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A web of relations : a grammar of rGyalrong Jiăomùzú (Kyom-kyo) dialects

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CHAPTER 2

PHONOLOGY

2.0 *Introduction*

In this chapter I describe the main features of the phonology of the Jiǎomùzú dialects.

The description starts in section 2.2 with an overview of the Jiǎomùzú phonemes and some remarks about their characteristics, as appropriate. I pay special attention to the glottal stop, since its position as a full phoneme and its distribution, word-initially before vowels and word-finally after a vowel or pre-finally before a consonant, are linked to issues of pitch and accent, which are described later on in this chapter.

Section 2.3 discusses the Jiǎomùzú phonological word. In the first part I look at CV patterns, giving examples of each and arguing that full phoneme status for the glottal stop is supported by CV patterns in Jiǎomùzú. The syllable canon is (C1)(C2)C3(C4)V(C5)(C6). The approximants /w, r, l, j/ all behave like consonants. The trill /r/ clusters with the approximants /w, l, j/ in complex CV patterns, though I mark it in the trill category on the phoneme chart. There is a complete series of prenasalised plosives and affricates, of which I give examples. In the great majority of cases, syllable breaks are clear, based on CV patterns or morphological information. There are a few cases that are ambiguous and cannot be solved dialect internally with the help of CV patterns or morphological information. I propose that, if for pragmatic reasons a decision has to be made, in such cases analogy with patterns in other dialects or even related languages may be of use. Clearly such decisions are outside of the realm of descriptive linguistics but may be necessary in applied situations, such as the development of an orthography.

In the second half of section 2.3 I look at pitch, accent, stress and tone. I establish the glottal stop as primary in causing pitch distinctions in certain syllables. It may be that Jiǎomùzú is in the early stages of generating a tonal system by replacing final consonants with glottal stops. Neither tone nor pitch-accent nor stress is contrastive on a phonological level, though Jiǎomùzú words have customary pitch patterns that are for the most part predictable. Stress is contrastive on a morphological level. I give a few examples of contrastive stress in this chapter but will discuss it more fully in chapter 7 on verb morphology. The section on the word concludes with an overview of the workings of assimilation in Jiǎomùzú.

At the end of the chapter two appendices, A and B, give a list of minimal pairs and a list of consonant clusters respectively.

2.1 Conventions

In this study I use square brackets such as [kǎe ʔt] for phonetic transcriptions and slashes, like /ka-leʔt/ for phonemic transcriptions. I use a primary stress mark as in [kə'ruʔ] to indicate accent on a syllable, either expressed in high pitch or as increased loudness, or both. In phonemic transcriptions, where relevant, a dot indicates a syllable break, as in /da.tsə.go.go/ while hyphens show morpheme breaks: /tə-skruʔ/

2.2 Phonemes

a. Phoneme chart

1. Consonants

Because palatal affricates tend to wander between post-alveolar and palatal positions, as discussed below, and because they contrast with palatal plosives, I have placed /tʃ, tʃʰ/ and /dʒ/ in the palatal column. Phonemes that occur in loanwords only are between parentheses.

	labial	alveolar	palatal	retroflex	velar	glottal
plosive	p p ^h b	t t ^h d	c c ^h ɟ		k k ^h g	ʔ
affricate		ts ts ^h dz	tʃ tʃ ^h dʒ	tɕ tɕ ^h dɕ (tɕ ^h)		
fricative	(f) v	s z (ʃ) ⁶¹	ʃ ʒ	(ʂ)		h
nasal	m	n	ɲ		ŋ	
trill		r				
approximant	w	l	j			

2. vowels

The vowels show a two-way contrast between /a/ and /ə/, In this respect Jiǎomùzú differs from Zhuōkèjī, another Central rGyalrong dialect, as well as the Northern rGyalrong variety of Chábǎo, which both have a triple contrast between /a/, /ɐ/ and /ə/.⁶²

⁶¹ In phonemic transcriptions I use /lh/ rather than /l/ because of the broad range of realisation that occurs in Jiǎomùzú for this phoneme.

⁶² Xiàng (尙) (2008: 31), Lin (2003: 250).

	front	central	back
close	i		u
close-mid	e		o
mid		ə	
open		a	

b. *Consonant phonemes: phonetic description and allophones*

labials

/p/	voiceless unaspirated bilabial plosive	[p]
/p ^h /	voiceless aspirated bilabial plosive	[p ^h]
/b/	voiced unaspirated bilabial plosive	[b]
/f/	voiceless labiodental fricative	[f]
/v/	voiced labiodental fricative	[v]
/m/	voiced bilabial nasal	[m]
/w/	voiced bilabial approximant	[w]

/f/ only occurs in Chinese loanwords:

- (1) [ma¹fɔŋ²] leprosy, Chinese: 麻风, *máfēng*
 [ʒe¹fun² ɲa¹vajŋ] married (literally: /ʒe¹fun/ 'marry', a loan from Chinese
 结婚, *jiéhūn*, plus 'do', 3p past)

Lín Xiàngróng reports the use of /f/ in the dialect of Zhuōkèjī in Chinese loanwords as well as in native vocabulary.⁶³ This is an innovation, as the use of /f/ in that dialect was still unknown in the 1950s. In the Jiǎomùzú dialects, /f/ is often realised as [ɸ].

⁶³ Lín (1993: 40, 41).

alveolars

/t/	voiceless unaspirated dental plosive	[t̪]
/tʰ/	voiceless aspirated dental plosive	[t̪ʰ]
/d/	voiced unaspirated dental plosive	[d̪]
/s/	voiceless unaspirated alveolar fricative	[s]
/z/	voiced unaspirated alveolar fricative	[z]
/lh/	voiceless alveolar lateral fricative	[ɬ]
/n/	voiced dental nasal	[n̪]
/r/	voiced alveolar trill	[r]
/l/	voiced alveolar lateral approximant	[l]

The plosives and the nasal in the alveolar category are realised as dentals on the phonetic level. But the rest of the alveolars is not, which is why I have chosen to label the entire category 'alveolar' rather than 'dental'.

Occurrence of /d/ word initially is rather rare. Mostly /d/ occurs in prenasalised form. Minimal pairs for /d/ are therefore few and far between.

Utterance-finally /r/ is realised as a voiced alveolar flap [ɾ]. In consonant clusters /r/ actually behaves like an approximant, see section 2.3.e below.

/lh/ only occurs in Tibetan loanwords and is fairly rare. Good minimal pairs are hard to find. Some examples of the occurrence of /lh/:

(2)	/lhase/	[ɬa'se]	Tibet	literary Tibetan: ལྷ་ས, <i>lHa-sa</i>
	/lhandɕe/	[ɬa'ndɕe]	devil, demon	literary Tibetan: ལྷ་འདྲེ, <i>lha-'dre</i>

In Amdo nomad dialects the cluster /sl/, as in literary Tibetan སློབ་མ་ *slob-ma*, 'student', is pronounced as [ɬ]. However, in the Jiǎomùzú dialects only loans that have /lh/ in literary Tibetan are pronounced with [ɬ]. The /sl/ combinations are pronounced just the way they occur in literary Tibetan.⁶⁴ In example (3) the second syllable of *kaslep*, 'study' and the first syllable of *sloppən*, 'teacher' correspond to literary Tibetan *slob*, 'study':

(3)	/kaslep/	[ka'slɛp]	study, learn; lit. Tibetan: སློབ་སྦྱང་ <i>slob-sbyong</i>
	/sloppən/	[slo'pən]	teacher, master; lit. Tibetan: སློབ་དཔོན་ <i>slob-dpon</i>

Not all instances of /lh/ in Tibetan loans are pronounced uniformly as [ɬ]. In Jiǎomùzú the cluster is variously pronounced as [ɬ], [xl] or even just [h], with only half of the cluster retained. Since the

⁶⁴ This kind of observation can provide a fruitful avenue for research concerning different layers of borrowing into the rGyalrong vocabulary. In this study I do not address diachronic issues. For an in-depth discussion of loan words and their origin, see Xiàng (2008: 107-147).

root letter in literary Tibetan is /h/, while /l/ is the head letter of the cluster, Jiǎomùzú never pronounces /lh/ as just [l], with /h/ disappearing, but it is possible to have just [h]. For this reason I transcribe all these phonemes as /lh/ rather than /l/ in phonemic descriptions.

(4)	/lhe/	[xle]	statue or image of a deity; deity; lit. Tibetan: ལྷ <i>lha</i>
	/lhandʁe/	[ʎa'ndʁe]	ghost; lit. Tibetan: ལྷ་འདྲེ <i>lha-'dre</i>
	/lharja/	[ha'rja]	man's name; lit. Tibetan: ལྷ་རྒྱལ <i>lHa-rgyal</i>
	/lhamo/	['hamo]	woman's name; lit. Tibetan: ལྷ་མོ <i>lHa-mo</i>

palatals

/c/	voiceless unaspirated palatal plosive	[c]
/c ^h /	voiceless aspirated palatal plosive	[c ^h]
/ʃ/	voiced unaspirated palatal plosive	[ʃ]
/ʃ̥/	voiceless unaspirated palatal fricative	[ʃ̥]
/ʒ/	voiced unaspirated palatal fricative	[ʒ]
/ɲ/	palatal nasal	[ɲ]
/j/	palatal approximant	[j]

retroflexes

Retroflex flaps occur only in affricates. They are discussed in section 2.3.b and 2.3.f. The only other occurrence of retroflexes is of retroflexed fricatives. These occur only in loanwords and in expressives and onomatopoeic words. Some examples of retroflexed fricatives in loanwords:

(5)	[ʃwe'piŋʑ]	thermos flask; Chinese: [ʃwějp ^h ín], 水瓶, <i>shuǐpíng</i>
	[tɕ ^h aʔʑ]	tea; Chinese: [tɕ ^h á], 茶, <i>chá</i>

Interestingly, though the word for 'tea' apparently is a direct loan from Chinese, the word for 'kettle', [c^ha'xɰ], reflects more an Amdo nomad pronunciation. Loans from Chinese, especially more recent ones, often reflect the pronunciation of the Sìchuān dialect as spoke in the north and east of the province, which, unlike the Chinese standard language, has no retroflexes in initials. Example (5) shows the contrast between the words for 'bed' and 'umbrella'. The word for 'bed' has a retroflex fricative in the affricate in standard Chinese but not in the Sìchuān dialect. Consequently, it is borrowed into rGyalrong without retroflex. The word for umbrella does not have a retroflex in either standard Chinese or Sìchuān dialect. The superscript numbers to the right of the phonetic transcription are tone marks:

- (6) [wu'tsw^haŋ^ʔ] his or her bed; Chinese standard: [tɕ^hwaŋ³⁵], 床, *chuáng*,
 Sìchuān dialect: [ts^hwaŋ²¹]
 [saŋ^ʔ] umbrella; Chinese standard: [san²¹⁴], 伞, *sǎn*
 Sìchuān dialect: [san⁵³]

[tɕ^haŋ^ʔ], 'tea' is also often pronounced as [tɕ^haŋ^ʔ], reflecting perhaps an adaptation to native phoneme preference. Here is an example of a retroflexed fricative in an onomatopoeic word:

- (7) [ɣəx¹ʂe^ʔk] expression of the sound a fast moving object makes, such as an
 arrow in flight or a log sliding down a hill side.

affricates

/ts/	voiceless unaspirated alveolar affricate	[ts]
/ts ^h /	voiceless aspirated alveolar affricate	[ts ^h]
/dz/	voiced unaspirated alveolar affricate	[dz]
/tʃ/	voiceless unaspirated palatal affricate	[tʃ]
/tʃ ^h /	voiceless aspirated palatal affricate	[tʃ ^h]
/dʒ/	voiced unaspirated palatal affricate	[dʒ]
/ɬ/	voiceless unaspirated retroflexed affricate	[ɬ]
/ɬ ^h /	voiceless aspirated retroflexed affricate	[ɬ ^h]
/dɮ/	voiced unaspirated retroflexed flap affricate	[dɮ]

Retroflexed flaps do not occur independently, so that /ɬ, ɬ^h, dɮ/ of needs must be analysed as affricates. The regular tests for the existence of the other affricates, such as position of plosive and fricative not interchangeable, occurrence of set combinations of plosive and fricative only, etc., don't work very well because of the abundance of consonant clusters in rGyalrong. However, the CV pattern is helpful. The maximum number of consonants in an initial cluster is three, see section 2.3.b. Assuming there are no affricates would leave one with a large amount of data showing clusters of four consonants, such as in /ta.ndzwi/, 'tusk'; /ka.rɬwek/, 'roll up (sleeves)'; /ta.rnd ʒak/, 'wrinkle'; /ka.ndɬwaŋp/, 'tumble, fall'; /ka.rdzwa/, 'dig'.

The affricates /tʃ/, /tʃ^h/ and /dʒ/ are realised anywhere between a post-alveolar and a palatal position:

- (8) /katʃ^hi/ [ka'cç^hi] go
 /japtʃen/ [ja'ɸtʃen] stirrup

I have not found any contrasting pairs for separate palatal and post-alveolar affricates, so I have chosen to use one set under palatals, allowing for free variation under influence of the phonetic environment. In the examples above the variation might be explained by the occurrence of [i] in the verb /ka.tʃ^hi/, 'go', which effects a more palatal sound for the affricate, and the bilabial [ɸ] in /ja.ptʃen/, 'stirrup', which hauls the whole consonant cluster more forward into an alveolar position.

Mansier⁶⁵ has commented on free variation between aspirated palatals and affricates for the Xiǎojīn dialect of rGyalrong as well as for some of the Amdo dialects. He notes that in some places older people tend to differentiate between palatal plosives and affricates, whereas younger people do not, and that in some locations he found either only a palatal plosives series or a series of affricates, whereas in other places both occur.⁶⁶ In previous literature on rGyalrong this same pattern is reflected, with some scholars reporting postalveolar and palatal affricates, but no palatal plosives,⁶⁷ some finding one series of affricates and a palatal plosives series.⁶⁸ Only one scholar, Kin P'eng⁶⁹ attests both a double series of affricates and a palatal plosives series. In Jiǎomùzú there is clear contrast between the post-alveolar affricates and palatal plosives. I give a full set of minimal pairs in Appendix A.

velars

/k/	voiceless unaspirated velar plosive	[k]
/k ^h /	voiceless aspirated velar plosive	[k ^h]
/g/	voiced unaspirated velar plosive	[g]
/ŋ/	velar nasal	[ŋ]

Occurrence of /g/ is relatively rare.

glottals

/ʔ/	glottal stop	[ʔ]
/h/	glottal fricative	[h]

The glottal stop always occurs utterance-initially before a vowel, in native vocabulary as well as in loanwords. I have not found any smooth onsets, that is, onsets without a glottal:

⁶⁵ Mansier (1983: 91-94).

⁶⁶ The distinction is very clear in the spelling of literary Tibetan, and is maintained in the Amdo dialects of Mag-sar བཀ་སར་ and Tsho-bzhi ཚོ་བཞི་ in Hóngyuán (红原, Hong yon རྩོད་ཡོན་) County, a little north of the rGyalrong areas: [tʃʰʔ], 'what', literary Tibetan: ཅི *cí*; [tʃʰə], 'water', literary Tibetan: རྩུ, *chu*; [cə], 'genitive particle', literary Tibetan: ཀྱི, *kyi*; [cʰə], 'dog', literary Tibetan: རྩུ, *khyu*.

⁶⁷ Jīn (金) 1957, Chang Kun (张琨) 1968, Lín Xiàngróng 1993.

⁶⁸ Nagano 1984, Lin 2000.

⁶⁹ Kin P'eng 1949.

(9)	/apa/	[ʔa ¹ pa]	father
	/amo/	[ʔa ¹ mo]	mother
	/are/	[ʔa ¹ re]	barley liquor
	/awurəṛə/	[ʔa ¹ wurəru]	snail
	/ardi/	[ʔa ¹ rḍi]	turban
	/owe/	[ʔo ¹ we]	yes

In this position the glottal stop contrasts with other consonants, e.g. the glottal fricative /h/, see Appendix A for examples of minimal pairs. Since there are no syllables with a smooth onset, the Jiăomùzú syllable canon does not allow for syllables that consist of a vowel only, making it imperative here to consider the glottal stop to have full phoneme status.⁷⁰ Also, Jiăomùzú allows for clusters of two consonants after the vowel, see section 2.3.b. There are plenty of words that have a glottal stop in final or pre-final position in final syllables, where they are in contrast with other consonants:

(10)	/kəruʔ/	(rGyalrong) Tibetan
	/kəru/	very
	/kəruk/	strong, black (of tea)
	/kəruʔk/	lynx
(11)	/kəsuʔ/	sunny
	/kəsuk/	tight
(12)	/kamoʔt/	drink
	/kamoʔ/	hungry
(13)	/ndoʔ/	have
	/kandon/	read
(14)	/ca/	musk deer
	/zdeʔmcaʔ/	mist
	/caʔkcaʔk/	magpie
	/tacakcak/	awn of wheat

⁷⁰ In the literature on rGyalrong most scholars have chosen to limit the glottal stop to phonetic status only, because it occurs word initially in relatively few words. However, Tibetan grammarians of old have dealt with the same issue by considering the glottal stop as a full phoneme. It has its own a symbol in the Tibetan syllabary: ཨ, *A-chen*, 'big a', the thirtieth consonant. In Tibetan, *A-chen* contrasts with *a-cung*, 'small a'. As mentioned in the body of the text, Jiăomùzú lacks the contrast between onsets that have a glottal and smooth onsets. There is only contrast between onsets that have a glottal and onsets that have a single other consonant.

Because of this I reckon the glottal stop as a full consonant. Since the glottal stop occurs always utterance-initially before a vowel and is therefore predictable, for the sake of convenience I do not mark its occurrence in that position in phonemic transcriptions.

Glottal stops occur in native vocabulary as well as in loanwords:

- | | | | |
|------|------------|-------------|--|
| (15) | /haŋtoʔwɿ/ | [haŋ'toʔwɿ] | soy bean; Chinese: 黄豆, <i>huángdòu</i> |
| | /saʔnɿ/ | [saʔnɿ] | umbrella; Chinese: 伞, <i>sǎn</i> |
| | /jaŋjuʔɿ/ | [jaŋ'jyʔɿ] | potatoe; Chinese: 洋芋, <i>yángyù</i> |

Final plosives and nasals are often unreleased, especially after a glottal stop. Glides and fricatives are usually released, but not always. I have not found any rule that governs the release of finals after a glottal. It seems to be up to individual speaker preference.

- | | | | |
|------|------------------------|--|------|
| (16) | /p ^h aroʔk/ | [p ^h ɑ'rəʔk ^ˀ] | crow |
| | /təwaʔm/ | [tə'waʔm ^ˀ] | bear |
| | /k ^h rəʔw/ | [k ^h rəʔw ^ˀ]; [k ^h rəʔw] | rice |

In connected speech, compounds, etc. finals are usually slurred or drop out altogether, or assimilate:

- | | | | |
|------|------------|------------|------------------------------|
| (17) | [pak] | /pak/ | pig |
| | [paŋ'ndze] | /pak-ndze/ | pig food, swill (pig + food) |
| | [pa'ŋgor] | /pak-ŋgor/ | pork fat (pig + fat) |
| | [pa'rŋaʔ] | /pak-rŋaʔ/ | wild boar (pig + wild) |

Glottal stops, like other finals in Jiǎomùzú, also disappear in compounds, due to morphological processes such as the marking of person or number, and because of assimilation. In phonemic transcriptions I maintain the glottal:

- | | | | |
|------|-----------------------|---------------|--------------------|
| (18) | [tə'pʃiʔ] | /təpʃiʔ/ | excrement |
| | [təpʃiʔ'rboʔ] | /təpʃiʔ'rboʔ/ | fart |
| (19) | [pkwaʔ] ⁷¹ | /pkwaʔ/ | chicken, hen |
| | [pkwa'puʔ] | /pkwaʔpuʔ/ | chick, little bird |
| (20) | [kaŋa'tsoʔ] | /kanatsoʔ/ | look, see |
| | [ŋa'tsoŋ] | /natsoʔŋ/ | look, 1s |

⁷¹ The form /pkwaʔ/ also often occurs as /pwaʔ/. In this study I use both forms.

All these things conspire to make glottal stops, those slippery customers, hard to spot. The only way of hearing and analyzing their position properly is in the isolation of individual words. I further discuss glottal stops in section 2.3.h below.

Though the glottal fricative /h/ is a relatively rare phoneme, it does occur in native vocabulary, (21), as well as in loanwords, (22):

- | | | | |
|------|-------------------|-----------------|--------------------------------------|
| (21) | [t̪ərə'har ka'va] | /t̪ərəhar kava/ | pant for breath |
| | [t̪a'həm ka'va] | /tahem kava/ | yawn |
| | [ha'r̥d̥o] | /hardo/ | that side |
| | [wa'hum kəmiʔ] | /wahum kəmiʔ/ | tasteless, bland |
| (22) | [kə'haʔw] | /kəhaʔw/ | good; Chinese: 好, <i>hǎo</i> |
| | [hun] | /hən/ | minute; Chinese: 分钟, <i>fēnzhōng</i> |

/h/ is sometimes realised as a velar fricative:

- | | | | |
|------|----------|---------|---|
| (23) | [mba'xe] | /mbahe/ | water buffalo; lit. Tibetan: མ་ཧེ, <i>ma-he</i> |
|------|----------|---------|---|

Final consonants of words, even if spoken in isolation, are frequently not released. In normal speech finals are unreleased or drop out altogether, or assimilate with the onset of the next word. This can make it hard to hear which is the consonant in final position. Especially tricky is the distinction between final velar plosive /-k/ and glottal stop /-ʔ/. The bilabials /-p/ and /-m/ and the alveolars /-t/ and /-n/ can be difficult to pin down too. At least they are more easily distinguished, in their unreleased shape, from glottal stop /-ʔ/ because of their different points of articulation. The problem is even more pronounced in words with a pre-final glottal, after which the final consonants are usually unreleased and tend to be devoiced as well.

In light of this, an interesting question is whether the glottal stop in Jiǎomùzú indicates a loss of final stops in some cases. I have found that within the different villages and settlements of Jiǎomùzú there are differences in pronunciation of glottals and final consonants. For example, most Jiǎomùzú speakers use [kə'ruʔ] for 'Tibetan, rGyalrong', as do speakers from other central rGyalrong dialects. But speakers from the Jiǎomùzú Mùchǎng, the high altitude grasslands, say [kə'ruk]. Also, the use of the glottal between the wider dialect groupings of rGyalrong, such as Southern and Central, is not consistent. One example comes from a Southern rGyalrong dialect of Xiǎojīn. Professor Āwàng, a native speaker of the Xiǎojīn dialect, when asked to write down in Tibetan script the word for 'put', gave ཀཱ་གྲུད་, *ka-gtad*, [ka'x̥t̪at̪]. In both Jiǎomùzú and Zhuōkèjī the word for 'put' is /kataʔ/, [ka't̪aʔ].

A comparison of different dialects of rGyalrong might be a worthwhile exercise to see where final stops occur, and where only a glottal stop. If such comparative research would show a tendency of final plosives to atrophy into glottal stops this may well indicate the beginning stages of a movement

towards the development of tone in rGyalrong dialects, as Dài and Yanmuchu⁷² proposed in their work on Suōmò. Interestingly, recent research⁷³ found that minimal pairs for words with and without final glottal occur throughout the dialects, but often it involves different pairs in different dialects. This sort of inconsistency may be another indication that rGyalrong final consonants are in the process of disappearing, and that this process unfolds differently in each speech community. More on the possible relationship between the glottal stop and tonality in rGyalrong follows in sections 2.3.h and 2.3.i on tone and pitch below.

c. *Vowel phonemes: phonetic description and allophones*

front vowels

/i/	close unrounded front vowel	[i]
/e/	close-mid unrounded front vowel	[e]

central vowels

/ə/	mid unrounded central vowel	[ə]
/a/	open unrounded central vowel	[a]

Scholars disagree as to the existence of the central vowel on a phonemic level. Jīn Péng,⁷⁴ for the Suōmò dialect, concluded that it does exist, but has a tendency to turn into cardinal vowels, especially /e/ and /i/. Mansier,⁷⁵ for Xiǎojīn, notes a strong tendency to centralisation and neutralisation of all the cardinal vowels, especially for /i/ and /u/. On a phonetic level this leads to frequent occurrence of the central neutral vowel. The tendency to centralisation of the close vowels explains the occurrence of [ə] for the most part. Other occurrences are in Tibetan loans in which the vowels /i/ and /u/ from literary Tibetan are all realised as /ə/, as they are in nomad Amdo dialects. Because of this Mansier does not want to grant [ə] full phoneme status. But he admits that he is left with a number of words in which it is difficult to link [ə] to any of the cardinal vowels /i/, /e/ and /u/, and maintains the central vowel in his phonemic transcriptions.

In the Jiǎomùzú dialects [ə] occurs both in accented and in non-accented syllables, in open as well as closed ones, and in words that are not clearly Tibetan loans. There is contrast between [ə] and all the cardinal vowels, see Appendix A for minimal pairs at the end of this chapter. Processes of

⁷² Dài Qīngxià (戴庆厦) and Yanmuchu 1992.

⁷³ S. Penner, personal communication, summer 2009. Mr. Penner, who is involved in a survey of rGyalrong dialects, mentioned that a list of minimal pairs for Zhuōkèjī did not give results in the township of Dǎngbà. There were minimal pairs there too for contrast between final glottal stops and words ending in vowels, but they were different from the Zhuōkèjī pairs.

⁷⁴ 金鹏 (Kin P'eng) (1957-58: 226-229).

⁷⁵ Mansier (1983: 141-146).

harmonisation and assimilation explain much of the instability of the rGyalrong vowels noted by Jin and Mansier. I give examples of these processes in section 2.3.j.

back vowels

/u/	close rounded back vowel	[u]
	after palatals	[y]
/o/	close-mid rounded back vowel	[o]

Vowel quality:

Vowels in the Jiǎomùzú dialects tend to be very short, to the point of sometimes disappearing altogether in unstressed syllables, see section 2.3.b on CV patterns. This tendency is especially strong for the central vowel /ə/:

- (24) /mbərzaʔ/ [mbr¹zaʔ] knife

The Jiǎomùzú dialects have a preference for rounding as well as backing, especially in the village of Kǒnglóng. In many words /u/ or /o/ occurs in places where other dialects, especially Suōmò and Zhuōkèjī, have /i/. It may be this feature that makes native rGyalrong speakers perceive of the Jiǎomùzú dialects as more 'heavy' than the Suōmò or Zhuōkèjī dialects: ⁷⁶

(25)	Jiǎomùzú	Suōmò	Zhuōkèjī
grass plot	/kajvuʔ/	[kaipi]	[kəipiʔ]
buy	/kaku/	[kaki]	[kaki]
grey	/kəbu/	[kəgbi]	[kəbgi]
four	/kəbdu/	[kəwdi]	[kəwdi]
day	/ʃnu/	[ʃpi]	[sni]

Cardinal vowel /i/ is mostly stable.

Cardinal vowel /e/ can be realised as [ɛ], especially in stressed or accented syllables:

(26)	/k ^h əʃp ^h eʔs/	[k ^h əʃp ^h ɛʔs]	marmot
	/təmt ^h ek/	[tə ¹ mt ^h ɛk]	waist
	/spen/	[spɛn]	glue
	/sokle/	[sɔx ¹ lɛ]	saw

⁷⁶ The Suōmò data are from Jin 1957-8, the Zhuōkèjī data from Hsieh (Xiè, 谢) 1999. In Hsieh's data I have left out the tone markings, as they are irrelevant to the point under discussion here.

The Jiāomùzú vowels are often influenced by their environment and assimilate in a variety of ways. I give examples in section 2.3.j on assimilation below.

The default realisation of /a/ is mostly somewhere between central open and front open position:

(27) /təwaʔm/ [tə'waʔm̐] bear

The vowel /a/ tends to brighten, especially in stressed or accented syllables where /a/ can be realised a bit less open as [æ] or even [ɛ]. This can make it hard to distinguish between /a/ and /e/:

(28)	/kaleʔt/	[ka'leʔt̚], [ka'laeʔt̚]	hit
	/tʰozan/	[tʰo'zɛn̐], [tʰo'zæn̐]	portion, ration
	/ntʰam/	[ntʰæm]	religious dance
	/marsar/	[mar'sɛr], [mar'sær]	fresh butter
	/tamŋaʔn/	[tam'ŋɛʔn̐]	bad omen

Vowels can flip-flop, with one vowel in a single syllable words but another vowel in compounds. Example (29) shows a change from /a/ to /e/:

(29)	[ɬe]	/lhe/	deity
	[ɬa'ndʁe]	/lhandʁe/	ghost
	[c ^h e], [c ^h ɛ]	/c ^h e/	liquor
	[c ^h a'lə]	/c ^h alə/	distiller's yeast

However, this does not mean that in every loan from Tibetan or close cognate with Tibetan the vowel /e/ is a representation of an underlying /a/. For example, in words such as /rgom be/, 'monastery', literary Tibetan: དགོན་པ་, *dgon-pa*, /e/ remains no matter what.

Cardinal vowel /o/ is almost always pronounced as [ɔ] in closed syllables, often with a very back quality when influenced by velar plosives etc.:

(30)	/təmdoʔk/	[tə'mdɔʔk̐]	colour
	/mbrot ^h oʔ/	[mbro't ^h ɔʔ]	colt
	/zgrok/	[zgrɔk]	bracelet

Cardinal vowel /u/ is realised as [y] after palatals. Since this is predictable, it does not need to be marked in phonemic transcriptions:

(31)	/patʃu/	[pa'tʃy]	bird
	/təɲu/	[tə'ɲy]	name
	/pəʃu/	[pə'ʃy]	mouse

2.3 The word

a. The building blocks of a word

The phonological word is made up of one or more syllables. The distinguishing features of the word are syllable pattern and contents. As shown below, there are nine possible patterns for the basic Jiāomùzú word. For clarity a dot separates syllables while a hyphen connects morphemes:

- * a single unprefix root: /zji/, 'ten'; /rdwe/, 'argali'.
- * two syllables that are not clearly divided in root and prefix, and are also not clearly a compound. These words are bisyllabic but monomorphemic: /mba.la/ 'ox'; /jor.wu/, 'squirrel'.
- * three syllables that are not prefix and root combinations, nor a compound. Such words are trisyllabic but monomorphemic: /tsa.gə.jo/, 'yellow weasel'; /na.mə.rjan/, 'ceiling'.
- * four syllables that are not a combination of affixes and a root, nor a compound, forming quadrisyllabic monomorphemic words: /da.tsə.go.go/, 'two-stringed instrument'; /a.rə.wu.rə/, 'hard working'.
- * a prefix and a root, forming bisyllabic bimorphemic words: /ta-roʔ/, 'chieftain, leader' (nominal prefix-root); /ka-vi/, 'come' (nominaliser-root). Sometimes the difference between a prefix-root combination and a two-syllable but monomorphemic word that is not a compound or other combination is difficult to make. The main test is whether or not the syllables can be split up and still carry meaning. In the following example *kə-* is a bound morpheme which does not carry meaning independently. It does not mean 'one' and is not a nominaliser or an aspectual marker, as in other uses of *kə-* (see for example sections 7.1 and 4.3). In the word *kəruʔ*, 'Tibetan', neither *kə-* nor *ruʔ* have meaning by themselves:

(32)	/kə.paʔ/			Han Chinese
	/kə.ruʔ/			(rGyalrong) Tibetan
	*/ruʔ-ndzu/	/kə.ruʔ-ndzu/		Tibetan log ladder (Tibetan-log ladder)
	*/paʔ-ndze/	/kə.paʔ-ndze/		Han Chinese food (Han Chinese-food)

- * two affixes and a root: /ka-sa-psoʔ/, 'compare' (prefix-CAUS-root); /ka-və-məndə/, 'be about to arrive' (prefix-VP-root). Causativity and viewpoint markers such as *sa-* and *və-* respectively are discussed in chapter 7 on verbs.

- * two affixes and a reduplicated root: /ka-ŋa-le-leʔt/, 'fight' (prefix-REC-RED-root). I discuss reciprocity markers like *ŋa-* in chapter 7 on verbs.

These forms, usually found in verbs, consist of set combinations of affixes and roots. Such words, in the perception of native speakers, are no longer productive combinations of meaningful affixes and roots, though often the meaning of the different affixes can still be fairly easily derived.

- * a compound of two or more roots: /zji-mŋi/, 'fifteen' (ten-five); /pwaʔ-puʔ/, 'chick' (chicken-child). Often the roots used in this sort of compound have prefixes of their own when used by themselves: /ta-puʔ/, 'child'; /kə-mŋi/, 'five'.

* a root combined with a number of affixes: /ma-kə-ndʒa/, 'different, naughty' (NEG-prefix-root). The number of syllables in such words can be four or more. If a word consists of more than four syllables it is usually a cluster of affixes bound to a verb root.

Of all these possible forms, one and two syllable words are by far the most common. Three and four syllable words, other than words consisting of several affixes and a root, which are mainly verb phrases, are rare.

b. *CV patterns*

pattern chart

CV	CVC	CVCC	CVCCC	CVCCCC
CCV	CCVC	CCVCC	CCVCCC	CCVCCCC
CCCV	CCCVC	CCCVC	CCCVCCC	CCCVCCCC

Below are examples of CV patterns. In order to make a clear distinction between morphemes and syllables I use a dot between syllables and hyphens between morphemes.

CV	/ca/	[ca]	musk deer
	/k ^h ə/	[k ^h ə]	hound
	/a.rdi/	[ʔa'rɗi]	turban
CCV	/mbu.ru/	[mbu'rɒ]	plough
	/zʒi-mɲi/	[zʒi'mɲi]	fifteen (ten-five)
CCCV	/rdwe/	[rɗwe]	argali
	/ta-ndzwi/	[tə'ndzwi]	tusk (prefix-root)
CVC	/k ^h oŋ]	[k ^h oŋ]	tiger
	/tʃ ^h ət/	[tʃ ^h ət]	goat
CCVC	/kə-ʃpət/	[kə'ʃpuɗ]	livestock (prefix-root)
	/kroŋ.kroŋ/	[krɔŋ'krɔŋ]	throat
CCCVC	/kə-rscat/	[kə'rscat]	eight (prefix-root)
	/spjaŋ.kə/	[spjaŋ'kə]	wolf
CVCC	/t ^h o-jn/	[t ^h ɔjɲ]	ascend-3p
	/tʃ ^h i-ndʒ/	[tʃ ^h indʒ]	go-3d

CCVCC	/zdeʔm/	[zdeʔm]	cloud
	/ka.ntʰak-j/	[ka'ntʰej]	in town (root-LOC)
CCCVCC	/ta-mbraʔm/	[ta'mbraʔm]	measles (prefix-root)
	/rdzwa-ndʒ/	[rdzwandʒ]	dig-3d
CVCCC	/kə-ŋan-ndʒ/	[kə'ŋendʒ]	the two evil ones
	/kə-va-mot-ndʒ/	[kə'vamondʒ]	the two who are blown away
CCVCCC	/kə-pjis-ndʒ/	[kə'pjindʒ]	the two who apply ointment
	/kə-ŋa-ndzor-ndʒ/	[kə'ŋandzondʒ]	the two who bark
CCCVCCC	/kə-rmbat-ndʒ/	[kə'rmbandʒ]	the two who draw near
	/kə-mpʃar-ndʒ/	[kə'mpʃandʒ]	the two beautiful ones
CVCCCC	/na-laʔt-jn/	[na'læjn]	hit, second or third person plural perfective
	/kə-neʔk-ndʒ/	[kə'nendʒ]	the two black ones
CCVCCCC	/kə-mtʃoʔk-ndʒ/	[kə'mtʃoŋndʒ]	the two old ones
	/kə-rkoʔt-ndʒ/	[kə'rkondʒ]	the two who engrave
CCCVCCCC	/kə-ʃkraʔk-ndʒ/	[kə'ʃkraŋndʒ]	the two clever ones
	/kə-skriʔn-ndʒ/	[kə'skrindʒ]	the two long ones

Note that syllable breaks and morpheme boundaries do not necessarily coincide, as in the case of person and number suffixes such as /-ndʒ/. On a morphological level /rdzwandʒ/, 'dig, third person dualis', contains a verb root suffixed with the non-first person dualis marker /-ndʒ/: /rdzwa-ndʒ/. But on the level of the syllable there is no boundary between the verb root and the suffix, since the suffix does not have a vowel and therefore cannot be a syllable in its own right. It can be argued that the non-first person dualis marker is a shortened form of a syllable /ndʒə/, as discussed in section 2.3.b on consonant clusters below. But even if /-ndʒ/ is interpreted as a syllable, the non-first person plural marker /-jn/ leaves no doubt that for person and number marking the syllable boundary and the morphological boundary do not coincide. Plural marker /-jn/ cannot be re-interpreted as a full syllable that has a vowel as well as consonants, so the case for a syllable pattern that has two final consonants stands, supported both by the occurrence of pre-final glottal stops and person and number markers such as /-jn/. Verbs that have in their last syllable a consonant as their final or a coda of a glottal stop and a final have CV patterns with three and four final consonants respectively, when these verbs are marked for second or third person plural with /-jn/.

c. *The status of the glottal stop*

Glottal stops have a limited distribution. They occur word-initially before a vowel and word-finally in final position or before the final consonant. Jiǎomùzú CV patterns call for syllables that consist at the least of one consonant and one vowel. There are quite a few words that start with only a vowel, see section 2.2.b on glottals in the description of consonants above, but there are no words or syllables that have a smooth onset. They all have either a glottal stop or a consonant as their initial. These words would be ungrammatical unless I propose a glottal stop to fill the required consonant slot in the CV pattern. Morphological marking, predominantly person and number marking, implies a CV pattern that has two final consonants. Non-first person plural is marked by /-jn/ suffixed to a verb root. The suffix /-ndʒ/, added to a verb root, marks second and third person dualis. It would be tempting to say that Jiǎomùzú syllable patterns normally either end in a vowel or in one consonant, and to view the occurrences of -CC as secondary, caused by morphological markers. However, this view would not take into account the plentiful occurrence of syllables that end in -ʔC. Either I count the glottal stop /ʔ/ as a proper phoneme, in which case I don't have to assume that there is a CV pattern consisting of a vowel only. But I do have to assume that rGyalrong can have syllables ending in two consonants - and proof for this comes from syllables that consist of a verb root and a person marker. Or I have to assume the glottal stop is a secondary phonetic phenomenon, in which case I have to assume a syllable consisting of one vowel only. Furthermore I am left with a large number of syllables ending in -ʔC, with the occurrence of the glottal unexplained unless there is another process at work that produces pre-final glottal stops. Such a possibility exists in the theories of tonality which have been put forward by several scholars. I will discuss them in section 2.2.h on tone below. A third possibility is that the glottal stop is a full phoneme word-initially but secondary in word-final position.

For now, in light of the previous observations, it seems to make more sense to grant the glottal stop full phoneme status and keep the most elegant CV patterns, as shown in the examples above.

d. *Syllable canon*

The Jiǎomùzú syllable canon can be represented in a formula as follows:

(C1)(C2)C3(C4)V(C5)(C6)

The consonants between brackets are optional. A Jiǎomùzú CV pattern at its simplest consist of C3 and a vowel. C4 is always an approximant (/j, l, w/ or /r/). The following subsections give a description of the possible initial and final consonant clusters. In the examples syllable breaks are represented by dots while morpheme boundaries are indicated by hyphens.

Initial clusters with three consonants

A Jiǎomùzú initial consonant cluster can at most have three consonants. There are two distinctive patterns for clusters with three consonants, with C1 and C4 being mutually exclusive. In the first one

C1 is empty, C4 is filled with a glide. In the second pattern C4 is empty, while C1 is filled by /r, m/ or /j/. here are some examples of the first pattern, [C1C2C3V(C5)(C6)]:

- (33)
- | | |
|---------------------------|---------------------------------|
| /ta-rmbok/ | mane (of a horse) (prefix-root) |
| /kə-rscat/ | eight (prefix-root) |
| /kə-mpʃar/ | beautiful (prefix-root) |
| /ca-mpso/ | musk (deer-musk) |
| /tə-jmbak/ | leaf (prefix-root) |
| /k ^h a. jŋguʔ/ | trough |

Some of the data with the glide /j/, such as /k^hajŋguʔ/ is suspect, in that /j/ may be an infix or part of a merged prefix⁷⁷ rather than a consonant properly belonging to the initial consonant cluster. This is a morphological rather than a phonological issue. More analysis, especially of meaning and form of affixes, should solve some of the problems surrounding the occurrence of /j/ in C1 position. In this pattern, C2 can be filled by /p, b, m, n, s, z, ʃ, ŋ/. C3 can be filled by /b, d, s, ʃ, dʒ, c, g/.

Examples of the second pattern, [C2C3C4V(C5)(C6)], are:

- (34)
- | | |
|------------|----------------------------|
| /mbroʔ/ | horse |
| /tə-skruʔ/ | body (prefix-root) |
| /spjaŋ.kə/ | wolf |
| /ka-mbjam/ | fly (v) (prefix-root) |
| /rdwe/ | argali |
| /tə-ntwa/ | sickle (prefix-root) |
| /tə-ŋgli/ | falsehood (prefix-root) |
| /ka-skliʔ/ | bear, endure (prefix-root) |

In this pattern, C2 can be filled by /p, m, n, s, z, r, ʃ, ʒ, k, ŋ, j/. C3 can be filled by /p, p^h, b, t, d, ts, dz, dʒ, c^h, k, g/.

Initial clusters with two consonants

Initial clusters consisting of two consonants follow either one of two patterns, [C2C3V(C5)(C6)] or [C3C4V(C5)(C6)]. C4 must be filled by a glide. The pattern in which both C2 and C3 are filled is rather more common than the second pattern with the C3C4 cluster. Below are some examples of the [C2C3V(C5)(C6)] pattern:

⁷⁷ Merged prefixes are quite common especially in Jiǎomùzú verb morphology. Verbal prefixes that mark mood, tense, aspect and evidentiality, among others, can merge into one prefix by retaining the initial consonant of the first prefix while the initial consonant of the second prefix is dropped. The vowel of the first prefix is dropped while the vowel of the second prefix is retained. In some cases a merged prefix can consist of three prefixes all rolled into one. For a discussion, see the chapter on verbs.

- (35)
- | | |
|-----------|--------------------------|
| /ta-ɾpi/ | hair (prefix-root) |
| /kə.mbuʔ/ | yak calf |
| /kə-ʃpət/ | livestock (prefix-root) |
| /tə-pʃiʔ/ | excrement (prefix-root) |
| /tə-ktsa/ | shoe, boot (prefix-root) |

In this pattern, C2 can be filled by /p, b, m, s, z, n, r, l, j, v, ʃ, ʒ, k, g, ŋ/. C3 can be filled by any consonant apart from /ʔ/. Examples of [C3C4V(C5)(C6)] are:

- (36)
- | | |
|-------------------------|-------------------|
| /k ^h a.priʔ/ | snake |
| /pja.rgoʔt/ | vulture |
| /ta-vluʔ/ | age (prefix-root) |
| /swej/ | barley |

In this pattern C3 can be filled by /p, p^h, m, t^h, r, s, z, v, j, ts, ʃ, ʒ, tʃ^h, c^h, k, k^h, g, w/.

Final clusters

Jiāomùzú has thirteen consonants that can fill the final slot: /p, t, k, m, n, ŋ, dʒ, s, w, j, l, r, ʔ/. All of these, apart from /ʔ/ and /dʒ/, can be preceded by a glottal stop, see Appendix A and section 2.3.h. The only other possible clusters in final position are /-jn/ and /-ndʒ/, which are person markers, see section 7.2 on person and number in the verbs chapter. There are no voiced plosives, fricatives or affricates in final position. The suffixes /-dʒ/, which marks first person dualis, and /-ndʒ/, for non-first dualis, are exceptional. Because of their voicing, one would almost expect there to be a vowel following the consonant cluster: /-dʒə/ or /-ndʒə/. Supporting evidence for this comes from the second person dual pronoun /ndʒənʝo/, a variant of /nənʝondʒ/ (see chapter 3 on pronouns). The conclusion must be that the full form of the markers is indeed /-dʒə, -ndʒə/, but that in normal speech the vowel becomes diminished to the point of being lost, while the tell-tale voicing remains. In this study I transcribe the dualis markers, if in syllable final position, without the final vowel, but retaining their voicing.

Morphological processes such as marking of locatives and person markers may replace the final consonant(s) in a syllable at the phonetic level. These issues are described in section 2.3.j in this chapter and in the following chapters on morphology.

Obviously, this overview only reflects the possibilities within the present set of data. Though I have little doubt that the general analysis of the syllable canon is right, there is a danger in trying to give rules as to which consonants exactly group together and how. There is a good chance that, with the accumulation of more data as well as fine-tuning of the analysis for syllable breaks, new and different insights as to the clusters' internal rules of combination will emerge. For now I simply give a list of all the clusters I have found in Appendix B.

e. *The approximants*

A syllable in Jiăomùzú can have only one vowel. The simplest Jiăomùzú syllable consists of a consonant and a vowel. There is overwhelming evidence, based on this CV pattern, that the glides /w, j, r, l/ behave as consonants. None of the approximants ever occurs in the position of a vowel. There are no syllables without vowels in which an approximant acts as a vowel:

(37)	/tə-waʔm/	bear (prefix-root)	/wu-graʔl/	system (3s-root)
	/tsa.gə.jo/	yellow weasel	/ja.wət/	balcony
	/kʰo.roʔk/	ant	/kə.par/	jackal
	/ka.laʔ/	rabbit	/leŋ.leŋ.fuʔ/	kind of wild berry

f. *Prenasalised series*

There is a complete series of prenasalised plosives and affricates. The prenasal consonants is expressed by N:

(38)	Np Np ^h Nb	Nts Nts ^h Ndz
	Nt Nt ^h Nd	Ntʃ Ntʃ ^h Ndʒ
	Nc Nc ^h Nɟ	Ntɬ Ntɬ ^h Ndɬ
	Nk Nk ^h Ng	

'Prenasalised' here indicates a nasal occurring before a plosive or affricate that harmonises for place of articulation with the plosive or affricate. The palatal plosives are a bit of an exception in that they are prenasalised by /n/ which is realised almost as far back as a palatal, but without the distinctive palatalised sound of /ɲ/. The prenasalised consonants in Jiăomùzú are similar to the clusters in literary Tibetan that are transcribed with འ, *a-cung*, 'small a'. Plosives and affricates can be prefixed by a nasal that does not harmonise. Such clusters are not counted as prenasalised clusters. In example (39) the nasal harmonises with the bilabial, the cluster counts as a prenasalised one:

(39)	/mbor.kʰe/	literary Tibetan: འབར་ཁམས་ <i>'Bar-khams</i> , place name.
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But in (40) the nasal does not harmonise with the velar and is considered a full consonant:

(40)	/kə-ngu/	nine (numeral prefix-root)
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In the phonetic and phonemic transcriptions used in this study all nasals of prenasalised clusters are transcribed as full consonants, harmonising for place of articulation of the following plosive or affricate. So far only /ntɬ^h/ and /ntʃ/ are lacking in my data. More data gathering will eventually

show whether these clusters do not exist in Jiǎomùzú or if my initial data set simply missed them. Examples of prenasalised series:

(41)	/mp/	/kampʃok/	build, erect	/ka.mpuʔ/	cloth
	/mp ^h /	/təmp ^h et/	vomit	/təmp ^h i/	outside
	/mb/	/tambat/	mountain	/təmbriʔ/	rope
	/nt/	/təntwa/	sickle	/təntok/	beak
	/nt ^h /	/kant ^h en/	pull		
	/nd/	/sondiʔ/	day after tomorrow	/tandar/	rubbish
	/nc/	/tancap/	shadow side of a slope	/kancu/	transport
	/nc ^h /	/kənc ^h at/	flat	/k ^h anc ^h wak/	pit, stone
	/ɲj/	/k ^h anʃarara/	cicada	/ɲjuruʔ/	nit
	/ŋk/	/kavanʃka/	chew		
	/ŋk ^h /	/təŋk ^h uʔ/	behind, back	/kaŋk ^h ruŋ/	incarnate
	/ŋg/	/kananʃə/	share	/ʃkʉŋguʔ/	pestle
	/nts/	/karantsuk/	cut up		
	/nts ^h /	/kanənts ^h ok/	gnaw	/kənts ^h əʔp/	hasty
	/ndz/	/kawandzor/	grind	/tandzwi/	tusk
	/ntʃ/				
	/ntʃ ^h /	/kantʃ ^h a/	butcher	/kantʃ ^h iʔ/	choose
	/ndʒ/	/tarndʒak/	wrinkle	/wuʃondʒ/	3d
	/ntʃ/	/kantʃok/	wild goose		
	/ntʃ ^h /				
	/ndʃ/	/kandʃaʔp/	tumble, fall	/təndʃu/	skin

g. *Syllable breaks*

As explained in section 2.3.b on syllable patterns above, morpheme boundaries and syllable breaks do not always coincide. The most frequent occurrence of a disconnect between boundaries on the morphological and syllabic level is in the case of morphemes that consist of one or two consonants only, while the Jiǎomùzú CV pattern requires each syllable to also have a vowel. For example, *k^horoʔk*, 'ant' consists of the prefix *k^h-* which occurs in animal names signalling 'non-mammal'. The morpheme break is after *k^h-*. But the most basic syllable pattern consists of one consonant and one

vowel, requiring a syllable break after *k^ho*. In the examples in this section a hyphen marks the morpheme boundary, a dot indicates the syllable break:

(42) [k^ho'roʔk] /k^h-o.roʔk/ ant

Since morphemes carry meaning, I mark morphological boundaries in the following chapters, not syllable breaks. Nevertheless, syllable breaks can be important for practical reasons such as the development of a phonologically sound orthography. I therefore briefly discuss some issues concerning syllable breaks here.

For most words in the Jiǎomùzú dialects it is easy to establish clear, unequivocal syllable breaks based on CV patterns and morphological information, since many Jiǎomùzú words consist of strings of morphemes whose boundaries coincide with CV patterns. Two factors that can cause problems in assigning correct syllable breaks are fastness of connected speech and ambiguity of a consonant sequence. In such cases, application of morphological information usually solves the issue. For example, in the fastness of connected speech, and due to a tendency towards voicelessness, vowels sometimes disappear, especially in unstressed syllables. This can lead to wrong grouping of consonants in a cluster and the disappearance of entire syllables:

(43) [n̩aʔə'ʃokʰ] */na-tə-ʃoʔk/ finished, 2s

In normal speech there are apparently just three syllables, though the [ʃ] may sound just a fraction longer than normally, and rounding, expected on consonants in syllables with rounded vowels, does not take place. The unaccountable lengthening of the consonant can be an indication of a hidden vowel, for which in this case proof comes from morphological comparison:

(44) /ka-joʔk/ end (dynamic verb prefix-root) [ka'joʔkʰ]
 /ka-sə-joʔk/ finish (dynamic verb prefix-causal marker-root) [kasi'joʔkʰ],
 [ka'ʃoʔkʰ]

The vowel of the causal marker assimilates for place with the glide, becoming [i], or disappearing altogether. By analogy with this form the correct second singular past form of 'finish' is:

(45) /na-tə-sə-joʔk-w/ finished (past-2-causality-root-2s) [n̩aʔə'ʃoʔkʰ]

Sometimes the apparent loss of vowels leads to seemingly impossible consonant clusters, as in [mbrza], 'knife'. Jiǎomùzú cannot have four consonants in an initial cluster, so there must be a syllable break. But it is unclear how it should be applied: /mbə.rza/ and /mbər.za/ are equally valid and there is no morphological information that can come to the rescue. In such a case the ambiguity cannot be solved dialect-internally. When, say for orthographic reasons, it is still desirable to decide

on a syllable break, comparison with variants from other dialects can be helpful. The following forms are from my word list survey:⁷⁸

(46)	Mǐyàluó ⁷⁹	[brtza]
	Dǎngbà	[mbə ¹ rtze]
	Shāshíduō	[brstza]
	Báiwān	[mbə ¹ rtsa]
	Bǎoxìng	[mbə ¹ rtsa]
	Dānbā	[za ¹ grǐʔ]
	Bādǐ	[za ¹ grəʔk]

Based on a comparison with Bǎoxìng and Báiwān the Jiǎomùzú variant [mbrza] could be analysed as /mbə.rza/.

In some instances an imploded syllable can become part of morphologically standardised forms:

(47)	/kə-raʔm/	dry (non-process verb; prefix-root)
	/ka-rə-kram/	make, cause to dry (process verb; prefix-cause-root)

The cluster /kr/ in the dynamic verb can easily be traced to a contraction of the two syllables of the stative verb. This kind of process may be responsible for quite a few of the initial consonant clusters, especially in verb roots. Careful analysis is needed to see which clusters are morphologically frozen or standardised, and which are actually caused by imploded syllables and should be split up in a prefix and root. Observations as to which clusters are indeed accepted by native speakers as morphological units, and which are strings of affixes that lose their separate identity only in connected speech can fruitfully inform such analysis.⁸⁰

The second factor that can cause mistakes in the correct allocation of syllable breaks is ambiguity of a consonant sequence. The final consonant of the preceding syllable is mistaken for the first consonant of the following syllable and vice versa. This is especially so for words in which it is not immediately clear where an affix ends and a root starts, for loanwords, and for compound words consisting of roots with consonant clusters. Decisions on ambiguous syllable breaks that cannot be resolved with the help of word-internal morphological information can be informed by application of analogy from unambiguous sequences:

⁷⁸ Prins 1997 (unpublished).

⁷⁹ 米亚罗, མྱག་ལོ་ Myag-lo.

⁸⁰ The implosion of syllables due to the tendency of speakers to drop vowels is a phonological process similar to, but not the same as, the morphological processes in which verbal prefixes are merged to form one new prefix, retaining the meanings of both the merged prefixes. For a discussion, see the chapter on verbs.

(48)	[kən'gu]		nine
	[zji]	/zji/	ten
	[zji'ngu]	/zji-ngu/	nineteen (ten-nine)
	*/kən.gu/	/kə.ngu/	nine
	[saxsəŋ'k ^h ʉʔ]		afternoon
	[sa'xsə]	/sa.ksə/	noon
	[tə'ŋk ^h ʉʔ]	/tə-ŋk ^h ʉʔ/	back; behind (n, prefix-root)
	*/sa.ksəŋ.k ^h ʉʔ/	/sa.ksə-ŋk ^h ʉʔ/	afternoon

In a small number of cases dialect-internal characteristics such as CV patterns, morphological information and analogy with unambiguous sequences fail to bring resolution. If nevertheless for pragmatic reasons a choice about a syllable break, one way or the other, has to be made, dialect external or even language external information can inform the decision. For the Jiǎomùzú dialects, comparison with other dialects or languages such as literary Tibetan and Chinese, can be helpful, especially for loanwords:

(49)	[ja'ŋxwo ^ʔ]		matches
	*/ja.ŋxwo ^ʔ /	/jaŋ.hwo ^ʔ /	Chinese: 洋火, <i>yáng huǒ</i> , 'foreign fire'
	[rgambə'tsaʔ]		small box (box-small)
	*/rga.mbə.tsaʔ/	/rgam.bə-tsaʔ/	literary Tibetan: སྐམ་ཅུ་, <i>sgam</i> , 'box'

Sometimes a syllable break can be assigned in either one of two valid ways, for lack of analogy with other syllables, morphological information and direct supportive evidence from other languages or dialects:

(50)	[məntoʔk]	flower
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The Jiǎomùzú syllable canon would support either /mə.ntoʔk/ or /mən.toʔk/. There is no direct match in the literary Tibetan form, which is མེ་རྩ་ཁྱེ་, *me-tog*. In such cases, though there is no dialect-internal evidence that would support one choice over the other, other arguments may be brought into play if a decision is required. The Tibetan form has as initial syllable *me*, and in Jiǎomùzú there are many instances of prenasalised /t/. The preferred choice here may therefore be /mə.ntoʔk/. Such reasoning is clearly not based on phonological or other dialect-internal arguments, but may help decide ambiguous cases while staying as close as possible to common characteristics of the dialect.

h. *Glottal stops, CV patterns and tone*

For the purpose of clarity in the discussions following in this section and the next, I define 'tone' as lexical tone: a distinctive pitch level of a syllable and an essential feature of the meaning of a word. I define 'pitch' as an auditory sensation in terms of which a sound may be ordered on a scale from 'low' to 'high'. And 'accent' is the emphasis which makes a word stand out in a stream of speech. Therefore accent is not solely a matter of loudness but also of pitch and duration. 'Stress' refers to the degree of force used in producing a syllable. Prominence of a syllable is usually due to an increase in loudness of a stressed syllable, but increases in length and often pitch may contribute as well. Lexical stress distinguishes meaning in a word.⁸¹

In previous descriptions of rGyalrong phonology various authors have noted contrast between level and falling pitch, in some studies linked to the occurrence of a glottal in final or pre-final position of the phonological word:⁸²

(51)	[tə'mbrɪ]	plaything, toy	[tə'rpû]	chaff
	[tə'mbrɪʔ]	rope (n)	[tə'rpûʔ]	seed
	[kʰa'ʃpâ]	frog	[kə'jô]	light (not heavy)
	[ka'ʃpāʔ]	know	[kə'jôʔ]	sheep

Different ideas have been offered to account for these phenomena. Some authors have interpreted the data to indicate that rGyalrong has a tonal contrast. However, solutions to the glottal-and-pitch phenomena have lacked the comprehensiveness to account for all data. This is firstly because the contrasting pitch and the occurrence of the glottal are limited to final syllables. Secondly, both the perceived tonality and the glottal stop linked to its occurrence disappear in compounds, even if the affected syllable is still in final position, not to mention connected speech. And third, the contrasting pairs of words are not necessarily the same across the dialects. I have, so far, not found any single syllable words that contrast for pitch in Jiăomùzú. The contrast between level and falling pitch in syllables is, at best, minimal and occurs independently from the glottal stop. In my data there are words with a glottal but a falling pitch. I also have words that have a level pitch, but no glottal appears:

⁸¹ These definitions are borrowed from David Crystal, *A Dictionary of Linguistics and Phonetics* (1991).

⁸² Kin 1949, Mansier 1983, and Nagano 1984 find that tone is not phonemic, and do not mention glottal stops in connection with tone. Jin 1957, Wolfenden 1936, Lín Xiàngróng 1993 and Chang 1968 find some pairs of words in which pitch is contrastive, but all of them admit there is no tonal system to be derived from these. Of these authors, only Wolfenden notes the existence of glottal stops in word final position. The watershed paper on tonality in rGyalrong is Dài and Yanmuchu 1992. Dài concludes that there is tone, or at least that a tonal system is developing, and that occurrence of the glottal stop and level pitch are linked. Lin You-Jing 2000 builds on Dài's work.

- (52) [zwîʔ] wall
 [kôʔ] scallion, onion
 [âʔm] iron

- (53) [ŋōs] be
 [pāk] pig
 [fōk] buckwheat

Then there are instances where an unaccented syllable retains a glottal and a level pitch:

- (54) ['nəmāʔk], ['nəmāʔ] no, not at all

Jiǎomùzú CV patterns may be of help here. In section 2.3.b on CV patterns I have proposed two basic patterns, CV and -V(C)(C), to fit the requirements of my data. One of these, CV, already made it necessary to view the glottal stop as a full phoneme. The -V(C)(C) pattern, necessitated by morphological markers suffixed to the root syllable, leaves space for clusters consisting of two consonants. If the glottal stop counts as a full consonant it can fill either the final or the pre-final consonant spot. It then fits all the Jiǎomùzú data without having to pose a separate tonal system. The disappearance of the glottal from connected speech, compounds etc. may be explained by the tendency in Jiǎomùzú for final consonants to erode into disappearance, and the displacement that takes place when morphological markers are added to the end of a syllable. Or the case can be made for the glottal to have limited distribution, word initially before a vowel, and word finally or prefinally in accented syllables only. A third possible way of looking at the puzzle is suggested by Dài and Yanmuchu in their 1992 paper. They note that the first condition to affect a split into tones is the presence of a final plosive in a syllable.⁸³ If this is correct, the tendency of the Jiǎomùzú dialects to lose finals and the presence of final and pre-final glottal stops may indicate that final stops are eroding into glottal stops. This in turn may point to the beginnings of the development of a tonal system.⁸⁴ Each of these possible interpretations would consider the appearance of the glottal as primary. Pitch becomes a secondary feature that does not contrast, which fits the Jiǎomùzú data. Slight level and falling pitch patterns can be observed. Level pitch mainly, but not always, occurs in closed syllables ending in a plosive, whereas falling pitch occurs predominantly, but not always, in open syllables or in syllables ending in a nasal or a fricative.

An additional indication that the glottal stop is primary, with pitch or tonal features as a secondary issue, comes from data that seems to imply a role for the glottal in distinguishing meaning on the

⁸³ Dài and Yanmuchu (1992: 29).

⁸⁴ There is some anecdotal evidence that supports this theory. For example, I have heard native speakers from Jiǎomùzú Mùchǎng pronounce 'sheep' as [kəʔjəʔk], and 'Tibetan' as [kəʔruk], with a clear final plosive. Also, Professor Āwàng suggests that [taʔroʔ], 'leader' derives from an ancient tribal name pronounced [taʔrək]. The descendants of the people bearing this name became leaders, and the word [taʔrək], by extension, came to mean 'leader, headman, boss'. The final consonant then sloughed off, leaving only a glottal stop, so that now we are left with the contrasting pair /ta.ro/, 'chest' and /ta.roʔ/, 'leader'.

grammatical level as well as on the phonological level. Consider the following two sentences from Púzhì:

- (55) [ka'ndza] /kandza/ eat
 [nə'ndzeŋ] /nə-ndze-ŋ/
 EREFL-eat-1s
 I eat by myself (without any company).
 [ŋa nə'ndzeʔŋ] /ŋa nə-ndzeʔ-ŋ/
 I EREFL-eat-1s
 I eat [something] myself (without sharing it with others).

Apart from the occurrence of *ŋa*, 'I', for emphasis, the only difference between the sentences is the glottal stop. Apparently the glottal stop here marks the subtle difference between semantic notions of 'by myself, without company' and 'by myself, without sharing the food'. The emphatic reflexivity marker *nə-* emphasises 'myself', see section (7.8.e) on reflexivity in the chapter on verbs, but is not able to mark the difference between the two different levels of 'not with others'. For that, the glottal stop is pressed into service. The difference is subtle. Of course, if I eat by myself, I also don't share my food with others. But the second phrase clearly means that there are other people there. I just don't want to give them any of my food. At this point it is unclear to me if such grammatical distinctions marked by a glottal stop are a matter of individual speaker preference, local usage at, say, the village level, or a broadly applicable principle that simply has gone unnoticed before. It is obvious that the glottal stop cannot be ignored and that a dedicated study of its functions and usage may open unexpectedly fruitful fields of study.

In regards to tone rGyalrong gives a mixed picture. Like the Jiǎomùzú dialects, the Northern dialect of Chábǎo does not have tone, though stress is contrastive.⁸⁵ Lin, in her most recent work on the Central dialect of Zhuōkèjī, proposes a simple two-way contrast between toneless words and words that have a falling tone. The glottal stop is not phonemic and plays no role in tonal patterns. Tonality is contrastive not only on the phonemic level but also marks grammatical distinctions.⁸⁶ Sun notes glottal stops as well as tonal alternations that serve, among other things, to mark tense, aspect and modal meanings on verbs for Northern rGyalrong varieties and other members of rGyalrongic.⁸⁷ A preliminary glance at the dialects of Southern rGyalrong shows that some of them have tonal systems that involve at least high, mid and low level tones as well as falling tones, by far the most complex tonal system in the rGyalrongic languages reported so far. At this point only raw data are

⁸⁵ Xiàng (2008: 36).

⁸⁶ Lin 2009.

⁸⁷ Sun 2000a and Sun 2000b.

available,⁸⁸ so that it is not clear yet whether the tones function on a phonological level only or are contrastive on a morphological level also.

i. *Stress, pitch and accent*

Contrastive stress or accent can arise only through morphology. On the phonological level stress is not contrastive. Discussions of contrastive stress on the morphological level can be found in subsection 2 below as well as section 2.3.j of this chapter and in sections 7.4 and 7.5 of the verb chapter. A simple pitch-accent system assigns relative high and low pitch to every syllable in a word, with the accent on the syllable that sounds loudest and has the highest pitch. I give examples of the various pitch patterns below. A stress marker marks the accented syllables. For ease of reading syllables in the examples are separated by a dot. High and low pitch is marked by H and L respectively below the corresponding syllables.

1. Pitch

Pitch patterns for two syllable words

The default pattern for two syllable words is accent on the second syllable, with low pitch on the first:

(56)	/k ^h a.'ɲuk/	pika	/tə.'nuʔ/	breast
	L H		L H	

Two syllable words that consist of a prefix and a root have low pitch on the prefix, and high pitch on the accented second syllable. In two syllable words that are compounds the pitch on the unaccented syllable is somewhat lower than that on the accented syllable, but not as low as on the prefix in prefix-root combinations. Level of pitch is relative:

(57)	/tʃu.'srem/	otter, of /tə.'juʔ/, 'water', and /srem/, 'otter'
	L H	L H

Note that the initial consonant has become voiceless. This can be attributed either to a tendency in Jiāomùzú to devoice initial plosives and affricates or to a straight loan from Tibetan [tʃ^hə'sram], 'otter'; literary Tibetan: རྩ་སྤྲུལ, *chu-sram*.

⁸⁸ The unpublished data are from an extensive survey of rGyalrong dialects undertaken by Professor Nagano.

Pitch patterns for three syllable words

The default pattern for three syllable words is accent and accompanying high pitch on the final syllable, with low pitch on the unaccented initial syllable and high pitch on the unaccented second syllable:

- (58) /ta.kʃi.'ru/ taste
L H H
/k^ha.rdi.'liʔ/ earth worm
L H H

A secondary pattern exists for words with reduplicated syllables, which have the accent on the second syllable with low pitch on both the initial and final syllable:

- (59) /k^ha.'mɲaʔm.mɲaʔm/ small bell for leading a circle dance
L H L
/ta.'tʃəm.tʃəm/ niter
L H L

Pitch patterns for four syllable words

The default pattern for four syllable words is accent on the final syllable, with low pitch on the initial syllable and high pitch on the second and third syllables:

- (60) /k^ha.jpə.lo.'ta/ skipping (a child's game)
L H H H
/kə.ka.va.'ʃki/ burnt, scorched
L H H H
/ka.ʃi.ktek.'snaŋ/ brothers
L H H H

A second pattern exists, as for three syllable words, for words that have reduplication of a syllable. In such words, the accent is on the second syllable. The initial syllable takes a low pitch, as do the third and fourth syllables:

- (61) /k^ha.'jpə.lo.lo/ butterfly
L H L L
/da.'tsə.go.go/ two stringed instrument
L H L L
/kə.'ɲa.gu.guʔ/ bent
L H L L
/ka.'ɲa.p^hət.p^hət/ lose contact with
L H L L

Pitch patterns for words of more than four syllables

Words that consist of more than four syllables are usually verb roots with a string of affixes. In this type of word stress is contrastive on the morphological level and overrules previous pitch patterns. I discuss this kind of stress pattern in section 2.3.j on morpho-phonemics at the end of this chapter and where relevant in chapter 7 on verb morphology.

Compounds

The accent in compounds consisting of three or four syllables is on the part of the compound that has dominance in establishing meaning or is emphasised by the speaker. Morpheme breaks are marked by hyphens, syllable breaks by dots. Some compounds consist of two nouns connected by a genitive construction in which the second term of the genitive is marked by the third person singular prefix *w-*. For more on genitive constructions, see the chapters on pronouns and nouns:

- (62) /'mbroʔ-w-a.rmbok/ mane (of a horse) (horse-3s.mane)
 H L L
 /'smok-kə.ŋam/ down (a very soft kind of hair) (wool-soft)
 H L L
- /k^hor.lo-'mnu/ augur, drill (wheel-drill)
 L H H
 /ta.waʔp-'jeʔm/ sewing kit (needle-house)
 L H H
- /k^ha.'mtse-pə.rjo/ centipede (bug-hundred)
 L H L L
 /tə.'ʃmi-w-a.wo/ tongue tip (tongue-3s-head)
 L H L L

The compounds conform to either the first or the second pitch pattern established earlier. In doing so, the constituent of the compound that is less emphasised loses its original pitch pattern and accent. Accent only occurs on one syllable within a word:

- (63) /tə.'ʃmi/ tongue
 /ta.'wo/ head
 /tə.'ʃmi-w-a.wo/ tongue tip (tongue-3s-head)

Loanwords

Most loanwords conform to the patterns described above, but there are some that behave differently. They have an accent on the first syllable in two syllable words, followed by a low pitch on the second syllable:

- (64) /'jun.loŋ/ bamboo food steamer; Chinese: 蒸笼 *zhēnglóng*
 H L
 /'p^{hi}.si.jaŋ/ leather box or chest; Chinese: 皮箱 *píxiāng*
 H L L

This sort of pattern, as well as the assignment of pitch in loanwords, can be accounted for by a rule that syllables following an accented syllable automatically have low pitch.

Based on this overview the following rules can be deduced for pitch patterns in Jiǎomùzú:

- accented syllables have high pitch
- there is only one accent per word
- default accent is on the final syllable
- initial un-accented syllables take low pitch
- syllables following the initial syllable and leading up to an accent take high pitch
- post-accent syllables take low pitch

High and low are relative standards. If two low or high pitches follow each other in a word, e.g. H-L-L, as in /k^hajpəlolo/, 'butterfly', the first low pitch will be pronounced at mid level and the last one at low level. Two high pitches leading up to the accent, as in /kəkavaʃki/, 'burnt', will sound like a mid level and a high level pitch respectively.

Accented syllables in Jiǎomùzú are marked both by a greater degree of loudness or force and a higher pitch than the surrounding syllables. Since pitch patterns are predictable, as shown above, but not contrastive, I do not mark pitch and accent in the phonemic descriptions.

2. Stress

Stress is contrastive on the morphological level, where it marks a variety of meanings, such as the difference between interrogative and prohibitive. Interrogatives and prohibitives are both marked by prefix *mə*, but only the verb root of the prohibitive is stressed. In the example below hyphens mark morpheme breaks and a stress mark indicates stress. The two verb phrases both have three syllables. The final syllable of each example consists of two morphemes:

- (65a) / mə-tə-tʃ^{hi}i-n/ Will you go? (INT-2-go-2s)
 L H L
- (65b) /mə-tə-^{hi}tʃi-n/ Don't go. (PROH-2-go-2s)
 L L H

Since pitch and accent are not contrastive on the phonological or the morphological level, I do not mark phonemic transcriptions for it in the following chapters. Stress is predictable and contrastive, and will be marked as appropriate throughout the rest of this study.

I discuss grammatically contrastive stress patterns more fully in sections 7.4 and 7.5 of the verb chapter. Here I just give a concise overview of the grammatical functions marked by stress. Contrastive stress is used to mark three kinds of evidentiality, first and second person present imperfective aspect, past-in-the-future relative tense and imperatives. Example (65a, b) above and examples (66), (67) and (68) below show the regular stress patterns for these grammatical functions. In the verb phrase two grammatical functions marked by two separate prefixes can merge into one slot. Usually the consonant of the first prefix remains as well as the vowel of the second prefix. If the second prefix carries grammatically distinctive stress, as in the case of the non-direct evidentiality marker *a-*, the stress remains, as in example (66). In this study I transcribe *a-* in its full form. Another kind of evidentiality is signalled by observation marker *na-*, used when a speaker has personal experience of an event or object. This marker is also stressed. After negation marker *ma-* and with some linking and existential verbs the vowel of the observation marker becomes *ə-*, see example (67). Since both *na-* and *nə-* can occur unstressed, signalling other grammatical functions, in the same slot, both forms of the observation marker must be marked for contrastive stress. The third stressed evidentiality marker is *nə-* which signals outside authority, see example (66). First en second person present imperfective aspect is marked by the stressed prefix *kə-*, as in (66). The relative tense past-in-the-future is formed by prefixing a perfective marker to a verb root and adding stress to the prefix. In normal perfective aspect frames the perfective marker is not stressed, as in example (66). Morpheme breaks are indicated by hyphens in the following examples.

(66)	/ka-top/	[kaʔop]	hit (INF-root)
	/'kə-top-ŋ/	['kətom]	I'm hitting (PRIMP-root-1s)
	/ŋa-top-w/	[ŋaʔop]	he is hitting (PRIMP-root-3s)
	/na-top-w/	[naʔop]	he hit (PFT-root-3s)
	/na-'top-w/	[na'ʔop]	hit! (IMP-root-2s)
	/'na-top-w/	['naʔop]	he is hitting (OBS-root-3s)
	/na-'a-top-w/	['naʔop]	he hit (PFT-NEV-root-3s)
	/'nə-top-w/	['nəʔop]	he hit (EV-root-3s)
	/ma-top-w/	[maʔop]	doesn't hit (NEG-root-3s)
	/'na-top-ŋ tʃe/	['naʔom tʃe]	once I will have hit (PFT-root-1s LOC)
(67)	/kə-mem/	[kəməm]	tasty (INF-root)
	/'na-mem/	['naʔməm]	tasty (OBS-root)
	/ma-'nə-mem/	[ma'nəməm]	not tasty (NEG-OBS-root)
(68)	/ka-ju/	[kaɲy]	live, be at home (INF-root)
	/ju/	[ɲy]	is at home (root)
	/ma-ju/	[maɲy]	is not at home (NEG-root)
	/'na-ju/	['naɲy]	is at home (OBS-root)
	/ma-'nə-ju/	[ma'nəɲy]	is not at home (NEG-OBS-root)

j. *Assimilation and dissimilation*

Assimilation in Jiăomùzú is expressed in a variety of ways. I give the main categories below, with some examples for each.

Voicing

There is a tendency for plosives to soften into fricatives in the Jiăomùzú dialects. These fricatives then may assimilate for voicing with the following consonants or vowels:

(69)	/k/ - [ɣ]	/tokənatsəʔŋ/	[təɣənaʔtsəŋ]	look, 1s past
		/kanəknu/	[kanəʔɣnu]	feel guilty
	/g/ - [ɣ]	/təgʒo/	[təʔɣʒo]	genital organ
		/zgogden/	[zgoʔɣdɛŋ]	threshold
	/p/ - [ɸ]	/pkwaʔ/	[ɸkwaʔ]	chicken
		/tapke/	[təʔɸke]	be full (after eating)
	/p/ - [b]	/ʃopʃop/	[ʃəbʔʃəpʰ]	fish
		/b/ - [β]	/kə bde/	[kəʔβde]

Voicing of voiceless consonants such as fricatives in a voiced environment is also common:

(70)	/kasənəna/	[kazənə'na]	stop, cease
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/ɾ/ can be devoiced after /k/ and especially /k^h/:

(71)	/k ^h roŋk ^h roŋ/	[k ^h ɾəŋ 'k ^h ɾəŋ]	throat
	/k ^h rəʔw/	[k ^h ɾəʔw]	rice

Place of articulation

In the prenasalised series the nasals assimilate to the place of articulation of the following plosive or affricate, see section 2.3.f on the prenasalised series.

The vowel /u/ assimilates to the place of articulation of preceding consonants, moving forward to [ʊ] or even [ø]:

(72)	/kəmbɾu/	[kə'mbrø]	yak
	/tavlu/	[tə'vlø]	age
	/mep ^h uʔ/	[me'p ^h ʊʔ]	poplar
	/kətsəru/	[kətsə'rʊ]	salty

The vowel /ə/ in non-accented syllables can assimilate to [ɔ] before /o, w/, and to [i] or [e] before palatals and alveolars occurring in a following syllable:

(73)	/təjla/	[tɛ'jla, ti'jla]	milk
	/təjwaʔk/	[tɛ'jwaʔk]	neighbour
	/təskruʔ/	[ti'skrʊʔ]	body
	/təʃnəʔ/	[ti'ʃnəʔ]	heart
	/təŋgro/	[tə'ŋgrɔ]	sinew, tendon
	/təmɲok/	[tə'mɲɔk]	bread
	/kəwas/	[kə'was]	fly

/a/ in a non-accented syllable can become [ɑ] before syllables with /o, k/ or /w/ and [e] before palatals:

(74)	/tajmi/	[tɛ'jmi]	tail
	/tajtʃen/	[tɛ'jtʃɛn]	scales, steelyard
	/kaktor/	[kɑ'ktɔr]	break up, scatter
	/p ^h aroʔk/	[p ^h ɑ'rɔʔk]	crow
	/kərnaʔk/	[kə'rɲɑʔk]	deep
	/kəpsak/	[kə'psak]	light, not dark
	/kawoʔr/	[kɑ'wɔʔr]	help with physical labour
	/kawu/	[kɑ'wu]	charm box

The assimilation caused by /w/ in these cases seems to indicate that native speakers perceive of /w/ as of a velar rather than a bilabial approximant. However, assimilation does not happen in all environments with /w/ and apparently is a matter of speaker preference. For this reason I keep /w/ in the bilabial column rather than grouping it with the velars.

Mode of articulation

plosives may harmonise with mode of articulation with nasals and fricatives:

(75)	/k/ - [ŋ]	/pakndze/	[paŋ'ndze]	swill, pigs feed
		/p ^h a mbo/	[p ^h aŋ'mbo]	corpse
	/c/ - [ç]	/stʃi/	[ʃçi]	linking verb 'be'

Disappearance of finals before following initials

In the flow of speech finals tend to disappear, sometimes without leaving a trace, sometimes with a glottal as a reminder:

- (76) /nə-jeʔmbak wu-je ɲi-ndʒa/ [nəjeʔm'baʔɲindʒa]
 2s:GEN-family 3s-POSS 3p:GEN-picture
 pictures of your family
- /kərscaʔzji/ [kərscaʔzji]
 eight-ten
 eighty
- /tajiʔk-mdzoʔ/ [tajiʔmdzoʔ]
 hand-digit
 finger

Morpho-phonemics

The principles of assimilation and dissimilation as described above also hold on the morphological level, when affixes are attached to roots. The phonological shape of the affix can influence the realisation of the root. For example, when a root is marked with the locative suffix *-j*, phonetically, the final consonant, if there is one, of the root drops out while the vowel of the last syllable assimilates for place to a more palatal or central environment. Locative *-j* sometimes is not pronounced:

- | | | | |
|------|--|---|--------------------------|
| (77) | /kantʃ ^h ak/
market, town | /kantʃ ^h ak-j/
market-LOC
at the market, in town | [ka'ntʃ ^h ej] |
| | /k ^h a/
room | /k ^h a-j/
room-LOC
in the communal kitchen or livingroom | [k ^h ej] |
| | /təŋgu/
inside | /təŋgu-j/
inside-LOC
on the inside | [təŋgi] |
| | /ston-pa/
every-year | /ston-pa-j/
every-year-LOC
in every year, yearly | [ston'pe] |
| (78) | /loser w-əʒak-j/
New.Year 3s:GEN-time-LOC
at New Year's | | [wu'ʒeʔ] |

- (79) /tambat w-ərka-j/ [wurke]
 mountain 3s:GEN-top-LOC
 on top of the mountain

Another example is the third person genitive marker *w-*, which replaces the initial consonant of a noun marker in possessives and other genitive type constructions. If *w-* is prefixed to a noun that has *ta-* as its nominal prefix, the vowel [a] remains unaltered. But if the prefix is *tə-* the central vowel is realised more as a back vowel [u]:

- (80) /ta-miʔ/ leg /w-a.miʔ/ [wa'miʔ] his leg
 3s:GEN-leg
 /tə-skruʔ/ body /w-ə.skruʔ/ [wu'skrʊʔ] his body
 3s:GEN-body

For nouns that do not have a nominal prefix the third person marker *wu-* is prefixed in its full form and the vowel is realised as [u]:

- (81) /hawʂuɕ/ number /wu-hawʂuɕ/ [wu'hawʂuɕ] his number
 3s:GEN-number

In the Jiǎomùzú verb paradigms, the pronominal suffixes are very important. However, it is not always easy to pinpoint exactly what the suffix is, because of the way the suffixes and the finals of the verb stem influence each other phonetically. Before I discuss the verb paradigm I first establish some of the morphophonemic rules of thumb and give some examples for common verb forms.

Final consonants

Jiǎomùzú verb roots can have a final consonant. These finals are from one of four categories: plosive, nasal, fricative or glide. Person and number suffixes influence, and sometimes are influenced by, these consonants. In my data there are examples with final plosives /p,t/ and /k/, final nasals /m/ and /n/, final fricative /s/ and final glides /l/ and /r/. The following generalisations can be extrapolated from my data:

- 1s -ŋ - plosives take the same place as the first person singular marker or become a glottal, while final glottals disappear
 - nasals take the same place as the first person singular marker
 - fricatives and glides are overruled and replaced by the first person singular marker

In the following examples the verb *kaleʔt* is used in the sense of 'write', part of the phrase *tascok kaleʔt*, 'write [any kind of writing]'. The verb *kasəraʔm* is transitive and means literally 'cause to dry'. The forms between slashes show the full form of the verb stems with their suffixes. The forms in brackets are phonetic transcriptions.

(82)	kanəʔup	sleep	/nəʔup-ŋ/	[nə'ʔym]	I sleep
	kaleʔt	write	/leʔt-ŋ/	[leʔn]	I write
	karʔəʔk	run	/rʔəʔk-ŋ/	[rʔəʔŋ]	I run
	kataʔ	put	/taʔ-ŋ/	[taʔŋ]	I put
	kasəraʔm	dry	/səraʔm-ŋ/	[sə'raʔm]	I dry
	kandon	read	/ndon-ŋ/	[ndon]	I read
	kanəʔkroʔs	discuss	/nəʔkroʔs-ŋ/	[nəʔkroʔŋ]	I discuss
	kap ^h əl	offer up	/p ^h əl-ŋ/	[p ^h əŋ]	I offer up
	kaskoʔr	hire	/skoʔr-ŋ/	[skoʔŋ]	I hire

- 2s/3s -n/-w
- plosives remain or become a glottal; glottals remain and may block the pronunciation of the number suffix
 - nasals take the same place as the second person singular markers
 - fricatives drop out, with sometimes a glottal replacing final as well as suffix
 - glides drop out or become a glottal

Jiāomùzú marks second and third person singular on transitive verbs with *-w*. Intransitive verbs are not marked for third person singular, while second person singular has *-n*. The examples below are all for second person singular.

(83)	katop	hit	/tə-top-w/	[tə'top]	you hit
	kaleʔt	write	/tə-leʔt-w/	[tə'leʔt]	you write
	kəʔpaʔk	thirsty	/tə-ʃpaʔk-n/	[tə'ʃpaʔk]	you are thirsty
	kataʔ	put	/tə-taʔ-w/	[tə'taʔw]	you put
	kasəraʔm	dry	/tə-səraʔm-w/	[təsə'raʔm]	you dry
	kandon	read	/tə-ndon-w/	[tə'ndon]	you read
	kanəʔkroʔs	discuss	/tə-nəʔkroʔs-w/	[tə'nəʔkroʔw]	you discuss
	kap ^h əl	offer up	/tə-p ^h əl-w/	[tə'p ^h əw]	you offer up
	kaskoʔr	hire	/tə-skoʔr-w/	[tə'skoʔ]	you hire

(85)	kanəʒup	sleep	/nəʒup-ndʒ/	[nə'ʒyndʒ] [nə'ʒymdʒ]	they two sleep
	katop	hit	/top-ndʒ/	[tɔmdʒ] [tɔndʒ]	they two hit
	kaleʔt	write	/leʔt-ndʒ/	[lendʒ]	they two write
	karʒəʔk	run	/rʒəʔk-ndʒ/	[rʒəndʒ]	they two run
	kataʔ	put	/taʔ-ndʒ/	[tandʒ]	they two put
	kasəraʔm	dry	/səraʔm-ndʒ/	[sə'ramdʒ]	they two dry
	kandon	read	/ndon-ndʒ/	[ndondʒ]	they two read
	kanəkroʔs	discuss	/nəkroʔs-ndʒ/	[nəkrondʒ]	they two discuss
	kap ^h əl	offer up	/p ^h əl-ndʒ/	[p ^h əndʒ]	they two offer up
	kaskoʔr	hire	/skoʔr-ndʒ/	[skondʒ]	they two hire

1p, 2p/3p -j, -jn - final consonants of all categories drop out

(86)	katop	hit	/top-j/	[toj]	we hit
	kanəʒup	sleep	/tə-ʒup-jn/	[tə'ʒyjɲ]	you (p) sleep
	kaleʔt	hit	/leʔt-jn/	[lejɲ]	they hit
	kəʃpaʔk	thirsty	/ʃpaʔk-j/	[ʃpaj]	we are thirsty
	kataʔ	put	/taʔ-jn/	[tajɲ]	they put
	kasəraʔm	dry	/səraʔm-jn/	[sə'rajɲ]	they dry
	kandon	read	/tə-ndon-jn/	[tə'ndojɲ]	you (p) read
	kanəkroʔs	discuss	/nəkroʔs-j/	[nəkroj]	we discuss
	kap ^h əl	offer up	/p ^h əl-j/	[p ^h əj]	we offer up
	kaskoʔr	hire	/tə-skor-jn/	[tə'skojɲ]	you (p) hire

Final vowels

All six of the Jiāomùzú vowels /i, e, a, o, u/ and /ə/ can occur as finals of verb roots. Person and number suffixes influence the final vowels in open syllable verbal roots to some extent, though not nearly as much as they do final consonants. In general the following rules apply:

The second and the third person singular transitive suffix *-w* tends to be difficult to hear or gets dropped, especially after final *-o*, *-u* and *-ə*. The finals *-a* and *-e* tend to become rounded before the *-w* suffix:

(87)	/karko/	put	/tərko-w/	[tə'rko]	you put
	/kaptɹu/	melt	/ptɹu-w/	[ptɹʊ]	he melts
	/kamejkrə/	climb	/mejkrə-w/	[me'jkrə]	she climbs
	/kava/	do	/təva-w/	[tə'vø]	you do
	/karəkse/	use up	/rəkse-w/	[rəxsø]	he uses up

The final *-u* tends to become fronted before plural suffix *-j*. The same holds for forms that are modified with locative suffix *-j*:

(89)	/kaptɹu/	melt	/ptɹu-j/	[ptɹyj]	we melt
	/kavavu/	cry	/vavu-jn/	[va'vyjɲ]	they cry

Final *-e* and *-i* become nasalised before first person singular suffix *-ŋ*, and tend to sound like a shwa:

(90)	/kavi/	come	/vi-ŋ/	[vĩŋ]	I come
	/kanətʃ ^h e/	get drunk	/nətʃ ^h e-ŋ/	[nĩ'tʃ ^h ẽŋ]	I get drunk

Verbs with a final *-ə* keep that vowel without showing much influence from the suffixes.

These morpho-phonemic changes can make it quite difficult sometimes to pinpoint what the final vowel of a certain verb actually is, a problem easily solved by the elicitation of uninflected forms in isolation.

observation and present imperfective markers

One other instance of morpho-phonemic change occurs with the stressed observation marker *na-*, which signals a certain kind of evidentiality based on experience, see section 7.5 of the verb chapter below. This marker has a vowel change, from *-a* to *-ə*, when it occurs after negation marker *ma-* and when prefixed to linking verbs *ŋos*, ‘be’, *maʔk*, ‘not be’ and the existential verb *miʔ*, ‘not have’. In the following examples hyphens in the first line separate morphemes:

(91)	kəmem	tasty	mə-'na-mem	ma-'nə-mem
			Q-OBS-tasty	NEG-OBS-tasty
			Does it taste good?	No, it doesn't.

(92)	ŋə-poŋeʔj	'nə-miʔ
	1s:GEN-money	OBS-not.have
	My money isn't here!	

A description of evidentiality and aspect follows in sections 7.5 and 7.4 respectively of the chapter on verbs.

For clarity of interpretation I give, in the following chapters, all roots and affixes in their phonemic form, with a hyphen between affixes. Syllable breaks are not indicated if they do not coincide with morpheme breaks. However, full forms of words, e.g. roots with their standard verbal or nominal prefix, if they are not modified by other prefixes, are given without hyphens, as in:

- | | | | |
|------|---------------------|--------|---|
| (93) | tami? | leg | nominal prefix <i>ta-</i> and root <i>-mi?</i> |
| | təskru? | body | nominal prefix <i>tə-</i> and root <i>-skru?</i> |
| | k ^h afpa | frog | non-mammal prefix <i>k^h-</i> and root <i>-afpa</i> |
| | kala? | rabbit | mammal prefix <i>k-</i> and root <i>-ala?</i> |

- | | | | |
|------|------------------------|---------------|------------|
| (94) | w-ami? | 3s:GEN-leg | his leg |
| | j-əskru? | 1p:GEN-body | our body |
| | ni-k ^h afpa | 2p:GEN-frog | your frog |
| | wu-kala? | 3s:GEN-rabbit | his rabbit |

- | | | | |
|------|----------|-------|--|
| (95) | kanəɟup | sleep | verbal prefix <i>ka-</i> and root <i>-nəɟup</i> |
| | kəməʃtak | cold | verbal prefix <i>kə-</i> and root <i>-məʃtak</i> |

- | | | |
|------|-------------------|------------|
| (96) | to-sa-nəɟup-w | 'na-məʃtak |
| | PFT-CAUS-sleep-3s | OBS-cold |
| | put to sleep | cold |

APPENDIX A

Minimal and near-minimal pairs

In the following series the left hand column contains phonetic transcriptions, the right hand column phonetic ones. In the phonemic transcriptions syllable breaks are indicated by a space. Stress is marked only in the phonetic transcriptions.

Consonants

a. (near) minimal pairs for labials

/p/ - /p ^h /	[pak]	/pak/	pig
	[p ^h ak'mbo]	/p ^h akmbo/	corpse
	[ka'pɔ]	/kapo/	spin
	[ka'p ^h ɔ]	/kap ^h o/	escape
/p/ - /b/	[ka'mpʉʔ]	/kampuʔ/	cloth
	[ka'mbʉʔ]	/kambuʔ/	give
	[ɽjar'po]	/ɽjarpo/	king, ruler
	[tə'rboʔ]	/tərboʔ/	drum
/p/ - /m/	[t̪a'paʔt̪ʰ]	/tapaʔt/	flower
	[t̪a'maʔ]	/tamaʔ/	work; business
	[t̪ə'waʔmʰ]	/təwaʔm/	bear
	[t̪a'waʔpʰ]	/tawaʔp/	needle
/p/ - /w/	[t̪a'pʉʔ]	/tapuʔ/	child
	[ka'wʉ]	/kawu/	amulet box
	[k ^h a'ʃpa]	/k ^h aʃpa/	frog
	[t̪ə'ʃwa]	/təʃwa/	tooth

/p/ - /v/	[ta'pa]	/tapa/	father
	[ka'va]	/kava/	do
	[ta'puʔ]	/tapuʔ/	child
	[ta'vø]	/tavu/	grandparent
/p ^h / - /b/	[ka'mbɛm]	/kambem/	overflow
	[tə'mp ^h ɛʔt̪]	/təmp ^h ɛʔt̪/	vomit (n)
	[tə'rp ^h ʌ]	/tərp ^h u/	fir tree
	[tə'rboʔ]	/tərboʔ/	drum
/p ^h / - /m/	[ka'mɔʔt̪]	/kamoʔt̪/	drink (v)
	[ka'p ^h ɔʔt̪]	/kap ^h oʔt̪/	pick; take off; reach for
	[pkwa'mo]	/pkwaʔmo/	chicken, hen
	[pkwa'p ^h o]	/pkwaʔp ^h o/	rooster
/p ^h / - /w/	[p ^h ɑ'rɔʔk̪]	/p ^h aroʔk̪/	crow, raven
	[wa'roʔ]	/waroʔ/	leader (3s)
	[p ^h ot̪]	/p ^h ot̪/	expression of disapproval
	[wu'wot̪]	/wuwot̪/	light (3s)
/p ^h / - /v/	[tə'p ^h ok]	/təp ^h ok/	salary
	[tə'vok]	/təvok/	abdomen
	[p ^h i'rmʌ]	/p ^h irmu/	outsider
	[ka'vi]	/kavi/	come

Because /b/ mostly occurs in clusters whereas /v/ and /w/ do not, minimal pairs for these phonemes are few.

/b/ - /w/	[la'bat̪]	/labat̪/	horn (musical instrument)
	[ta'wat̪]	/tawat̪/	mountain
/b/ - /v/	[la'bat̪]	/labat̪/	horn (musical instrument)
	[swi'vaʔt̪]	/swivaʔt̪/	barley flour

/m/ - /b/	[koŋ'me rjarpo]	/koŋme rjarpo/	emperor
	[k ^h oŋ'be]	/k ^h oŋbe/	viscera
	[ta ^h rmɔʔk ^h]	/tarmoʔk/	thunder; dragon
	[tə ^h rboʔ]	/tərboʔ/	drum
/m/ - /w/	[ta ^h waʔp]	/tawaʔp/	needle
	[ta ^h maʔ]	/ta maʔ/	thing, business
	[ka ^h moʔt]	/kamoʔt/	drink
	[wu ^h wot]	/wuwot/	light (3s)
/m/ - /v/	[ta ^h maʔ]	/tamaʔ/	thing, business
	[ka ^h va]	/kava/	do
	[tə ^h məʔ]	/təmuʔ/	girl
	[ta ^h vø]	/tavu/	grandparent
/v/ - /w/	[va ^h ŋaʔr]	/vaŋaʔr/	bird of prey; buzzard
	[wa ^h kej]	/wakaj/	on top; over
	[ta ^h vø]	/tavu/	grandparent
	[ta ^h wo]	/tawo/	head

b. (near) minimal pairs for alveolars

/t/ - /t ^h /	[ka ^h taʔ]	/kataʔ/	put
	[tə ^h t ^h a]	/tət ^h a/	book
	[mbo ^h tɛʔm ^h]	/mboteʔm/	kidney
	[ta ^h mt ^h ɛʔm ^h]	/tamt ^h eʔm/	vegetable(s)
/t/ - /d/	[kə ^h dar]	/kədar/	slow (in thinking)
	[kə ^h tar]	/kətar/	developed
	[rə ^h dak]	/rədak/	(wild) animal
	[tə ^h taʔk ^h]	/tətaʔk/	weaving, knitting, plaiting

/t/ - /n/	[t̪a'miʔ]	/tamiʔ/	foot, leg
	[n̪a'miʔ]	/namiʔ/	your leg (2s-leg)
	[t̪a'mbat̪]	/tambat/	mountain
	[ʔ̪n̪ambaʔt̪]	/nambaʔt/	cheap (OBS-cheap)
/t/ - /ɾ/	[ka't̪aʔ]	/kataʔ/	put
	[kʰa'raʔ]	/kʰaraʔ/	basket
	[t̪ə'skaʔt̪]	/t̪skaʔt/	language, speech
	[t̪ə'skar]	/t̪skar/	roast barley flour
/t/ - /s/	[ka't̪ɔp]	/katop/	hit
	[t̪a'sɔʔp̪]	/tasoʔp/	anus
	[t̪a'kaʔ]	/takaʔ/	hoof
	[sa'kʰa]	/sakʰa/	difficult
/t/ - /z/	[t̪ə't̪aʔk̪]	/t̪taʔk/	weave or knit work; plaiting
	[kʰə'zaʔ]	/kʰəzaʔ/	bowl
	[ka't̪ɔp]	/katop/	hit
	[t̪a'zɔʔk̪]	/tazoʔk/	nail
/t/ - /lh/	[t̪a'nd̪ɾiʔ]	/tand̪ɾiʔ/	friend
	[ʔ̪a'nd̪ɾe]	/lhand̪ɾe/	devil; demon; ghost
	[me't̪oʔ]	/metoʔ/	upper (e.g. upper teeth)
	[ka'ʔɔk]	/kahlɔk/	appear, emerge
/t/ - /l/	[ka't̪ɔp]	/katop/	hit
	[ka lɔk]	/kalok/	graze, herd (v)
	[t̪a'miʔ]	/tamiʔ/	leg
	[la'mɲy]	/lamɲu/	big bamboo basket
/tʰ/ - /d/	[t̪ə'mtʰek]	/t̪əmtʰek/	waist
	[kʰa'md̪e]	/kʰamde/	reins
	[t̪ə't̪ʰa]	/t̪ə'tʰa/	book
	[d̪a'tsəgogo]	/datsəgogo/	two stringed instrument

/t ^h / - /n/	[t̚ə't̚h̥a]	/tət ^h a/	book
	[k ^h ə'na]	/k ^h əna/	dog
	[t̚ ^h oŋ]	/t ^h oŋ/	go up, 1s prs.
	[n̚oŋ]	/noŋ/	be, 1s prs.
/t ^h / - /r/	[t̚ə't̚h̥a]	/tət ^h a/	book
	[kə'ra]	/kəra/	want, need (n)
	[ka't̚ ^h o]	/kat ^h o/	ascend
	[t̚a'ro]	/taro/	breast, chest
/t ^h / - /s/	[t̚ ^h i]	/t ^h i/	what
	[si]	/si/	who
	[t̚am't̚ ^h ɛʔm]	/tamt ^h ɛʔm/	vegetables
	[t̚ə'sem]	/təsem/	heart; thought
/t ^h / - /z/	[t̚ə't̚h̥a]	/tət ^h a/	book
	[t̚ə'za]	/təza/	male; son
	[ka't̚ ^h oʔ]	/kat ^h oʔ/	ask
	[t̚a'zɔʔk̚]	/tazoʔk̚/	nail
/t ^h / - /l/	[ka't̚ ^h oʔ]	/kat ^h oʔ/	ask
	[ka'lo]	/kalo/	set out
	[t̚ə't̚h̥a]	/tət ^h a/	book
	[la'm̚ɲy]	/lam̚ɲu/	big bamboo basket
/t ^h / - /lh/	[t̚ə't̚h̥a]	/tət ^h a/	book
	[t̚a'ndʒe]	/lhandʒe/	ghost, demon
	[ka't̚ ^h oʔ]	/kat ^h oʔ/	ask
	[ka't̚ɔk̚]	/kalhok̚/	appear, emerge
/d/ - /n/	[kə'd̚ɰ]	/kədu/	heavy
	[t̚a'n̚ɰ]	/tanu/	father's sister
	[d̚a't̚səgogo]	/datsəgogo/	instrument with two strings
	[n̚a'rəɲə]	/narəɲə/	and

/d/ - /r/	[kə'dʱə]	/kədu/	heavy
	[kə'rʱəʔ]	/kəruʔ/	(rGyalrong) Tibetan
	[ɕa'tsəgogo]	/datsəgogo/	instrument with two strings
	[ra]	/ra/	need
/d/ - /s/	[d̥o'sket̚]	/dosket/	stone steps
	[sɔ̃'nd̥iʔ]	/sondiʔ/	tomorrow
	[kə'dʱə]	/kədu/	heavy
	[kə'sʱəʔ]	/kəsuʔ/	sunny
/d/ - /z/	[kə'dʱə]	/kədu/	heavy
	[kʰə'zʱə]	/kʰəzu/	monkey
	[kə'd̥ar]	/kədar/	slow (in thought)
	[kə'zat̚]	/kəzat/	busy
/d/ - /l/	[ta'd̥aʔ]	/tadaʔ/	tomb
	[tʃa'laʔ]	/tʃalaʔ/	road
	[zgər'lək]	/zgərlok/	hunchback
	[wu'mdoʔk̚]	/wumdoʔk/	colour (3s-colour)
/d/ - /lh/	[ta'd̥aʔ]	/tadaʔ/	tomb
	[ʃa'nd̥ɕe]	/lhandɕe/	ghost
	[wu'mdoʔk̚]	/wumdoʔk/	colour (3s-colour)
	[ka'ʃok]	/kalhok/	appear
/n/ - /r/	[t̥ə'nd̥əʔ]	/tənuʔ/	breast, udder
	[t̥ə'rʱəʔ]	/təruʔ/	horn
	[kə'neʔk̚]	/kəneʔk/	black
	[kə'rek]	/kərek/	one
/n/ - /s/	[soʔr]	/soʔr/	louse
	[n̥or'wu]	/norwu/	treasure
	[kasa'li]	/kasali/	cover
	[kaŋa'li]	/kanali/	owe

/n/ - /z/	[wu ¹ na]	/wuna/	3s
	[wu ¹ za]	/wuza/	his son (3s-male)
	[ta ¹ zor]	/tazor/	crack
	[nor ¹ wu]	/norwu/	treasure
/r/ - /s/	[kə ¹ səʔ]	/kəsuʔ/	sunny
	[kə ¹ rəʔ]	/kəruʔ/	(rGyalrong) Tibetan
	[kə ¹ sam]	/kəsam/	three
	[kə ¹ raʔm]	/kəraʔm/	dry
/r/ - /z/	[ta ¹ roʔ]	/taroʔ/	leader, boss, chieftain
	[ta ¹ zoʔk ^ˀ]	/tazoʔk/	nail
	[kə ¹ ra]	/kəra/	need, want (n)
	[tə ¹ za]	/təza/	male, son
/r/ - /l/	[ta ¹ ro]	/taro/	breast, chest
	[ka ¹ lo]	/kalo/	blind person
	[ʒy ¹ rək]	/ʒuʔrok/	canal
	[ʒy ¹ lək]	/ʒulok/	stone, rock
/s/ - /z/	[ta ¹ soʔp ^ˀ]	/tasoʔp/	anus
	[ta ¹ zoʔk ^ˀ]	/tazoʔk/	nail
	[səm ¹ saʔm]	/səmsaʔm/	heel
	[zaʔm]	/zaʔm/	bucket
/s/ - /l/	[ta ¹ soʔp ^ˀ]	/tasoʔp/	anus
	[ka ¹ lək]	/kalok/	herd, graze
	[sa ¹ tʃ ^h e]	/satʃ ^h e/	place
	[la ¹ mnyʔ]	/lamnyʔ/	big bamboo basket
/z/ - /l/	[kamə ¹ zeʔk ^ˀ]	/kaməzeʔk/	jump
	[kamə ¹ leʔk ^ˀ]	/kaməleʔk/	swallow (v)
	[ka ¹ laʔ]	/kalaʔ/	rabbit
	[ka ¹ zaʔ]	/kazaʔ/	longleafed grass

/l/ - /lh/	[ka'lok]	/kalok/	graze
	[ka'ʰok]	/kalhok/	appear
	[la'pok]	/lapok/	turnip
	[ʰa'ndʒe]	/lhandʒe/	ghost

c. (near) minimal pairs for palatals

/c/ - /cʰ/	[ka'cop]	/kacop/	burn
	[ka'cʰop]	/kacʰop/	break (string)
	[zdeŋ'caʔ]	/zdeŋ'mcaʔ/	mist, haze
	[ka'cʰa]	/kacʰa/	(be) together
/c/ - /ɟ/	[kə'cy]	/kəcu/	short
	[tɕ'jyʔ]	/tɕjuʔ/	water
	[ca]	/ca/	musk deer
	[ʒa'skə]	/ʒaskə/	winnowing fan
/c/ - /ɲ/	[ɲa'ɲaʔ]	/ɲaɲaʔ/	lamb
	[ca]	/ca/	musk deer
	[-ɲo]	/-ɲo/	plural and honorific marker
	[co'lo]	/colo/	seasoned rtsam-pa
/c/ - /tʃ/	[ca]	/ca/	musk deer
	[kə'tʃa]	/kətʃa/	poor
	[caʔŋ]	/caʔŋ/	mud wall
	[tʃaʔŋ]	/tʃaʔŋ/	horse shoe
/c/ - /tʃʰ/	[caʔŋ]	/caʔŋ/	mud wall
	[tʃʰaŋ'ra]	/tʃʰaŋra/	toilet
	[kə'cy]	/kəcu/	short
	[kə'tʃʰy]	/kətʃʰu/	sweet
/c/ - /dʒ/	[ta'cakcak]	/tacakcak/	awn of wheat
	[tətʃo'mdʒak]	/tətʃomdʒak/	loess mud

/c/ - /ʃ/	[ca]	/ca/	musk deer
	[ʃa'rə]	/ʃarə/	bone
	[kə'cy]	/kəcu/	short
	[ʃy]	/ʃu/	tree
/c/ - /ʒ/	[co'lo]	/colo/	seasoned rtsam-pa
	[ʒoʔ]	/ʒoʔ/	curd
	[caʔk'caʔk]	/caʔkcaʔk/	magpie
	[ʒak'ma]	/ʒakma/	day
/c/ - /j/	[caʔk'caʔkʰ]	/caʔkcaʔk/	magpie
	[kə'jaʔkʰ]	/kəjaʔk/	thick
	[co'lo]	/colo/	seasoned rtsam-pa
	[jɔl've]	/jolve/	curtain
/cʰ/ - /ʧ/	[kə'mcʰæŋ]	/kəmcʰan/	soothsayer
	[kə'ŋʃæm]	/kəŋʃam/	soft
	[cʰa'lə]	/cʰalə/	distiller's yeast
	[ʃa'rə]	/ʃarə/	meat
/cʰ/ - /ɲ/	[cʰe]	/cʰe/	liquor
	[kə'ɲes]	/kəɲes/	two
	[cʰa'lə]	/cʰalə/	distiller's yeast
	[ɲa'ɲaʔ]	/ɲaɲaʔ/	lamb
/cʰ/ - /tʃ/	[kə'cʰe]	/kəcʰe/	far
	[kə'tʃe]	/kəʈʃe/	where
	[kə tʃa]	/kəʈʃa/	poor
	[ka'cʰa]	/kacʰa/	right hand side
/cʰ/ - /tʃʰ/	[kə'cʰe]	/kəcʰe/	far
	[kə'tʃʰe]	/kəʈʃʰe/	pair
	[tʃʰaʔ]	/tʃʰaʔ/	tea
	[cʰa'lə]	/cʰalə/	distiller's yeast

/c^h/ - /dʒ/ no minimal pairs found, due to rarity of occurrence of these phonemes

/c ^h / - /ʃ/	[c ^h a'lə]	/c ^h alə/	distiller's yeast
	[ʃa'rə]	/ʃarə/	bone
	[c ^h e]	/c ^h e/	liquor
	[skat'ʃe]	/skaʔtʃe/	accent

/c ^h / - /ʒ/	[c ^h a'lə]	/c ^h alə/	distiller's yeast
	[ʒak'ma]	/ʒakma/	day, time
	[ka'c ^h op]	/kac ^h op/	break (string)
	[ʒoʔ]	/ʒoʔ/	curd

/c ^h / - /j/	[c ^h e]	/c ^h e/	liquor
	[nə'je]	/nəje/	yours (2s possessive)
	[c ^h a'lə]	/c ^h alə/	distiller's yeast
	[ja'vø]	/javu/	grandfather (1p-grandparent)

/ʃ/ - /ɲ/	[k ^h a'ɾʃy]	/k ^h arʃu/	hawk
	[ka'ɾɲy]	/karɲu/	be called
	[kə'ɲoʔ]	/kəɲoʔ/	ready made
	[kə'ʃoʔ]	/kəʃoʔ/	sheep

/ʃ/ - /tʃ/	[ta'ʃi]	/taʃi/	face
	[ta'tʃik]	/tatʃik/	sprout
	[tə'ʃyʔ]	/təʃuʔ/	water
	[kə'tʃyʔ]	/kətʃuʔ/	rotten

/ʃ/ - /tʃ ^h /	[ka'nʃarara]	/kanʃarara/	cicada
	[ka'ntʃ ^h a]	/kantʃ ^h a/	butcher
	[ta'ʃi]	/taʃi/	face
	[tak'tʃ ^h iʔ]	/taʔktʃ ^h iʔ/	weaving implement

/ʃ/ - /dʒ/	[tə'mʃa]	/təmʃa/	chin
	[tatʃo'mdʒak]	/tatʃomdʒak/	loess mud

/ʃ/ - /ʃ/	[kə'ʃoʔ]	/kəʃoʔ/	sheep
	[ʃo]	/ʃo/	dice
	[tə'jyʔ]	/təjuʔ/	water
	[ʃy]	/ʃu/	tree
/ʃ/ - /ʒ/	[ʃob'ʃop]	/ʃopʃop/	fish
	[ʒoʔ]	/ʒoʔ/	curd
	[ʃa'skə]	/ʃaskə/	winnowing fan
	[ʒak'ma]	/ʒakma/	day
/ʃ/ - /j/	[kə'joʔk]	/kəjoʔk/	end
	[kə'ʃoʔ]	/kəʃoʔ/	sheep
	[tə'ji]	/təji/	face
	[ji'maʔ]	/jimaʔ/	corn
/ɲ/ - /tʃ/	[ka'ɲy]	/kaɲu/	live, stay
	[kə'tʃyʔ]	/kətʃuʔ/	rotten
	[ɲa'ɲaʔ]	/ɲaɲaʔ/	lamb
	[kə'tʃa]	/kətʃa/	poor
/ɲ/ - /tʃʰ/	[ka'ɲy]	/kaɲu/	live, stay
	[kə'tʃʰy]	/kətʃʰu/	sweet
	[tʃʰaʔ]	/tʃʰaʔ/	tea
	[ɲa'ɲaʔ]	/ɲaɲaʔ/	lamb
/ɲ/ - /dʒ/	[tə'mɲak]	/təmpak/	eye
	[tə'tʃo'mdʒak]	/tə'tʃomdʒak/	loess mud
/ɲ/ - /ʃ/	[ka'ɲy]	/kaɲu/	live, stay
	[ʃy]	/ʃu/	tree
	[-ɲo]	/-ɲo/	plural marker
	[ʃo]	/ʃo/	dice

/ɲ/ - /ʒ/	[ka'ɲy]	/kaɲu/	live, stay
	[kə'ʒy]	/kəʒu/	all
	[-ɲo]	/-ɲo/	plural marker
	[ʒoʔ]	/ʒoʔ/	curd
/ɲ/ - /j/	[ji'ɾpɛ]	/jirpɛ/	our village (1p-village)
	[ɲi'ɾpɛ]	/ɲirpɛ/	your village (2p-village)
	[kə'joʔk]	/kəjoʔk/	end
	[kə'ɲoʔ]	/kəɲoʔ/	ready made
/tʃ/ - /ʃ/	[kə'tʃyʔ]	/kətʃuʔ/	rotten
	[ʃy]	/ʃu/	tree
	[kə'tʃa]	/kətʃa/	poor
	[ʃa'rə]	/ʃarə/	bone
/tʃ/ - /ʒ/	[kə'tʃaʔk]	/kətʃaʔk/	bitter
	[ʒak'ma]	/ʒakma/	day
	[kəmə'ʒyr]	/kəməʒur/	spin, turn (stative verb)
	[kasəmtʃyr]	/kasəmtʃur/	spin, turn (dynamic verb)
/tʃ/ - /j/	[kə'tʃa]	/kətʃa/	poor
	[kanə'ja]	/kanəja/	go home
	[kə'tʃe]	/kətʃe/	where
	[wu'je]	/wuje/	his (third person possessive)
/tʃʰ/ - /ʃ/	[kə'tʃʰy]	/kətʃʰu/	sweet
	[ʃy]	/ʃu/	tree
	[tʃʰaʔ]	/tʃʰaʔ/	tea
	[ʃa'rə]	/ʃarə/	bone
/tʃʰ/ - /ʒ/	[kə'tʃʰy]	/kətʃʰu/	sweet
	[kəmə'ʒyr]	/kəməʒur/	spin, turn (stative verb)
	[tʃʰaʔ]	/tʃʰaʔ/	tea
	[ʒak'ma]	/ʒakma/	day, time

/tʃʰ/ - /j/	[ta'ptʃʰak]	/taptʃʰak/	middling, so-so
	[sa'pjak]	/sapjak/	broom
	[tʃʰaʔ]	/tʃʰaʔ/	tea
	[jaʔk]	/jaʔk/	pad
/dʒ/ - /ʃ/	[ka'ndʒyʔ]	/kandʒuʔ/	sue
	[ka'pʃy]	/kapʃu/	sharpen
/dʒ/ - /ʒ/	[ta'rndʒak]	/tarndʒak/	wrinkle
	[ʒak'ma]	/ʒakma/	day, time
/dʒ/ - /j/	[ta'rndʒak]	/tarndʒak/	wrinkle
	[sa'pjak]	/sapjak/	broom
/ʃ/ - /ʒ/	[ʒoʔ]	/ʒoʔ/	curd
	[ʃo]	/ʃo/	dice
	[ʒoŋ'mar]	/ʒoŋmar/	dark butter
	[ʃoŋ'ce]	/ʃoŋce/	log
/ʃ/ - /j/	[ʃa'rə]	/ʃarə/	bone
	[ja'wət̚]	/jawət̚/	balcony
/ʒ/ - /j/	[ʃo]	/ʃo/	dice
	[jɒl've]	/jɒlve/	curtain
	[ʒak'ma]	/ʒakma/	day
	[jaŋ'ma]	/jaŋma/	bike
	[ʒoʔ]	/ʒoʔ/	curd
	[jɒl've]	/jɒlve/	curtain

d. (near) minimal pairs for affricates

/tʃ/ - /tʃʰ/	[ta'tʃo]	/tatʃo/	mud
	[ta'tʃʰoʔ]	/tatʃʰoʔ/	lamp, light
	[tʃa'laʔ]	/tʃalaʔ/	road
	[zok'tʃʰa]	/zoktʃʰa/	white bellied dzo

/tʰ/ - /dʰ/	[tʰaˈlaʔ]	/tʰalaʔ/	road
	[rəˈdʰa]	/rədʰa/	envy
	[tiˈʃtʰʌʔ]	/təʃtʰuʔ/	sweat
	[kaˈʒdʰʌ]	/kaʒdʰu/	peel off
/tʰʰ/ - /dʰʰ/	[zokˈtʰʰa]	/zoktʰʰa/	white bellied dzo
	[rəˈdʰa]	/rədʰa/	envy
/ts/ - /tsʰ/	[kəˈtso]	/kətso/	not busy
	[kəˈtsʰoʔ]	/kətsʰoʔ/	fat
	[tsarˈtsaʔr]	/tsartsaʔr/	fence
	[tsʰar]	/tsʰar/	bharal
/ts/ - /dz/	[tʰəˈrtse]	/tərtse/	wrist; pulse
	[kəˈŋardzordze]	/kəŋardzordze/	dishevelled
	[kaˈptsək]	/kaptsek/	build
	[saˈndzət]	/sandzət/	upbringing, education
/tsʰ/ - /dzʰ/	[kaˈrtsʰwek]	/kartsʰwek/	roll up (sleeves)
	[kaˈrdzwa]	/kardzwa/	dig
/tʃ/ - /tʃʰ/	[kəˈtʃʰy]	/kətʃʰu/	sweet
	[tʃyˈtʃy]	/tʃutʃu/	crouch, squat
	[tʃʰaʔ]	/tʃʰaʔ/	tea
	[kəˈtʃa]	/kətʃa/	poor
/tʃ/ - /dʒ/	[kəˈtʃaʔk]	/kətʃaʔk/	bitter
	[tʰatʰoˈmdʒak]	/tʰatʰomdʒak/	loess mud
/tʃʰ/ - /dʒʰ/	[tʰaˈptʃʰak]	/tʰaptʃʰak/	mediocre
	[tʰatʰoˈmdʒak]	/tʰatʰomdʒak/	loess mud
	[tʃʰət]	/tʃʰət/	goat
	[kəˈndʒəʔt]	/kəndʒəʔt/	hold

e. (near) minimal pairs for velars

/k/ - /k ^h /	[kɔŋ]	/kɔŋ/	price, cost
	[k ^h ɔŋ]	/k ^h ɔŋ/	tiger
	[ka ^h kaʔk]	/kakaʔk/	peel, skin
	[ʃa ^h k ^h a]	/ʃak ^h a/	valley
/k/ - /g/	[kanəʔŋka]	/kanəŋka/	divide, split up
	[kanəʔrgaʔ]	/kanərgaʔ/	like, cherish
	[wa ^h ke]	/wakaj/	before
	[tʃa ^h geʔ]	/tʃageʔ/	parrot, ara
/k/ - /ŋ/	[jaŋ ^h səʔ]	/jaŋsəʔ/	felt blanket
	[jaʔk]	/jaʔk/	pad
	[ʃɔŋ ^h ce]	/ʃɔŋce/	log
	[ʃok ^h ʃoʔk]	/ʃokʃoʔk/	paper
/k ^h / - /g/	[k ^h ə]	/k ^h ə/	dog
	[gəʔr]	/gəʔr/	enclosure
	[k ^h o]	/k ^h o/	room
	[ta ^h goʔ]	/tagoʔ/	fool
/k ^h / - /ŋ/	[k ^h ɔŋ]	/k ^h ɔŋ/	tiger
	[ŋɔŋ]	/ŋɔŋ/	be, 1s
	[k ^h ə]	/k ^h ə/	dog
	[ŋəʔje]	/ŋəʔje/	mine (1s possessive)
/g/ - /ŋ/	[kanəʔrgaʔ]	/kanərgaʔ/	like, cherish
	[ka ^h rŋaʔ]	/karŋaʔ/	borrow
	[tʃa ^h geʔ]	/tʃageʔ/	parrot
	[po ^h ŋeʔ]	/po ^h ŋeʔ/	silver

g. (near) minimal pairs for glottals

/ʔ/ - /h/	[ʔa'na]	/ana/	down there (near)
	[ha'na]	/hana/	down there (far)
	[ʔa'rdi]	/ardi/	turban
	[ha'rdo]	/hardo/	that side

Vowels

a. (near) minimal pairs for cardinal vowels /i, e, u/ and central vowel /a/

/i/ - /e/	[kə'tʰe]	/kə'tʰe/	pair
	[lam kə'tʰi]	/lam kə'tʰi/	easy, smooth
	[me'kaŋ]	/mekəŋ/	relatives
	[miʔ]	/miʔ/	not have
/i/ - /a/	[ta'miʔ]	/tamiʔ/	leg
	[ta'maʔ]	/tamaʔ/	business, issue
	[ka'vi]	/kavi/	come
	[ka'va]	/kava/	do
/i/ - /u/	[ta'piʔ]	/tapiʔ/	mud
	[ta'puʔ]	/tapuʔ/	child
	[kə'mbiʔk]	/kəmbiʔk/	old
	[kə mbuʔ]	/kəmbuʔ/	calf
/i/ - /o/	[ta'ri]	/tari/	laughter
	[ta'ro]	/taro/	chest
	[tə'mbri]	/təmbri/	toy
	[kə'mbro]	/kəmbro/	high

/e/ - /a/	[keʔk]	/keʔk/	hoe
	[ka'kaʔk]	/kakaʔk/	tear, rip, peel
	[ʈa'ndʐe]	/ʈandʐe/	ghost
	[tə'ndʐa]	/təndʐa/	picture
/e/ - /u/	[kə'rek]	/kərek/	one
	[kə'ruʔk]	/kəruʔk/	lynx
	[pə'ʃyr]	/pəʃur/	yesterday
	[ʃer]	/ʃer/	glass
/e/ - /o/	[ser'po]	/serpo/	yellow
	[soʔr]	/soʔr/	louse
	[kə'mbre]	/kəmbre/	thin, sparse
	[kə'mbro]	/kəmbro/	high
/a/ - /u/	[ta'kaʔ]	/takaʔ/	hoof
	[ta'ku]	/taku/	mother's brother
	[kə'ra]	/kəra/	need, desire
	[kə'rʉʔ]	/kəruʔ/	(rGyalrong) Tibetan
/a/ - /o/	[ca]	/ca/	musk deer
	[co'lo]	/colo/	seasoned rtsam-pa
	[ka'laʔ]	/kalaʔ/	rabbit
	[ka'lo]	/kalo/	blind person
/u/ - /o/	[kə'mbrʉ]	/kəmbu/	cattle
	[kə'mbro]	/kəmbro/	high
	[tə'zur]	/təzur/	corner
	[ta'zor]	/tazor/	crack, rift

b. (near) minimal pairs for central unrounded vowel /ə/ and other vowels

/ə/ - /i/	[kə ^h k ^h i]	/kə ^h k ^h i/	stupid
	[k ^h ə]	/k ^h ə/	hound
	[kə ^h bəʔk]	/kəbəʔk/	lonesome
	[kə ^h mbiʔk]	/kəmbiʔk/	old
/ə/ - /e/	[səm ^h saʔm]	/səmsaʔm/	heel
	[tə ^h sem]	/təsem/	thought, mind
	[c ^h a ^h lə]	/c ^h alə/	distiller's yeast
	[ts ^h a ^h le]	/ts ^h ale/	welding
/ə/ - /a/	[tə ^h nəʔ]	/tanu/	father's sister
	[tə ^h nəʔʔ]	/tənuʔ/	breast, udder
	[tə ^h c ^h ə]	/tac ^h ə/	wedge
	[c ^h a ^h lə]	/c ^h alə/	distiller's yeast
/ə/ - /u/	[k ^h ə]	/k ^h ə/	hound
	[tə ^h k ^h u]	/tak ^h u/	cigarette
	[ti ^h ʃtəʔʔ]	/təʃtəʔʔ/	body hair
	[ti ^h ʃtəʔʔʔ]	/təʃtəʔʔʔ/	sweat
/ə/ - /o/	[tə ^h lə]	/tələ/	yeast
	[tə ^h lo]	/təlo/	the animal signs of the twelve year cycle
	[k ^h ə]	/k ^h ə/	hound
	[k ^h o]	/k ^h o/	room

c. (near) minimal pairs for /-V/ and /-Vʔ/

/-i/ - /-iʔ/	[tə ^h mbri]	/təmbri/	plaything, toy
	[tə ^h mbriʔ]	/təmbriʔ/	rope (n)
/-e/ - /-eʔ/ I have found no pairs in my data			

/-a/ - /aʔ/	[t̪a¹mbja]	/tambja/	cripple (n)
	[t̪a¹mbjaʔ]	/tambjaʔ/	thunderbolt
	[ʃa¹kra]	/ʃaskra/	boundary line
	[ka¹kraʔ]	/kaʃkraʔ/	sieve, sift
/-o/ - /oʔ/	[kəʔɔ]	/kəʔo/	light (not heavy)
	[kəʔɔʔ]	/kəʔoʔ/	sheep
	[t̪a¹rɔ]	/taro/	chest, breast
	[t̪a¹rɔʔ]	/taroʔ/	leader; chieftain
/-u/ - /uʔ/	[t̪ə¹rpʰ]	/tərpʰu/	chaff; scrapings left after threshing
	[t̪ə¹rpʰʔ]	/tərpʰuʔ/	seed (n)
	[t̪ə¹mʰ]	/təmu/	rain (n)
	[t̪ə¹mʰʔ]	/təmuʔ/	girl
/-ə/ - /əʔ/	[kʰə]	/kʰə/	hound
	[kʰr̥əʔ]	/kʰr̥əʔ/	pig-iron

APPENDIX B

Consonant clusters

In the following listings I have marked suspect clusters with × behind the example word and possible alternatives in bold. Reasons for such suspicion include doubt about a syllable break and uncertainty about a phoneme in the cluster. I trust that more work on the language will eventually clear up these hesitations. For ease of reading syllable breaks are indicated by a dot.

1. C1C2C3

rmb	/ta.rmbok/	mane (horse)	mpʃ	/ka.mpʃok/	build, erect
rndʒ	/ta.rndʒak/	wrinkle	mps	/ca.mpsɔ/	musk
rŋg	/ka.rŋgop/	bind; tie up			
rsc	/kə.rscat/	eight	jŋg	/k ^h a.jŋguʔ/	trough, water conduit
rʃc	/rʃcaŋ/	wild donkey	jmb	/tə.jmbak/	leaf
rnd	/kə.rndi/	slack, lax			
rstʃ	/ka.rstʃut/	drench × stʃ, rtʃ			
rstɿ	/tə.rstɿaʔ/	claw			

Some of the clusters with /j-/ may be suspect because of unclear syllable breaks or morphological issues.

2. C2C3C4

pkw	/tə.pkwot/	shape, form (P)	mbj	/ka.mbjam/	fly
pk ^h w	/kə.mə.pk ^h waʔ/	faded (colour) (P)	mbr	/ta.mbraʔm/	measels
			mbw	/tə.mbweʔm/	corpse (P)
			mpj	/kə.mpja/	warm (water)
ndɾw	/ka.ndɾwaʔp/	tumble, fall (P)	mp ^h j	/kə.mp ^h jam/	classifier cloth
ndzw	/ta.ndzwi/	tusk	mp ^h r	/mp ^h rəʔs/	Tibetan woolen cloth
ntw	/tə.ntwa/	sickle	mkr	/kə.ŋa.mkrak/	horizontal
nc ^h w	/k ^h a.nc ^h wak/	pit, stone	mk ^h w	/ka.mk ^h wi/	patch, tinker (P)
nɣl	/kə.mə.ŋgli/	con artist	mgr	/tə.mgri/	arrow

ŋk ^h r	/ka.ŋk ^h ruŋ/	be reborn			
ŋgr	/kə.ŋgri/	thin, clear (soup)	rdw	/rdwe/	argali
ŋgl	/ka.nə.ŋglaʔ/	cross	rdzw	/ka.rdzwa/	dig
			rts ^h w	/ka.rts ^h wek/	roll up (sleeves)
			rpj	/ka.sə.rpju/	congeal
spj	/spjaŋ.kə/	wolf	zbr	/ta.zbrok/	kick
skr	/tə.skruʔ/	body	zgr	/zgrok/	bracelet
skl	/ka.skliʔ/	endure			
ʃkl	/ka.ʃkli/	cross-eyed person	ʒbr	/ʒbruʔ/	coracle
ʃkr	/ka.ʃkraʔk/	sieve, sift	ʒgr	/ʒgroʔ/	mouth harp
ʃpr	/tə.ʃpros/	curse			
jkr	/ka.mə.jkrə/	climb	kpj	/ka.kpjer/	open, unfold

/pkw, p^hw, ndɿw, mbw/ and /m^hw/ are particular to speakers from Púzhì. In Kǒnglóng these clusters occur as /pk, p^hk nd ɿ, mg/ and /m^h/ respectively. Also /jkr/ is particular to Púzhì. In Kǒnglóng it is realised as /jk/. Púzhì's /kpj/ is /p^hj/ in Kǒnglóng.

3. C2C3

sp	/spi.lem/	habit	ŋg	/ʃku.ŋguʔ/	pestle
sn	/kə.snaʔ/	good	ŋk	/ka.va.ŋka/	chew
sk	/tə.sker/	measurement	ŋd	/ka.ŋdor/	come lose, spread
sc	/sceʔk/	eagle	ŋk ^h uʔ	/tə.ŋk ^h uʔ/	behind, back
sm	/smon.be/	doctor			
stʃ	/ta.stʃuʔ/	urine			
sr	/srem/	otter	zd	/kə.məzdək.pe/	pain, agony
st	/ta.sti/	bladder	zb	/zbor.k ^h ok/	tortoise
sts	/ʃuʔ.stsoʔ/	hot water	zg	/ta.zgən/	back
sp	/spet/	crupper strap	zʃ	/mbroʔ.zʃok/	fetter
sŋ	/kə.va.sŋop/	hot; muggy			
sk ^h	/ka.sk ^h ut/	provoke (P)			

kʃ	/ta.kʃi.ru/	taste	jp	/k ^h a.jpo.lo.lo/	butterfly
ks	/sa.ksə/	noon	jk	/ka.sa.jkoʔk/	hook
kp	/sa.kpar/	map	jm	/tə.jmi/	tail
kt	/tə.kto/	stomach	jv	/ka.jvuʔ/	level grass plot
kts	/tə.ktsa/	boot, shoe	jtʃ ^h	/tə.jtʃ ^h u/	pillar
ktʃ	/tə.ktʃaʔm.tʃ ^h o/	wheat straw torch	jn	/se.jnok.ka.va/	hoe (weeds)
kp ^h	/kə.kp ^h u/	measureword plants	jg	/ta.jga ka.leʔt/	branch out
km	/kə.kmen/	short	jd	/ka.və.jdoʔ/	coax
kn	/ka.rə.kna/	listen			
lt ^h	/ta.ro.lt ^h em/	diaphragm	gʒ	/tə.gʒo/	genital organ
ltʃ	/lʃa.ltʃaʔm/	willow × rʃa mtʃaʔmʔ	gd	/zgo.gden/	threshold
ln	/ka.lni/	knead	gn	/ka.nə.gnu/	feel guilty
ld	/ka.ldaʔ/	untie			
lʃ	/lʃa.ltʃaʔm/	willow			
md	/tə.mdoʔk/	colour	rɲ	/ta.rɲi/	hair
mt	/ta.mtut ka.leʔt/	tie a knot	rn	/tə.rna/	ear
mb	/kə.mbuʔ/	yak calf	rɲ	/rɲa.monɲ/	camel
mdz	/mdza.jiʔk/	flea	rm	/ta.rmoʔk/	dragon
mdɿ	/mdɿoɲ/	wild yak	rts	/ka.rtseʔs/	deer
mts	/k ^h a.mtsu.pə.rʃo/	lizzard	rʃ	/rʃar.poʔ/	king
mɲ	/tə.mɲak/	eye	rd	/k ^h a.rdi.liʔ/	earth worm
mtʃ ^h	/tə.mtʃ ^h u/	mouth	rk ^h	/tə.rk ^h oʔ/	husk
mʃ	/tə.mʃa/	chin	rt	/k ^h ə.rtoʔk/	locust
mtɿ	/tə.mtɿi/	drool	rg	/pja.rgoʔt/	vulture
mk	/tə.mku/	neck	rb	/tə.pʃiʔ.rboʔ/	fart
mt ^h	/tə.mt ^h ek/	waist	rts ^h	/tə.rts ^h ot/	lungs
mɲ	/k ^h a.mɲaʔm.mɲaʔm/	small bell	rp	/ta.rpaʔk/	shoulder
mp	/ka.mpuʔ/	cloth	rʒ	/ka.rʒəʔk/	chop
mk ^h	/ka.mk ^h i/	patch, tinker (K)	rtʃ	/kə.rtʃəp/	harvest
mc ^h	/kə.mc ^h en/	soothsayer	rv	/kə.nə.rva.bɔʔ/	industrious
mts ^h	/mts ^h en.ji/	vegetable oil	rp ^h	/tə.rp ^h uʔ/	fir tree
mc	/kə.mci/	beggar	rz	/ʃu.rzək/	tree trunk
mɿ	/tə.wu tə.mɿe/	offspring	rdz	/kə.ɲa.rdzo.rdze/	disheveled
mdʒ	/ta.tʃo.mdʒak/	loess mud			
mg	/tə.mgeʔm/	corpse (animal) (K)			
mp ^h	/wə.mp ^h oj/	outside			
mʃ	/ka.sa.mʃok/	comb			

/mdɿoɲ/, 'wild yak', is also often pronounced /mbrɔɲ/.

ʃp	/kə.ʃpət/	livestock	ʒg	/kə.ʒgoʔ/	boatman
ʃtɹ	/ʃtɹoʔ/	dove	ʒd	/kə.ʒder/	afraid
ʃp ^h	/k ^h ə.ʃp ^h eʔs/	marmot	ʒb	/tə.ʒba/	cheek
ʃk	/ʃkaʔm/	muntjac	ʒdɹ	/ka.ʒdɹu/	peel off
ʃn	/k ^h a.ʃnaʔ/	spider			
ʃt	/ta.ʃtes/	buttocks	bd	/kə.bdu/	four
ʃm	/tə.ʃmi/	tongue	bɟ	/kə.nə.rva.bɟo/	industrious
ʃt ^h	/mbə.ʃt ^h eʔk/	saliva	bg	/tə.bga/	belch
ʃk	/ʃku.ŋguʔ/	pestle	bʒ	/ka.bʒaŋ/	practice
ʃtʃ	/ta.ʃtʃək/	layer, floor, storey			

vʒ /ka.vʒer/ scrape × **vəʒər** Also pronounced as /ka bʒer/.

ndz	/sa.ndzət/	upbringing	pʃ	/tə.pʃiʔ/	excrement
ndɹ	/ndɹə.ʃəʔk/	bedbug	ps	/ka.sa.psoʔ/	compare
nɟ	/k ^h a.nɟa.ra.raʔ/	cicada	pk	/ka.pki.ka.lo/	hide-and-seek
ntɹ	/ka.ntɹok/	wild goose	ptʃ	/ja.ptʃen/	stirrup
nt	/ʃu.ŋgu.kə.ntok/	woodpecker	ptɹ	/ka.ptɹu/	melt (vt)
nd	/ta.ndar/	garbage	ptʃ ^h	/t ^h a.ptʃ ^h aʔk/	mediocre
ntʃ ^h	/ka.ntʃ ^h a/	butcher	pc	/ka.pcər/	change
ng	/kə.ŋgu/	nine	pts	/ka.ptseʔk/	filter
ndʒ	/nə.nʒondʒ/	2d	pk ^h a	/kə.pk ^h a/	faded (K)
nc	/ta.ncap/	shadow side			
nts ^h	/kə.nts ^h əp/	hasty			
nc ^h	/kə.nc ^h at/	flat			
nɟ	/ka.nɟaʔ/	be defeated			
nk	/ka.nə.nkas/	separate × ŋk			
nts	/ka.ra.ntsuk/	cut			
nt ^h	/ka.nt ^h en/	pull			

4. C3C4

wr	/zgo.wre/	garden	kr	/ka.kre/	misbehave
wl	/wlo.rəʔk/	trick	kl	/ka.kloʔk/	roll up
			kw	/ka.rə.kwam/	freeze
gr	/wu.graʔl/	system	sr	/sron.ɭaʔ/	ring
gl	/ka.glo.ʃke/	left handed person	sw	/swej/	barley
gj	/kə.tə.gje/	measureword meal	sl	/ka.slep/	study

pw	/pwaʔ/	chicken (K)	jl	/tə.jla/	cow
pr	/k ^h a.priʔ/	snake	jw	/ta.jwaʔk/	neighbour
pj	/pja.rgoʔt/	vulture	jr	/ka.nə.jros/	ruminant
ʃw	/kə.ʃwuʔ/	fly blow	vr	/tʃə.vrok/	rtsam-pa mixed with tea
ʃl	/tə.ʃla/	joke	vj	/tə.vjo/	marrow
ʃr	/tə.ʃros/	trace, imprint	vl	/ta.vluʔ/	age
ʃp	/kə.ʃpət/	livestock			
rw	/ta.rwek.k ^h ə/	hound	zw	/zwor.k ^h oʔk/	tortoise × zb
rl	/tə.rluʔ/	hornless cow	zl	/zla.wa/	moon
k ^h r	/k ^h rəʔw/	cooked rice	p ^h j	/wu.p ^h jok/	direction
k ^h l	/ta.k ^h la/	sleeve	p ^h r	/ka.p ^h rəm ka.leʔt/	spray water
t ^h w	/kə.t ^h we/	fox	ʒw	/ka.ʒwa.ʒwa/	shallow, flat
tsw	/ka.tswi/	lower	tʃ ^h w	/ka.tʃ ^h weʔs/	reverse

5. finals

p	/ka.top/	hit	ʔp	/ta.soʔp/	anus
t	/kə.ʃpət/	livestock	ʔt	/ka.leʔt/	hit
k	/kə.rdok/	one	ʔk	/k ^h ə.rtoʔk/	locust
ʔ	/ta.roʔ/	leader			
m	/srem/	otter	ʔm	/tə.waʔm/	bear
n	/spen/	glue	ʔn	/tə.leʔn/	penis
ŋ	/k ^h oŋ/	tiger	ʔŋ	/tʃaʔŋ	horse shoe
s	/kə.was/	fly	ʔs	/peʔs/	badger
r	/kə.par/	jackal	ʔr	/soʔr/	louse
l	/ka.nə.gral/	line up	ʔl	/wu.graʔl/	system
w	/to.ndzaw/	eat, IMP	ʔw	/k ^h rəʔw/	rice
j	/swej/	barley	ʔj	/ta.paʔj/	claw
			jn	/vajn/	do, 3p

dʒ /tʃʰidʒ/ go, 1d ndʒ /vindʒ/ come, 3d

/-dʒ/ and /-ndʒ/ are exceptional, see section 2.3.b on CV patterns