | |

Although the data is insufficient for a definitive conclusion, the correlation in (30)-(33) suggests that the activation of upstep may be influenced by the need to show tonal contrast between the verb stem and the immediately-preceding word²³. In (30) & (31), the M.M tone pattern on the verb stem is high enough to differentiate it from L on the preceding word. In (32) & (33), however, upstep must apply on the verb stem (raising it to H.H) to distinguish it from the preceding M. Verification of this hypothesis, however, requires a systematic investigation of the M.M-L/H.H-L variability in Class 3 verbs, which is beyond the scope of this paper.

²³ If this is true, then upstep is a process which is sensitive to larger scale than tonological derivations at the word-level, since its activation is affected by a tone pattern on the other side of a word boundary.

4.4.2. Trigger-suffixes

As with Class 1, Class 3 verb stems undergo tonal alternations upon concatenation with a trigger-suffix. The two A-stem subclasses are shown in the following table:

Stem type	Alternate stem tone	Example:	
		stem	trigger-suffixed
3A1	L	/a ^M -təm ^M / 'wrap'	-təm¹-tar³¹ 'is now wrapping'
			-təm¹-aŋ² 'wrap!'
			-təm¹-u³ku² 'has wrapped'
3A2	M	/a ^M -tʃəp ^M / 'cry'	-tʃəp²-tar³¹ 'is now crying'
			-tʃəp²-aŋ² 'cry!'
			-tʃəp²-u³ku² 'has cried'

Table 19. Class 3 A-stem subclasses

Most 3A stems are of type 3A2, preserving the M tone on their de-prefixed roots. Type 3A1 is unambiguously populated by only one verb stem (/a^M-təm^M/ 'wrap'), while a single chimera stem (/a^M-tʃən^M/ 'escape') alternates between 3A1 & 3A2 for its three trigger-suffixed forms (**-tʃən²-tar³¹** 'is now escaping', **-tʃən¹-aŋ²** 'escape!', **-tʃən¹-u³ku²** 'has escaped').

The trigger-suffixed B-stems fall into three subclasses. (Note that L.L and L.M are treated as belonging to the same subclass, as discussed in Section 4.2.3.)

Subclass	Alternate stem tone	Example:	
		stem	trigger-suffixed
3B1	L.L / L.M	/a ^M tsək ^M / 'hide'	a¹tsək¹-tar³¹ 'is now hiding'
			a¹tsək²-aŋ² 'hide!'
			a¹tsək¹-u³ku² 'has hidden'
3B2	M.M	/mə ^M tʃak ^M / 'chew'	mə²tʃak²-tar³¹ 'is now chewing'
			mə²tʃak²-aŋ² 'chew!'
			mə²tʃak²-u³ku² 'has chewed'
3B3	H.H	/mə ^M tʃaŋ ^M / 'sleep' (chimera)	mə²tʃaŋ²-tar³¹ 'is now sleeping'
			mə³tʃaŋ³-aŋ² 'sleep!'
			mə²tʃaŋ²-u³ku² 'has slept'

Table 20. Class 3 B-stem subclasses

An unusual feature of 3B stems is that the 3B3 alternate stem pattern (H.H) only appears on imperatives. Each 3B3 verb stem, therefore, is a chimera: its

immediate-present and present-perfect forms belong to other subclasses. In Class 3, all the chimera B-stems mirror the behaviour of /mə^Mtʃaŋ^M/ ‘sleep’ as illustrated in the table above. Their imperative-suffixed forms exhibit the 3B3 pattern (H.H), while their other two trigger-suffixed forms belong to type 3B2 (preserving the underlying M.M stem tone pattern).

5. DERIVATION OF VOWEL-FINAL STEMS

5.1. Introduction

A certain set of verbs that requires special consideration consists of those whose stems end in a vowel or a glottal stop²⁴. When such a stem is combined with the present suffix /-əɪ^L/, the schwa of the suffix disappears (presumably as a repair for vowel hiatus). The remaining [-ɪ^L] coalesces with the stem-final vowel, as illustrated in the following examples (syllable boundaries are denoted with periods):

(34)	/a ^H -tuɪ ^L /	-əɪ ^L	→	a ³ .tuɪ ¹	‘digs’	(Class 1)
(35)	/a ^H .saɪ ^L /	-əɪ ^L	→	a ³ .saɪ ¹	‘shouts’	(Class 1)
(36)	/a ^M -i ^M /	-əɪ ^L	→	a ² .iɪ ³¹	‘goes in’	(Class 2)
(37)	/a ^M -u ^M /	-əɪ ^L	→	a ² .uɪ ³¹	‘goes’	(Class 2)
(38)	/tʃa ^M .tʃa ^M /	-əɪ ^L	→	tʃa ² .tʃaɪ ³¹	‘walks’	(Class 2)
(39)	/tʃəm ^M .piɪ ^M /	-əɪ ^L	→	tʃəm ² .piɪ ³¹	‘speaks’	(Class 3)
(40)	/mu ^M .lu ^M /	-əɪ ^L	→	mu ² .luɪ ³¹	‘boils (vt.)’	(Class 3)

As seen in examples (34) and (35), Class 1 verbs exhibit straightforward tonal effects as a result of this coalescence: [-ɪ^L] is concatenated with the H(.)L stem and the final two L tones are fused. The resulting H(.)L tone pattern is thus identical to that of the original stem.

The vowel-final Class 2 and Class 3 stems, on the other hand, show behaviour which requires additional analysis. These verbs all surface as M.HL in the present. While the H tone in the HL contour on the Class 2 verbs could be attributed to upstep of the floating M (see Section 4.3.2), the Class 3 tone patterns are less easily explained. We must answer the question of why these vowel-final stems do not undergo upstep on both of their syllables, as depicted below:

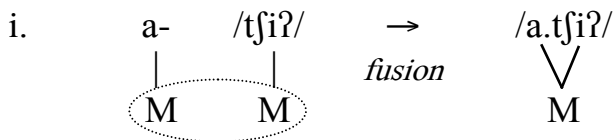
(41)	/mulu/	-əɪ	→	/mulu-ɪ/	→	*mu ³ luɪ ³¹	‘boils (vt.)’
	∨		upstep	∨		actual: mu ² luɪ ³¹	
	M	L		H L			

²⁴ Stem-final glottal stops disappear upon suffixation, causing glottal-final stems to pattern with vowel-final stems.

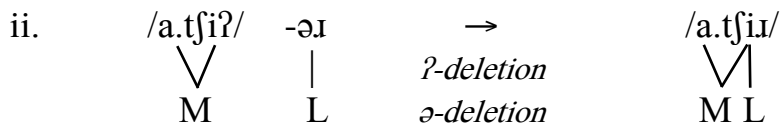
5.2. Class 3 derivation

Since the derivational process developed for Class 3 verbs has implications for Class 2, we will begin with Class 3, choosing an A-stem (which requires an extra initial derivational cycle) to produce the most comprehensive procedure possible²⁵.

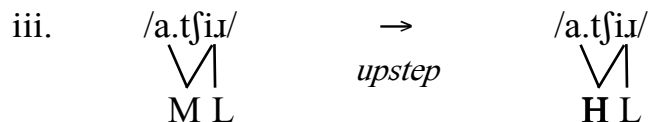
The first stage in deriving the Class 3 verb $a^2tʃiɹ^{31}$ ‘eats’ attaches the *a*-prefix to the root and fuses the M tones to form the A-stem:



The stem $/a^M tʃiɹ^M/$ is then combined with the present suffix $/-əɹ^L/$. The glottal stop disappears and the schwa of the present suffix is deleted to repair vowel hiatus, coalescing the suffix with the final syllable of the stem:



The result of these purely segmental processes is then passed as the input to the tonological system. Since a M-L sequence exists in this input, upstep is activated to raise M to H before L:



At this point, a new constraint must be proposed for Chungli Ao, which militates against representations of the following type:

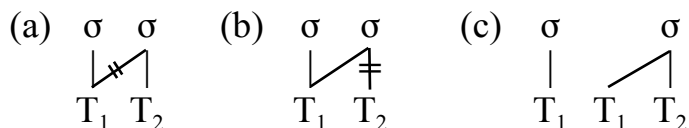


In the illicit representation above, a single tone (T₁) serves as both the level tone in one syllable and the first half of a contour in the following syllable. No items discovered thus far in Chungli Ao bear this type of tonal structure, supporting the idea that a language-wide constraint forbids it²⁶.

²⁵ As very little research has been conducted on the Chungli Ao tone system, the tentative derivation presented here is subject to revision as additional data is analysed.

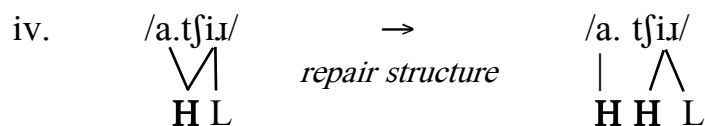
²⁶ There are therefore no sequences of two syllables with the tone patterns L.LM, L.LH, M.ML, M.MH, H.HM, or H.HL, although sequences like LM.M (in which the **second** tone is doubly-linked) do exist (e.g. *su*¹²*ʃi*² ‘clothes’).

Depicted below are the possible repairs to satisfy this constraint, in which (a) the first tone is delinked from the second syllable, (b) the second tone is delinked from its syllable, or (c) the first tone is copied, with its copy retaining the link to the second syllable:

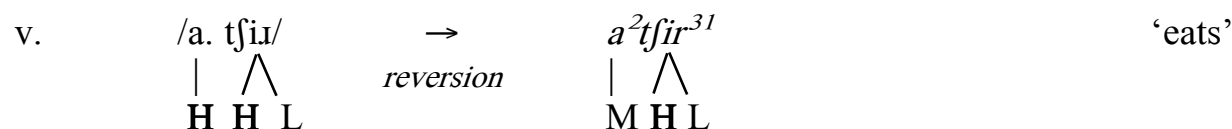


It is not unreasonable to assume that a constraint like *DISASSOCIATE (Yip 2002: 83) might rank highly in Chungli Ao, militating against the removal of association lines and thus forcing the repair shown in (c) above.

Returning to our derivation of $a^2tʃiɹ^{31}$, the next step applies the aforementioned repair to copy the upstepped H tone:



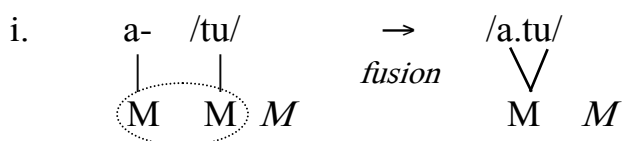
Having conceptualized upstep as a “magnetic force” active at every step in the derivation (Section 3.2), we now extend the metaphor by proposing the following additional detail: Upstep is “undone” when the upstepped H tone becomes separated from its following L by some process. With the opposing force gone, the H tone is free to sink back down to M. In the current derivation, therefore, the H tone linked to /a/ reverts to M, yielding the expected output:



5.3. Class 2 derivation

The same sequence of steps applies to the Class 2 vowel-final verbs, which differ from Class 3 in the presence of a floating M tone. The derivation of Class 2 $a^2tuɹ^{31}$ ‘goes up’ is discussed below.

The first stage combines the *a*-prefix with the root and fuses the linked M tones to form the A-stem. (Recall that floating tones are disregarded by the stem-level tone-fusion process). For clarity, the floating tone will be represented in italics throughout this derivation:



HTS (High-Tone Spreading): Spreads a floating H to the right whenever it appears in the input.

Ordered Processes (cyclically-applied first to the stem, then to the suffixed word)

1. *Tone Fusion*: Fuses all adjacent identical tones (to satisfy the OCP). During the stem-level cycle, floating tones are ignored by this operation.

2. *Structure Repair*: Repairs illicit tonal structure in disyllables (see Section 5.2) while preserving association lines, by copying the first tone or reattaching the second association line to a floating tone.

6. CONCLUSION

If the language of Chungli Ao could “tell its story” (cf. Rice 2006), the verb system would no doubt constitute its own volume, filled with complex subplots and unexpected plot twists. Since it is clear that the current state of research on Chungli Ao verbs is not yet to the point of producing a unified “narrative,” the aim of this investigation into verb classes has been to present a comprehensive descriptive picture of the tonal phenomena observed in Chungli Ao. By developing a taxonomy of verb stems here, however, we have indeed constructed the foundation of such a narrative. In addition, the description of subclasses, the identification of floating tones, the proposal of particular tonal processes, and the examination of vowel-final stems all serve to fill in various details of this framework. As research on Chungli Ao continues, this analysis will be expanded and refined as it seeks to capture the tonal behaviour of other aspects of Chungli Ao verbal morphology, including prefixes, lexical suffixes, derivational suffixes, modals, converb suffixes, and multiple-suffix combinations. Such research will also aid historical-comparative work to better understand the “Naga” languages – an enterprise which is still very much in its infancy.

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APPENDIX A: GLOSSARY

- A-stem:* A verb stem consisting of the *a*-prefix plus a verb root.
e.g. /a^M-ʃi^M/ ‘say’
- B-stem:* A verb stem consisting of a solitary verb root.
e.g. /pu^Mʃi^M/ ‘search for’
- Chimera:* A verb which exhibits different stem tone patterns for each trigger-suffix, and thus belongs to multiple subclasses.
- De-prefixed root:* An A-stem that has been stripped of its *a*-prefix and appears as a solitary verb root.
- Trigger-suffix:* Any suffix that, when combined with a verb stem, triggers loss of the *a*-prefix and a tonal alternation in the stem (e.g. immediate-present /-taɪ³¹/, imperative /-aŋ²/, and present-perfect /-u³ku²/).
- Upstep:* The tonal process by which M is raised to H whenever L follows it at any stage in a derivation. This effect is reversed when the triggering L no longer follows the upstepped tone.

APPENDIX B: SUMMARY TABLES

The following tables summarize the tonal taxonomy of stem classes and subclasses developed for Chungli Ao verbs. Table 21 presents the tone patterns of the three classes as they pertain to bare stem, preterite, irrealis, and present verb forms. Table 22 displays the alternate stem tone patterns of each subclass under trigger-suffixation. (Periods represent syllable boundaries, while dashes indicate stem-suffix boundaries.)

<i>Form</i>	<i>Class 1</i>	<i>Class 2</i>	<i>Class 3</i>
Bare Stem (underlying tones)	H(.)L	M(.M) / L(.)M + <i>floating M</i>	M.M
Unaffixed Stem (preterite)	H(.)L	M(.M) / L(.)M	M.M
Stem + /-tsə ^L / (irrealis)	H(.)L-L	M(.M)-H / L(.)M-H	H.H-L / M.M-L
Stem + /-əɪ ^L / (present)	H(.)L-L	M(.M)-HL / L(.)M-HL	H.H-L / M.M-L / M-HL

Table 21. Tone patterns of verb stem classes

<i>Class</i>	<i>Stem tone</i>	<i>Alternate stem tone (trigger-suffixed)</i>	
1	H(.)L	A-stems	1A1: L
			1A2: M
		B-stems	1B1: L(.)L / L(.)M
			1B2: M(.M)
			1B3: H(.)L / H(.)M
2	M(.M) / L(.)M	A-stems	M
		B-stems	M(.M) / L(.)M
3	M.M	A-stems	3A1: L
			3A2: M
		B-stems	3B1: L.L / L.M
			3B2: M.M
			3B3: H.H

Table 22. Alternate stem tone patterns under trigger-suffixation

APPENDIX C: VERB CORPUS

The corpus of 204 verbs used in this research is laid out in the following tables, with their stem types and alternate stem tone patterns under trigger-suffixation. Double-dashes (--) indicate that a form does not exist, while numbers separated by slashes (/) in the stem type designate the various subclasses to which a chimera verb belongs. For example, the chimeric Class 1 A-stem /a^H-ju^L/ ‘put’ is classified as 1A1/2/2, which means that its imperative form belongs to Subclass 1, while its immediate-present and present-perfect forms belong to Subclass 2.

Table 23 lists the 86 Class 1 verb stems (all H.L or HL):

Stem	Gloss	Stem type	Alternate stem tone pattern:		
			imperative	immed.pres	pres.perf
a.ɿn/a-ɿn?	prosper	1(?)(?)	?	?	?
asən/a-sən?	pound (e.g. grain)	1(?)(?)	?	?	?
a-ka	fire a firearm	1A(?)	?	?	?
a-taŋ	block, stop up	1A(?)	?	?	?
a-tən	join, participate	1A(?)	?	?	?
a-təp	hit w/ stick	1A(?)	?	?	?
a-tsək	get injured	1A(?)	?	?	?
a-tuŋ	arrive	1A(?)	?	?	?
a-wak	swell, be swollen	1A(?)	?	?	?
a-zəŋ	read	1A(?)	?	?	?
a-ʃi?	know	1A1	--	L	L
a-mən	sit down	1A1	L	L	L
a-nən	choke (strangle)	1A1	L	L	L
a-ŋu	see	1A1	--	L	L
a-sə	do, happen	1A1	L	L	L
a-səm	put on (clothes)	1A1	L	L	L
a-ma?	slap	1A1/--/2	L	--	M
a-su	be born/give birth	1A1/1/2	L	L	M
a-su?	chop (firewood)	1A1/1/2	L	L	M
a-ɿaŋ	cut (e.g. finger)	1A1/2/1	L	M	L
a-ju	put	1A1/2/2	L	M	M
a-ʃi	close	1A2	M	M	M
a-ʃi	wash	1A2	M	M	M
a-ʃi?	rot	1A2	--	M	M
a-ləp	cut	1A2	M	M	M
a-lət	scald/get drunk	1A2	M	M	M
a-luk	limp	1A2	M	--	--
a-muk	brood (sit on eggs)	1A2	M	M	M
a-na?	urinate	1A2	M	M	M
a-ŋu	be painful	1A2	--	M	M
a-ŋu?	bite	1A2	M	M	M
a-pu?	catch	1A2	M	M	M
a-sək	feel cold	1A2	--	--	M

<i>Stem</i>	<i>Gloss</i>	<i>Stem type</i>	<i>Alternate stem tone pattern:</i>		
			<i>imperative</i>	<i>immed.pres</i>	<i>pres.perf</i>
a-səp	put in a bag, pack	1A2	M	M	M
a-tuʔ	dig	1A2	M	M	M
a-waʔ	swim	1A2	M	M	M
a-zək	hit, beat	1A2	M	M	M
a-saŋ	bark	1A2/1/1	M	L	L
ənuk	put	1B(?)	?	?	?
jiṃla	hope	1B(?)	?	?	?
ji.ru	get hurt	1B(?)	?	?	?
juk	send	1B(?)	?	?	?
juŋtaŋ	block, obstruct	1B(?)	?	?	?
kasət	shoot to death	1B(?)	?	?	?
kələk	deceive	1B(?)	?	?	?
lapuk	open	1B(?)	?	?	?
məjip/məjəpʔ	turn back	1B(?)	?	?	?
məkəp	overturn	1B(?)	?	?	?
məsək	resemble	1B(?)	?	?	?
ait	come in	1B1	L	L	L
akət	cough	1B1	L.L	--	L.M
alu	come down	1B1	L	L.L	L.M
a.rək	drown, choke	1B1	L.L	L.L	L.M
a.ru	come	1B1	L	L.L	L.M
atsəʔ	pull	1B1	L.L	--	--
atu	come up	1B1	L	L.L	L.M
atuk	come out	1B1	L.L	L.L	L.L
ʃipaŋ	close	1B1	L.L	L.L	L.L
kilək	tickle	1B1	L.L	--	L.L
piləm	think	1B1	L.L	L.L	L.M
sak	awake, wake up (vi.)	1B1	LM	LM	LM
saktə	vomit	1B1	--	--	L.M
samaʔ	lose	1B1	--	L.M	L.M
tʃiku	shower, bathe	1B1	L.L	L.L	L.M
təpsət	kill	1B1	L.L	L.L	L.L
zəlu	write	1B1	L.L	L.L	L.M
a	earn	1B1/3/1	L	HM	LM
ak	feel shy	1B2	L	L	L
məʃiʔ	ask, request	1B2	M.M	M.M	M.M
məsək	be itchy/promiscuous	1B2	--	M.M	--
məsəp	suck	1B2	M.M	M.M	M.M
pə.rəp	twist	1B2	M.M	--	M.M
ratət	explain	1B2	M.M	M.M	M.M
tənzək	begin	1B2	M.M	M.M	M.M
mətsək	pinch	1B2/3/2	M.M	H.M	M.M
alaŋ	trip & fall	1B3	H.L	H.M	H.L
aliʔ	buy	1B3	H.M	H.M	H.M
am	hold	1B3	HM	HM	HM
anən	cease	1B3	H.M	H.M	H.M
asaʔ	shout, make noise	1B3	H.L	H.M	H.M
injaḱ	do, work	1B3	H.L	H.L	H.L

<i>Stem</i>	<i>Gloss</i>	<i>Stem type</i>	<i>Alternate stem tone pattern:</i>		
			<i>imperative</i>	<i>immed.pres</i>	<i>pres.perf</i>
məsu	lift up	1B3	H.L	H.M	H.L
mətən	be acquitted	1B3	--	--	H.M
mətsəʔ	kick	1B3	H.L	H.M	H.M
tsək	fall down	1B3	--	HM	HM
məsə	comb/lure	1B3/2/3	H.L	M.M	H.L

Table 23. Class 1 verbs

Table 24 lists the 78 Class 2 verbs, including their stem tones:

<i>Stem</i>	<i>Gloss</i>	<i>Stem tone</i>	<i>Stem type</i>
anəm/a-nəm?	press down	M.M	2(?)
asaja/a-saja?	play (a sport)	M.M.M	2(?)
a-ʃi	say	M.M	2A
a-ʃi	be painful	M.M	2A
a-i	go in	M	2A
a-jəm	fly/flow	M.M	2A
a-kəm	become	M.M	2A
a-kuŋ	crow	M.M	2A
a-ləm	hand out	M.M	2A
a-li	be, live	M.M	2A
a-lu	go down	M.M	2A
a-luŋ	spin, turn, roll	M.M	2A
a-mən	ripen, cook (vi.)	M.M	2A
a-nəm	push, press	M.M	2A
a-nuŋ	push	M.M	2A
a-pən	carry (with hands)	M.M	2A
a-pu	blow	M.M	2A
a-puŋ	sprout	M.M	2A
a-puŋ	carry (children) on back	M.M	2A
a-ɾəm	bury/bear	M.M	2A
a-ɾuŋ	burn with fire	M.M	2A
a-saŋ	bake	M.M	2A
a-sə	die	M.M	2A
a-sən	leak, drip	M.M	2A
a-səŋ	fill, be full	M.M	2A
a-su	cook	M.M	2A
a-taŋ	bear (fruit)	M.M	2A
a-tʃa	heat up, boil (stative?)	M.M	2A
a-tʃa	call	M.M	2A
a-tʃəm	drink	M.M	2A
a-təm	plant	M.M	2A
a-təm	end, finish	M.M	2A
a-tən	sing	M.M	2A
a-tsəŋ	punch	M.M	2A
a-tu	go up	M.M	2A
a-u	go	M	2A
a-un	throw at	M	2A

<i>Stem</i>	<i>Gloss</i>	<i>Stem tone</i>	<i>Stem type</i>
a-uŋ	shave	M	2A
a(-)laŋ	cut in half	M.M	2A/B
a(-)səm	run	M.M	2A/B
aki	take	M.M/L.M	2B
amaŋ	believe	M.M	2B
aŋaʔ	hear, listen	M.M/L.M?	2B
ap ^h uʔ	carry (on shoulder)	M.M	2B
aɪ	sew	M/LM	2B
asəŋtaŋ	ask	M.M.M	2B
atʃaŋ	cross	M.M	2B
atʃi	stare	M.M	2B
atʃuŋ	hold, lift	M.M/L.M	2B
atʃu.ru	meet	M.M.M	2B
azəŋ	be at leisure	M.M	2B
ʃiɪaŋ	be sick	M.M	2B
jaŋlu	create, make	M.M	2B
ja.ɪ	help	M.M	2B
kazə	spend time	L.M/M.M	2B
kələm	worship	M.M	2B
maŋam	hold in mouth	M.M	2B
maŋmaŋ	feel dizzy	M.M	2B
mənə	laugh, smile	M.M	2B
mənəm	smell	M.M	2B
mənu	be late	M.M	2B
məɪaŋ	try	M.M	2B
məsə	raise, rear	M.M	2B
muluŋ	be willing	M.M	2B
pala	divorce	M.M	2B
pəla	be happy	M.M	2B
pələm	be/get tired	M.M	2B
pələn	change, shift	M.M	2B
puʃi	search	M.M	2B
ɪənəm	be/get ready	M.M	2B
ɪəɪaŋ	look, watch	M.M	2B
safi	breathe	M.M	2B
səmtaŋ	visit	M.M	2B
səŋmaŋ	wonder, be surprised	M.M	2B
su.ru	cook (rice)	M.M	2B
tʃaʃi	feel bad	M.M	2B
tʃatʃa	walk	M.M	2B
tsəpu	fear	M.M	2B

Table 24. Class 2 verbs

Table 25 lists the 40 Class 3 verbs. An asterisk (*) following the stem tone indicates that the verb belongs to the set of stems whose irrealis/present forms show M.M-L/H.H-L variability:

Stem	Gloss	Stem tone	Stem type	Alternate stem tone pattern:		
				imperative	immed.pres	pres.perf
a-kət	like	M.M *	3A(?)	--	--	--
a-kət	have	M.M	3A(?)	?	?	?
a-nək	be soft	M.M	3A(?)	?	?	?
a-təm	wrap (rice)	M.M	3A1	L	L	L
a-tʃən	escape	M.M	3A1/2/1	L	M	L
a-kuk	learn/win	M.H/M.M *	3A2	M	M	M
a-tak	weave	M.M *	3A2	M	M	M
a-tʃəp	cry	M.M *	3A2	M	M	M
a-tʃi?	eat	M.M	3A2	M	M	M
a-təp	paint	M.M	3A2	M	M	M
a-tsək	roast	M.M	3A2	M	M	M
p ^h ua	be charmed	M.M	3B(?)	?	?	?
ama?	forget	M.M	3B1	L.M	--	L.M
apu	borrow	M.M	3B1	L.M	L.M	--
atsək	hide	M.M	3B1	L.M	L.L	L.L
nuktak	stand	M.M	3B1	L.M	L.M	L.M
atʃət	grab	M.M *	3B1?	L.L	?	?
əntuk	throw	M.M	3B2	M.M	M.M	M.M
juŋja?	long for	M.M	3B2	--	M.M	--
məjuk	swallow	M.M	3B2	M.M	M.M	M.M
mənək	lick	M.M	3B2	M.M	M.M	M.M
mənəp	catch up	M.M *	3B2	M.M	M.M	M.M
mə.ək	clean, be clean	M.M *	3B2	M.M	M.M	M.M
mətʃək	chew	M.M *	3B2	M.M	M.M	M.M
mətət	know	M.M	3B2	M.M	M.M	M.M
anuŋ	remain	M.M	3B3/--/--	H.H	--	--
ani?	lead	M.M	3B3/--/2	H.H	--	M.M
ajuŋ	organize	M.M *	3B3/2/2	H.H	M.M	M.M
alən	tie	M.M	3B3/2/2	H.H	M.M	M.M
ata?	await	M.M/M.H? *	3B3/2/2	H.H	M.M	M.M
laŋzə	respond, reply	M.M	3B3/2/2	H.H	M.M	M.M
məim	love	M.M *	3B3/2/2	H.H	M.M	M.M
mələn	(ex)change	M.M	3B3/2/2	H.H	M.M	M.M
mənən	make dirty, soil	M.M	3B3/2/2	H.H	M.M	M.M
mətʃaŋ	sleep	M.M/M.H *	3B3/2/2	H.H	M.M	M.M
mətən	get soaked	M.M	3B3/2/2	H.H	M.M	M.M
mulu	boil (water; vt.)	M.M	3B3/2/2	H.H	M.M	M.M
puŋmaŋ	dream	M.M *	3B3/2/2	H.H	M.M	M.M
saju?	teach, show	M.H	3B3/2/2	H.H	M.M	M.M
tʃəm̩pi?	speak, talk	M.M/M.H?	3B3/2/2	H.H	M.M	M.M

Table 25. Class 3 verbs