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2 The sound system of Kanashi

Abstract: We present the first systematic description of the sound system of Kanashi. In addition to a thorough investigation and description of the Kanashi phoneme system based on fieldwork data, we also present a comparison of the Kanashi sound system with the phonologies of a number of closely related Sino-Tibetan languages, belonging to the same West Himalayish subgroup of Sino-Tibetan as Kanashi.

Keywords: Kanashi, Sino-Tibetan, phonology, phonetics, comparative linguistics. Himalayan region

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1 Introduction

The aim of this chapter is to describe the sound system of Kanashi, based on our fieldwork data, collected during a number of field trips to Malana over several years. This is the first systematic description of the Kanashi sound system. In the last section of this chapter (Section 5) we will also compare the Kanashi sound

system with some other languages belonging to West Himalayish, the same Sino-Tibetan subgroup as Kanashi.¹

2 Data collection and processing

This description is based mainly on 2,063 sound files from three Kanashi speakers for 975 words. In addition, our data also include material from other speakers which has been taken into account in this description. The two main etymological sources of the Kanashi vocabulary are Sino-Tibetan (ST) and Indo-Aryan (IA). In the analysis presented in this chapter, we have included all lexical items, regardless of their origin.

The three primary language consultants are one older male Kanashi speaker (older male, “OM” in the following) and two younger speakers – one man (younger male, “YM”) and one woman (younger female, “YF”). At the time of the data collection the older speaker was about 50 years old, the younger male speaker around 22 years old and the female speaker around 28 years old. The female speaker had received some formal education. Both male speakers were illiterate; they had not received any formal education. All three speakers were born and brought up in the village. Like other Kanashi speakers, they leave the village occasionally. All three could understand Hindi (hin), the national language of India and Kullu Pahari (kfx), the locally dominant language (both are IA languages). While the female speaker could speak Hindi quite well, the male speakers (especially the younger speaker) spoke a mixed Hindi with strong influence of their mother tongue Kanashi.

Apart from lexical items, we have also collected elicited phrases and sentences and some narratives. The elicitation was done in Hindi. All recordings were done with a general documentary purpose, that is, not with a particular phonetic experiment in mind. This means that in some cases the materials are not optimal for the analyses performed on them (e.g. having list intonation, not having tokens of the same word from all speakers etc.). The sound files were processed using Audacity and Praat (Boersma & Weenink 2018).

¹ Our investigations of different aspects of the phonology of Kanashi have been presented at several conferences (Saxena & Sjöberg 2017; Saxena et al. 2018a,b,c). We would like to thank to the participants of these events for their comments and suggestions.

2.1 Transcriptions

Unless otherwise stated,² Kanashi examples are provided here in phonemic transcription, using the phoneme inventory presented in Sections 2.2 and 2.3. Stress is not indicated, as at this stage, we are not certain of its phonemic status. In Kanashi lexical items which end in a consonant in the transcription, a short final [ə] is heard when these words are spoken in isolation. Similarly, a short final [h] is heard when words ending in vowels in the transcription are spoken in isolation. In our transcriptions such word-final [ə] and [h] are not marked. Further, vowels preceding a nasal consonant tend to be nasalized. But there is also a restricted set of lexical items with nasal vowels without a following nasal consonant. Nasalization on vowels is only marked when there is no nasal consonant following them. Finally, between vowels and in word-final position, /ŋ/ is often pronounced [ŋg], resulting in variant forms ([ŋ] ~ [ŋg]). This seems to occur more commonly between vowels than word-finally. In some cases where this variation is absent or minimal – only [ŋg] is attested in our data – this is explicitly expressed in our phonemic transcription (e.g. /raŋg/ ‘color’).

For phonemic analysis, all speakers are considered together and as representing one sound system. This, at times, poses some challenges for describing the phonology of Kanashi. We will discuss some problematic cases below. For phonetic analysis, the transcription of one particular instance of recorded pronunciation is given. Most of the examples come from the female consultant and this is thus normally not indicated. When the transcription represents the speech of one of the male speakers, OM or YM is given in brackets following that transcription.

² Phonetic transcriptions are given in IPA notation in square brackets “[...]”. Even though our transcription conventions for Kanashi are intended as phonemic, whenever we wish to stress that phonemes and phonemic representations are under discussion, we write single phonemes and phoneme sequences surrounded by “/.../”. We represent geminate consonants as doubled (biphonemic) rather than long (i.e. we write *daddu* rather than *dadu*), but we would like to stress that this does not imply a strong preference on our part for the one or the other analysis.

2.2 Consonants

	Bilabial	Alveolar	Postalveolar	Retroflex	Velar	Glottal
Plosive	p b	t d		ʈ ɖ	k ɡ	
Aspirated plosive	p ^h	t ^h		t ^h	k ^h	
Fricative		s	ʃ			h
Affricate		ts ɖʒ	ʈʃ ɖʒ			
Aspirated affricate		ts ^h	ʈʃ ^h			
Nasal	m	n		ɳ	ŋ	
Lateral		l				
Rhotics		r		ɽ		
Approximant	ʋ		j			
	(labiodental)		(palatal)			

Kanashi exhibits considerable phonetic variation in the realization of consonant phonemes. /d/, /n/ and /ɽ/ in Kanashi are found mostly in words of IA origin, where IA (Western Pahari) languages, too, have the same retroflex consonant. For example, Kanashi: /ka:ŋas/ ‘one-eyed person’, Kotgarhi: *ka:ŋɔ* ‘one-eyed person’; /ba:ŋes/ ‘nephew’, Kotgarhi: *b^hane* ‘nephew’).³ At the same time these retroflex consonants also show a lot of variation in Kanashi. For example, [ŋ] in Kanashi shows variation with [n], [ɽ], [ɳ] and [t]. For example, Kanashi: [k^ha:na] ~ [k^ha:ŋa] ‘food’;⁴ /banɪŋ/ [b^(h)anɪŋ] ~ [b^(h)ɳɪŋ] ‘utensil’;⁵ /baŋaŋ/ ‘forest’:⁶ [baŋaŋ] ~ [baɽaŋ] ~ [baɳaŋ] ‘forest’;⁷ /ʃaŋam/ ‘make, do’, [k^ha:na/k^ha:ŋa ʃaŋm] ~ [k^ha:na/k^ha:ŋa ʃaɽam] ‘to cook’. At times, the retroflex nasal /ŋ/ seems to be realized as a retroflex flap or approximant, with the preceding vowel nasalized, e.g. /ʃaŋaŋ/ ‘ice’ with variations [ʃãɽaŋ] ~ [ʃãɳaŋ]. The retroflex /ɽ/ also shows variation with [d] in the word-medial position, e.g. /buɽits/ [buɽits] ~ [buɖits] ‘old(F)’.

Variation is also observed between [s] and [ʃ]. This variation is found both in the speech of the same speaker (e.g. YF: /aʃi/ [as(s)i] ~ [aʃi] ‘eighty’) as well as between speakers, e.g. YF vs. OM, where in some lexemes YF has [s] while OM has [ʃ]. For example, /ʃaɽ^h/ ‘sixty’ YF: [saɽ^h], OM: [ʃaɽ^h] ~ [ʃɔɽ^h]; /saɽ/ ‘seven’, YF: [saɽ], OM: [ʃaɽ]; /sadrən/ ‘autumn’ YF: [sadrən], OM: [ʃadrən]. Note that in all these ex-

³ Source: Hendriksen (1976).

⁴ Western Pahari *k^ha:ŋ* ‘food’. Information provided in this chapter on Western Pahari languages is from Turner (1966) and/or Hendriksen (1976).

⁵ Jaunsari: *b^hãɖe* [utensil.PL] (Turner 1966: 538).

⁶ Bhalesi: *baŋ* ‘forest’.

⁷ Variation among /ɽ/, /r/, /l/ is also mentioned by Grierson (1928) (e.g. *chāri* ‘forty’; *sōra* and *sōla* ‘sixteen’; *khalas* and *kharas* ‘standing’).

amples /s/ or /ʃ/ precedes /a/. But at the same time, /a/ is by far the most frequent vowel, therefore it is impossible to say if this is significant.

There is also variation found in our material between [ɖ] and [z] (e.g. /ɖa:m/ [ɖa:m] ~ [za:m] ‘food, to eat’). In general, the voiced fricatives ([z] and [ʒ]) are quite rare in our material. They almost only occur as variants of the affricates (although there are instances where we have [z] and no attested variant with [ɖ], e.g. [zan] ‘life’ and [dazi] ‘doorframe’). This may be a gap in our data. If they should be treated as phonemes, which currently seems unlikely, they appear to have a marginal status in the language.⁸

Similarly, [ɖ] and [ɖʒ], too, show variation. For instance, /ɖʒaŋgal/ [ɖʒaŋgal] ~ [ɖʒaŋgal] ~ [ɖʒaŋgal] ‘forest’. However, there are also near minimal pairs for /ɖ/ and /ɖʒ/, e.g. /ɖʒab/ ‘rain’ : /ɖam/ ‘to eat’. For this reason they are treated here as separate phonemes.

Variation between aspirated stop and fricative is attested for /p^h/, which is also realized as [ɸ] or [f]. Example: /kop^hi/ [kɔp^hi] ~ [kɔɸi] ~ [kap^hi] ~ [koɸi] ‘coffee’, and /k^h/, which is also realized as [x]. Example, /naɾuk^h/ [naɾuk^h] ~ [naɾux] ‘navel’.

Variation is further found in the realization of the rhotics. The alveolar trill /r/ is also realized as a tap or flap [ɾ] and sometimes also as a more approximant-like sound [ɹ] (e.g. /ɖʒurɪŋ/ [ɖʒurɪŋ] ~ [ɖʒɹɪŋ] ‘glacier’). Further, /r/ is not always clearly audible in the word-final position.

/tʃ/ shows variation with [ts^h] and [tʃ^h], e.g. /tʃets/ [tʃets] ~ [tʃ^hets] ~ [ts^hets] ‘wife’ and /tʃa:ri/ [tʃa:ri] ~ [ts^ha:ri] ‘attic’.

In addition to a more vocalic /ʊ/ that contrasts with /b/ (e.g. /ba:/ ‘father’ /ʊa:/ ‘nest’), /b/ is also realized as [ʊ] (e.g. [bais] ~ [ʊais] ‘twenty two’). This variation occurs in all positions in our material. In some items (e.g. /na:b/ ‘tomorrow’) with a final /b/, it is clearly realized as [ʊ] but in other instances it is difficult to tell, whether from listening or from inspecting the waveforms and spectrograms. Further, /b/ sounds at times like a [β] or a [ɸ], as a fricative rather than a stop. This is also the case with /g/. It, too, is often realized as a fricative [ɣ]. Because of the small database, it is not possible to examine the distribution of these variants.

Generally speaking the degree of aspiration in Kanashi consonants is much less than in the corresponding aspirated consonants in IA languages such as Hindi. Voiced aspirates are almost entirely limited to the IA part of the Kanashi lexicon. Hindi is not necessarily – or even most likely – the source language for most IA vocabulary items in Kanashi, but is used here to represent IA. In all such examples we find both variants in our material – with and without aspiration.

⁸ Grierson (1928) provides the following consonants: *ts*, *tsh*, *ɖ*, *zh*.

They appear to be in free variation, both in the speech of the same speaker and across speakers.⁹ IA words beginning with [b^h], [d^h] and [g^h] are realized as [b^h] ~ [b], [d^h] ~ [d] and [g^h] ~ [g] respectively (e.g. /bukamp/ [b^hukamp] ~ [bukamp] ‘earthquake’; /daram/ [d^haram] ~ [daram] ‘religion’; /gan̪a/ [g^han̪a] ~ [gan̪a] ‘hour’). The status of voiced aspirated stops in Kanashi ([b^h], [d^h], [d̪^h] and [g^h]) is problematic in some respects. There is one potential minimal pair in our materials: [g^(h)oɾa] ‘horse’ and [goɾa] ‘ankle’. There are, however, two problems with treating this minimal pair as conclusive evidence for their phonemic status. First, the already mentioned free variation: ‘horse’ is often realized as [goɾa], homophonous with ‘ankle’. Postulating voiced aspirated stops as phonemes means that they are only occasionally contrastive on the surface and often have the exact same realization as another phoneme. Additionally, this merger is not rule-bound but completely free. The problem with treating voiced aspirated stops as “allophones” brings a very strange kind of allophony with it. There is free variation, but this free variation occurs only in certain lexical items. Something being lexically restricted is generally taken to be a criterion for phonemicity. This problem complex is discussed in more detail in Chapter 4 in this volume.

Even though retroflex and alveolar consonants have phonemic status in Kanashi, there are also instances of free variation between retroflex and alveolar consonants. The last-mentioned could be due to the fact that the position of the retroflex consonant in Kanashi is closer to alveolar. This has the effect that the retroflex consonant is heard often as a non-retroflex consonant. This variation is heard in the speech of almost all language consultants that we have worked with.

Finally, in the word-final position voiced stops generally exhibit what appears to be free variation between voiced and voiceless consonants. In Section 4 we will discuss this in more detail.

2.2.1 Examples of occurrence

2.2.1.1 Stops

/p/ – a voiceless unaspirated bilabial stop

/pa:n/	[pa:n]	‘stone’	/puɖa/	[puɖa] ~ [puza]	‘fifty’
/ta:pu/	[ta:pu]	‘island’	/ipit̪/	[ipit̪ɟ] ~ [ipit̪]	‘behind’
/bukamp/	[b ^(h) ukamp]	‘earthquake’	/jep/	[ʃep] ~ [jep]	‘foam’

⁹ There are also instances where the locus of aspiration fluctuates (e.g. [k^hakan] ~ [kak^han] ‘mouth’).

/p^h/ – a voiceless aspirated bilabial stop

/p ^h uts/	[p ^h ʊts] (YM), [puts]	‘mouse’
/kop ^h i/	[kop ^h i] ~ [kɔp ^h i] ~ [kɔfi] ~ [koɸi] ~ [kap ^h i]	‘coffee’

/p ^h asam/	[p ^h asəm] ~ [p ^h asm]	‘to vomit’
/gup ^h a/	[gup ^h a]	‘cave’

/b/ – a voiced unaspirated bilabial stop

/bi:g/	[bi:g] ~ [bi:(ː)k ^h] (YM)	‘ant’
/bube/	[bube] ~ [bøbe]	‘father’s sister’
/sura:b/	[sura:b] ~ [sura:v]	‘alcohol’

/ba:/	[ua:] ~ [ba:] (OM), [ba] (YM)	‘father, uncle’
/kuba:r/	[kuba:(r)] ~ [kuɔar]	‘in, inside’
/na:b/	[na:b] ~ [na:v] ~ [na:p ^h]	‘tomorrow’

/t/ – a voiceless unaspirated alveolar stop

/ta/	[ta]	‘nose’
/bitiŋ/	[b ^(h) iti:(ː)ŋ] ~ [b ^(h) itɪŋ]	‘wall’

/ti:r/	[ti:r]	‘arrow’
/batak/	[batak] ~ [ɔatak]	‘duck’

/t^h/ – a voiceless aspirated alveolar stop

/t ^h ar/	[t ^h ar] ~ [t ^h a:(r)]	‘lion’
/matt ^h a/	[matt ^h a] ~ [mat ^h a] (YM)	‘forehead’
/pod/	[pod] ~ [pot ^h] (YM)	‘dandruff, ash’

/t ^h i:d/	[t ^h i:d] ~ [t ^h i:t ^(ə)]	‘today’
/kat ^h a:/	[kat ^h a:]	‘story’
/parsed/	[parsed] ~ [pəset ^h] (YM)	‘sweat (N)’

/d/ – a voiced unaspirated alveolar stop

/dil/	[dɪl] ~ [dɪl] (YM)	‘heart, soul’
/gidaɾ/	[gɪdaɾ] ~ [gɪda]	‘jackal’
/i:d/	[i:d] ~ [ɪd] ~ [it] ~ [i:(ː)]	‘one’

/das/	[das]	‘ten’
/ɖzaddu/	[ɖzaddu]	‘magic’
/bud(d)/	[büdd] ~ [bud(d ^ə)]	‘Wednesday’

/ɽ/ – a voiceless unaspirated retroflex stop

/ta:ŋg/	[tā:ŋ(g)]	‘leg, foot’
/beɽiŋ/	[b ^(h) eɽiŋ] ~ [b ^(h) eɽiŋ] ~ [biɽiŋ]	‘tree’
/seɽ/	[seɽ ^(h)]	‘rich’

/tulem/	[tülēm] ~ [tulem]	‘to sleep’
/gaɽa:ŋ/	[g ^(h) aɽā:ŋ]	‘watermill’
/ūt/	[ūt ^(h)]	‘camel’

/tʰ/ – a voiceless aspirated retroflex stop

/tʰi:k/ [tʰi:k] ‘right (= not wrong)’

/utʰras/ [utʰ(ʰ)əras] ~ ‘high’
[utʰ(ʰ)ras] ~
[utʰ(ʰ)aʀas]

/atʰ/ [atʰ] ~ [aʔtʰ] ‘eight’

/tʰullaŋ/ [tʰuʔlla] (OM), ‘leg’
[tʰullaŋ]

/ka:tʰiŋ/ [ka:tʰi] ~ ‘mountain top’
[ka:tʰiŋ]

/pat/ [pɔʔtʰ] (YM), ‘threshing
[pat] stone’

/d/ – a voiced unaspirated retroflex stop

/deb/ [deb] ~ [dep] ‘left
(direction)’

/godŋ/ [godŋ] ~ ‘foot’
[godī:(ŋ)]

/gud/ [gud] ~ [gəʔ] ‘arm, hand’
(YM)

/dugas/ [dugas] ~ ‘deep’
[dugɔs]

/dodre/ [dɔʔdɾe] (YM) ‘beehive’

/ho:d/ [ho:d] ‘bread’

/k/ – a voiceless unaspirated velar stop

/ka/ [ka] ~ [kə] [2SG]

/bakar/ [bakar] ~ ‘goat’
[bɔkar]

/jak/ [jak] ~ [jaʔ] ‘yak’

/keb/ [keb] ~ [kep] ‘needle’

/tsʰika/ [tsʰika] ~ ‘early, soon’
[tsʰeka]

/dɛ:k/ [dʰe:k] ‘fence’

/kʰ/ – a voiceless aspirated velar stop

/kʰas/ [kʰɔs] (OM), ‘sheep’
[kʰəs] ~
[kʰis] (YM)

/bikʰa:rija/ [bikʰa:rijə] ‘beggar’

/kʰili/ [kʰiʔli] (YM) ‘neck’

/dukʰe/, /dukʰis/ [dukʰe] ~ ‘disease,
[dukʰis] grief’

/g/ – a voiced unaspirated velar stop

/ga:r/ [ga:(r)] ~ ‘tooth’
[ga:(ɹ)] ~ [gar]
(YM)

/dauga/ [dʰ(ʰ)auga] ~ ‘thread’
[dʰ(ʰ)aga]

/bi:g/ [bi:g] ~ [bi:kʰ] ‘ant’
(YM)

/gun/ [gun] ‘winter’

/rigi:n/ [rigi:(n)] ‘above’

/daq/ [daq] ~ [dʰɔg] ‘cliff’

2.2.1.2 Fricatives*/s/* – a voiceless alveolar fricative

<i>/sa:t/</i>	[sa:(t)] ~ [ʃa:t]	‘seven’	<i>/su:ru/</i>	[surʃ] ~ [su:r] ~ [suru]	‘pig, swine’
<i>/gasa/</i>	[gasa]	‘dress’	<i>/ba:saʰ/</i>	[ba:saʰ] ~ [ʋa:saʰ]	‘sixty two’
<i>/ti:s/</i>	[ti:(s)]	‘thirty’	<i>/ba:s/</i>	[ba:(s)] ~ [ʋa:s]	‘scent, smell’

/ʃ/ – a voiceless postalveolar fricative

<i>/ʃa/</i>	[ʃa]	‘skin, hide’	<i>/ʃiŋ/</i>	[ʃiŋ] ~ [ʃiŋ]	‘wood’
<i>/dʒuʃaŋ/</i>	[dʒuʃaŋ] ~ [dʒʉʃaŋ]	‘cloudy weather, fog’	<i>/oʃaŋ/</i>	[oʃaŋ]	‘dew’
<i>/buʃ/</i>	[buʃ] ~ [bøʃ]	‘rope’	<i>/niʃ/</i>	[niʃ], [niʃ] ~ [nis]	‘two’

/h/ – a voiceless glottal fricative

<i>/ha:r/</i>	[ha:r]	‘necklace’	<i>/ho:m/</i>	[ho:m] ~ [hom] (YM)	‘bear’
<i>/samhetan/</i>	[samhetan]	‘get someone ready. FIN’	<i>/jeher/</i>	[ʃɛhɛr] ~ [ʃɛr]	‘town’

2.2.1.3 Affricates*/ts/* – a voiceless alveolar affricate

<i>/tsa:m/</i>	[tsã:m]	‘wool’	<i>/tsu:mu/</i>	[tsu:mu]	‘catch, hold’
<i>/ketsi:/</i>	[kɛtsi:]	‘alone’	<i>/tsʰutsurug/</i>	[tsʰʉtsʉrɛg]	‘a kind of wild mushroom’
<i>/barits/</i>	[b ^(h) ɛrʃts] ~ [b ^(h) ɔrʃts] ~ [b ^(h) arʃts]	‘many, more’	<i>/sõts/</i>	[sõts]	‘place’

/tsʰ/ – a voiceless aspirated alveolar affricate

<i>/tsʰa:m/</i>	[tsʰã:m]	‘hear, listen’	<i>/tsʰika/</i>	[tsʰiʃka] ~ [tsʰɛka]	‘early, soon, fast’
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/dz/ – a voiced unaspirated alveolar affricate

<i>/dza:ŋ/</i>	[dza:ŋ]	‘gold’	<i>/dʒeher/</i>	[dʒɛher] ~ [dʒɛr]	‘poison’
<i>/badʒug/</i>	[badʒu(g)] ~ [badʒuk] ~ [bazuk]	‘thigh’	<i>/niɖa/</i>	[niɖa] ~ [niza]	‘twenty’
<i>/ʋa:ɖ/</i>	[ʋa:ɖ]	‘hawk’	<i>/roɖ/</i>	[roɖ] ~ [roz]	‘daily’

/tʃ/ – a voiceless unaspirated postalveolar affricate

/tʃara/	[tʃara] (YF, OM)	‘child’	/tʃeka/	[tʃeka] (YF, YM)	‘back’
/p ^h akuʃ/	[p ^h akuʃ] ~ [p ^h akudʒ]	‘small, young, short’	/tʃa:tʃi/	[tʃa:tʃi(:)]	‘paternal uncle’s wife’

/tʃ^h/ – a voiceless aspirated postalveolar affricate

/tʃ ^h o/	[tʃ ^h o]	‘boy’	/tʃ ^h ets/, /tʃ ^h etsaŋ/	[tʃ ^h ets] ~ [ts ^h ets] (YM), [tʃ ^h etsaŋ]	‘wife’
/kaʃ ^h ua/	[kaʃ ^h ua]	‘turtle’	/magarmaʃ ^h /	[magarmaʃ ^h]	‘crocodile’

/dʒ/ – a voiced unaspirated postalveolar affricate

/dʒab/	[dʒab]	‘rain’	/dʒuʃt ^h a/	[dʒuʃt ^h a] ~ [dʒəʃt ^h a] ~ [dʒʊʃt ^h a]	‘moon’
/adʒaŋ/	[adʒã(ŋ)] ~ [adʒãŋ] (YM)	‘intestines’	/tʃudʒaŋ/	[tʃudʒaŋ] ~ [tʃʊdʒaŋ] (YM)	‘beak’
/hu:dʒ/	[hʉ:dʒ] ~ [hʊ:dʒ]	‘cow’	/suradʒ/	[sʉrə(:)dʒ]	‘sun’

2.2.1.4 Nasals

In the word-final position, nasals (especially [n] and [ŋ]) are not always clearly articulated; instead the preceding vowel is nasalized and in some cases also lengthened. See Section 4.

/m/ – a voiced bilabial nasal

/mig/	[mig] ~ [mik ^(h)]	‘eye’	/mu:l/	[mu:l]	‘silver’
/duma:ŋ/	[d ^(h) ʉma:ŋ]	‘smoke’	/tʃime/	[tʃime]	‘daughter’
/ho:m/	[ho:m] ~ [hom] (YM)	‘bear’	/li:m/	[li:m]	‘pine (tree)’

/n/ – a voiced alveolar nasal

/na:b/	[na:b] ~ [na:v] ~ [na:p ^h]	‘tomorrow’	/niʃ/	[niʃ], [niʃ] ~ [nis]	‘two’
/baniŋ/	[baniŋ] ~ [b ^(h) aniŋ]	‘pot’	/munuk/	[mʉnək]	‘person’
/gun/	[gun]	‘winter’	/tʃi:nd/	[tʃi:nd] ~ [tʃi:n]	‘fingernail’

/ŋ/ – a voiced retroflex nasal. There are no instances of /ŋ/ word-initially

/ba:ŋes/	[b ^(h) a:ŋes]	‘nephew’	/vaŋam/	[vaŋ ^ə m]	‘to be hungry’
/kra:ŋ/	[kra:ŋ]	‘brain, mind’	/poŋ/	[poŋ] (OM)	‘straw shoe’

/ŋ/ – a voiced velar nasal

/ŋa/ [ŋa] (OM), [na] ‘five’
/toŋ/ [tɔŋ] ‘face’

/maŋgal/ [maŋgal] ‘Tuesday’
/bitiŋ/ [b^(h)ti(:)ŋ] ~ [b^(h)ɪtjŋ] ‘wall’

2.2.1.5 Lateral

/l/ – a voiced alveolar lateral approximant

/luk/ [luk] ‘itch’

/la:r/ [la:(r)] ~ [la:(ɿ)] ‘rice (uncooked)’

/k^hili/ [k^hɪli] (YM) ‘neck’

/sulʊs/ [sulʊs] ~ [sulʊs] ~ [ʃulʊs] ‘slow’

/la:l/ [la:l] ‘red’

/ʃe:l/ [ʃe:l] ‘medicine’

2.2.1.6 Rhotics

/r/ – a voiced alveolar trill

/rag/ [rag(g)] ~ [rag(g)] ~ [rak(k)] ‘green, blue’

/re:t/ [re:t] ‘sand’

/a:ri/ [a:ri] ‘dough’

/k^hiraŋ/ [k^hiraŋ] ~ [k^hiraŋ(g)] ‘milk’

/du:r/ [du:(r)] ~ [du:(ɿ)] ‘far’

/ga:r/ [ga:(r)] ~ [ga:(ɿ)] ~ [gar] (YM) ‘tooth’

/ɽ/ – a voiced retroflex trill. There are no instances of /ɽ/ word-initially

/boɽits/ [boɽits] ‘butterfly’

/doɽag/ [doɽag] ~ [doɽag] ‘twins’

/gidaɽ/ [gɪdaɽ] ~ [gɪdaɽ] ‘jackal’

/tʃamga:daɽ/ [tʃamga:daɽ] ‘bat’

2.2.1.7 Approximant

/ʋ/ – a voiced bilabial approximant

/ʋa:ɖ/ [ʋa:ɖ] ‘hawk’
/t^hauʋis/ [t^hauʋis] ~ [t^hauʋɪs] (OM) ‘traditional wooden house builder’

/ʋeraŋ/ [ʋerā(ŋg)] ‘evening’
/tala:ʋ/ [tala:ʋ] ~ [tula:ʋ] (OM) ‘pond’

/j/ – a voiced palatal approximant

/ja:/ [ja:] ~ [ja(:)] (YM) ‘mother’

/juʃk/ [juʃk] ~ [jʊʃk] ‘old’

/ba:jlits/ [ba:jlits] ‘mad’

/ʋaʃaŋ/ [ʋəʃaŋ] (YM), [ʋaɪŋ] (YF) ‘honey bee’

/ma:j/ [ma:j] ~ [mai] [NEG.BE]

/ettej/ [ette(j)] [1PL]

2.2.2 Evidence of contrast

/p/ – /b/	/pi:g/	[pi:g] ~ [pᵢg]	‘yellow’	/bi:g/	[bi:g] ~ [bi:kʰ] (YM)	‘ant’
/t/ – /d/	/ra:t/	[ra(:)t]	‘night’	/ra:d/	[rʰ)a:d] ~ [ra:t] ~ [ra:d]	‘bull, ox’
/t/ – /d/	/ʈaki/	[ʈaki] ~ [taki] (YM)	‘window’	/ɖaggis/	[ɖaggis]	‘blacksmith’
/k/ – /g/	/ka:r/	[ka:(j)]	‘axe’	/ga:r/	[ga:(r)] ~ [ga:(j)] ~ [gar] (YM)	‘tooth’
/t/ – /t/	/ra:t/	[ra(:)t]	‘night’	/laʈpat/	[laʈpat]	‘cloth’
/d/ – /d/	/ru:d/	[ru:d] ~ [rütʰ)] (YM)	‘horn’	/mud/	[mud]	‘yesterday’
/p/ – /pʰ/	/pa:n/	[pā:n]	‘stone’	/pʰar/	[pʰar]	‘shoulder’
/t/ – /tʰ/	/to/	[tō]	‘be’	/tʰo/	[tʰo] ~ [tʰə]	‘up’
/t/ – /tʰ/	/ʈulem/	[ʈüləm]	‘to sleep’	/tʰulla/, /tʰullaŋ/	[tʰulla] (OM), [tʰullaŋg]	‘leg’
/k/ – /kʰ/	/ka/	[ka] ~ [kə]	[2SG]	/kʰa:/	[kʰa:]	‘sheep.PL’
/ts/ – /tsʰ/	/tsa:m/	[tsā:m]	‘wool, sheep’s hair’	/tsʰa:m/	[tsʰā:m]	‘to listen’
/ʈ/ – /ʈʰ/	/ʈfokets/	[ʈɔkɛts]	‘rotten’	/ʈʰakts/	[ʈʰakts] ~ [ʈɔkts]	‘boy’
/t/ – /ʈ/	/ti:/, /ti:s/	[ti:(s)]	‘thirty’	/ʈits/	[ʈits] ~ [ʈiʈ]	‘wet, washed’
/t/ – /ts/	/ta/	[ta]	‘nose’	/tsa:m/	[tsā:m]	‘wool, sheep’s hair’
/d/ – /dz/	/daddu/	[dadu] (YM), [daddu] (YF)	‘paternal grandfa- ther’	/ɖaddu/	[ɖaddu]	‘magic’
/d/ – /dʒ/	/dil/	[dᵢl] ~ [dɪl] (YM)	‘heart, soul’	/dʒil/	[dʒʰ)ᵢl]	‘lake, lagoon’
/g/ – /ŋ/	/ʈʰog/	[ʈʰög]	‘white’	/ton/	[tōŋ]	‘face’
/k/ – /ʈ/	/ka:m/	[ka:m]	‘soil, clay’	/ʈa:m/	[ʈā(:)m]	‘dance’
/ts/ – /dz/	/tsa:m/	[tsā:m]	‘wool, sheep’s hair’	/ɖa:m/	[ɖā:m] ~ [zā:m]	‘food, to eat’
/ʈ/ – /dʒ/	/ʈaŋg/	[ʈāŋ(g)] (OM)	‘mountain’	/dʒaŋ/	[dʒā(:)ŋg]	‘root’

/tʃ/ – /ts/	/tʃa:m/	[tʃā(:)m]	‘dance’	/tsa:m/	[tsā:m]	‘wool, sheep’s hair’
/tʃ/ – /ʃ/	/tʃa(:)/	[tʃa(:)]	‘tea’	/ʃa/	[ʃa]	‘skin, hide’
/dʒ/ – /dz/	/dʒab/	[dʒab]	‘rain’	/dʒa:b/	[dʒa:b]	‘now’
/s/ – /ts/	/saŋ/	[sāŋg]	‘with’	/tsa:m/	[tsā:m]	‘wool’
/s/ – /ʃ/	/su:ru/	[surũ] ~ [su:r]	‘pig, swine’	/ʃum/	[ʃũm]	‘three’
/s/ – /h/	/som/	[som]	‘morning’	/ho:m/	[ho:m] ~ [hom] (YM)	‘bear’
/ʃ/ – /h/	/ʃo/	[ʃø]	‘hundred’	/ho:m/	[ho:m] ~ [hom] (YM)	‘bear’
/m/ – /n/	/ka:m/	[kā:m]	‘work’	/pa:n/	[pā:n]	‘stone’
/m/ – /b/	/dʒa:m/	[dʒa:m] ~ [za:m]	‘to eat’	/dʒa:b/	[dʒa:b]	‘now’
/n/ – /ŋ/	/tʃi:nd/	[tʃi:nd] ~ [tʃi:n]	‘fingernail’	/ʃiŋ/	[ʃiŋ] ~ [ʃiŋ]	‘wood’
/n/ – /ŋ/	/ʋanam/	[ʋan(ʰ)m]	‘to laugh’	/ʋaŋam/	[ʋaŋʰm]	‘to be hungry’
/n/ – /ŋ/	/gana/	[gana] ~ [gʰana]	‘flame’	/gaŋa/	[gaŋa]	‘song’
/n/ – /d/	/nid/	[nid] ~ [nid]	‘here’	/didd/	[did(d)] ~ [di:t] ~ [ditt]	‘there’
/l/ – /r/	/du:r/	[du:(r)] ~ [du:(ɹ)]	‘far’	/du:l/	[d(ʰ)u:l]	‘dust’
/r/ – /d/	/ri:d/	[ri:(d)] ~ [ri:t]	‘day before yesterday’	/didd/	[did(d)] ~ [di:t] ~ [ditt]	‘there’
/r/ – /d/	/ha:r/	[ha:r]	‘necklace’	/ho:d/	[ho:d]	‘bread’
/r/ – /t/	/a:ri/	[a:ri]	‘dough’	/ta:ri/	[ta:ri]	‘padlock’
/r/ – /t/	/ʃika:r/	[ʃika:r]	‘hunting’	/gidaɾ/	[gɪdaɾ] ~ [gɪdaɪ]	‘jackal’
/d/ – /t/	/ro:d/	[ro:d] ~ [rɔ:d]	‘ear’	/dʒoɾ/	[dʒoɾ] ~ [zoɾ]	‘shoe’
/d/ – /t/	/maɖa	[maɖə]	‘mute’	/naɾa/	[nəɾa] ~ [nɜɾa]	‘arm’
/j/ – /ʋ/	/ja:/	[ja:] ~ [ja(:)] (YM)	‘mother’	/ʋa:/	[ʋa:]	‘nest’
/b/ – /ʋ/	/ba:/	[ʋa:] ~ [ba:] (OM), [ba] (YM)	‘father, uncle’	/ʋa:/	[ʋa:]	‘nest’

Table 1: Distribution of consonants

	Initial	Medial	Final		Initial	Medial	Final
Stops							
/p/	+	+	+	/t/	+	+	+
/p ^h /	+	+	(+)	/t ^h /	+	+	+
/b/	+	+	+	/d/	+	+	+
/t/	+	+	+	/k/	+	+	+
/t ^h /	+	+	+	/k ^h /	+	+	+
/d/	+	+	+	/g/	+	+	+
Fricatives							
/s/	+	+	+	/h/	+	+	(+)
/ʃ/	+	+	+				
Affricates							
/tʃ/	+	+	+	/tʃ/	+	+	+
/tʃ ^h /	+	+	(+)	/tʃ ^h /	+	+	+
/dʒ/	+	+	+	/dʒ/	+	+	+
Nasals							
/m/	+	+	+	/ŋ/	(+)	+	+
/n/	+	+	+	/ŋ/	(+)	+	+
Rhotics							
/r/	+	+	+	/ɾ/	(+)	+	+
Lateral							
/l/	+	+	+				
Approximants							
/j/	+	+	+	/v/	+	+	+

2.2.3 Distribution of consonants

/ŋ/ occurs word-initially only in one word (*ŋa* ‘five’) in the speech of OM and some other older speakers (both male and female: [ŋa]), while the younger speakers use an [n] in ‘five’ (i.e. [na] ‘five’).¹⁰

¹⁰ *ŋa* coincides with the reconstructed proto-ST word for ‘five’, and should consequently be the older variant.

In Table 1, the positions in which the consonant phonemes are attested¹¹ are indicated. “+” denotes that the phoneme is found in that position, “(+)” indicates that the phoneme rarely occurs in this position (5% or less of its highest number of occurrences in some other position), and “–” that it is not found in this position.

2.3 Vowels

The vowel phonemes in Kanashi are the following.

i, i:	u, u:
e, e:	o, o:
a, a:	

As was the case with the consonants, Kanashi also exhibits considerable variation in the phonetic realization of its vowel phonemes. For instance, /i/ shows variation between [i] and [i̠]; /e/ is also realized as [e̞] or [ɛ]. In a similar way /u/ is sometimes realized as more central and closer to [ə] or [ʊ]. /a/ and /o/, too, display considerable variation. /o/ is, at times, realized as more central, and, at times, it is realized more like [ɔ]: [tʃ^hakts] ~ [tʃ^hɔkts] ‘boy’; [barʃ/ [barʃ] ~ [bɔrʃ] ‘year’; [madras] ~ [mɔdras] ‘man’. /a/ is also realized as [ə] or as a variant that is more like [ɑ]. In words such as /barits/ ‘many, more, full’, the realization of /a/ is more central [ə]. Cross-linguistically [r] tends to make the preceding vowel more like a [ə], which is also the case in Kanashi.

Finally, at times, [a] in Kanashi words of IA etymology occurs as [u] or [o] especially in OM’s speech (e.g. [buzar] ‘market’; cf. Hindi: [baza:r]). OM, in some lexemes, has [u] while the younger speakers pronounce [a] (for example, [kuna:ʃi] (OM), [kana:ʃi] (YF, YM) ‘Kanashi (language name)’). On the other hand, for ‘iron’ OM and YF have [ranʃ], while another young female speaker pronounces it as [ronʃ].

2.3.1 Vowel charts

In order to prepare the vowel (non-long vowels) chart, we took into consideration only YF’s speech.

¹¹ The information in the table refers to occurrence in lexical citation forms, not in text word types, so it should be taken as indicative only.

The vowels of all recorded monosyllabic words (253 recordings in total with YF)¹² were manually marked in Praat and then the average of formants 1 and 2 for the duration were extracted. At times, Praat had obvious difficulty in getting good formants (for instance, not being able to differentiate two low formants for words with [u]) and as can be seen in the plot of all the items (Figure 1, left-hand panel), there are some that were almost certainly incorrect. Despite this shortcoming, we can still see in this chart that the vowels tend to cluster in the expected way, which suggests that the measurements are largely correct and that averages are useable.

We can also see in this chart that /u/ tends to be centralized. Similarly, /a/ is displaced toward the back, and /i/ and /e/ are quite close to each other. We have not found a phonemic contrast between two central, unrounded vowels.

Figure 1: Vowel instance plot (left) and vowel plot (right) for YF

A comparison of the resulting vowel plot (Figure 1, right-hand panel) with corresponding vowel plots (produced in the same way), based on the recordings of OM and YM show some interesting results (Figure 2). For OM the number of words/tokens were 36/43 and for YM the number of words/tokens were 52/137.

To some extent in the speech of all three speakers the realization of /u/ is more central – closer to [u] or [ø], but it is more so in the case of YM. In his speech, /u/ is almost always more centralised.

¹² As there is a possibility of vowels in unstressed positions behaving differently (e.g. vowel reduction), we have considered here only monosyllabic words.

Figure 2: Vowel plot for OM (left) and YM (right)

Figure 3: Vowel length minimal pair: /tsʰam/ 'bridge' : /tsʰa:m/ 'hear, listen'

2.3.2 Vowel length

Vowel length appears to be phonemic in our material (*pace* D. D. Sharma 1992). An illustrative minimal pair is shown in Figure 3.

YM's speech diverges also concerning long vowels. In his speech the long vowels tend to be shorter than in YF's speech; see Figure 4.

The average vowel durations are provided in Table 2.¹³ This difference in the vowel length between YM and YF can also be seen in the box plots shown in Figure 5 of vowels preceding stops in monosyllabic words. The labels LONG and SHORT refer to the underlying phonological category.

¹³ The figures in Table 2 are based on a dataset with the following parameters: words (long/short): 8/4 (YM), 13/10 (YF), 6/5 (OM); tokens (long/short): 27/16 (YM), 20/18 (YF), 7/5 (OM).

Figure 4: Inter-speaker vowel length realization differences: /ga:r/ ‘tooth’: YM (left) : YF (right)

Table 2: Vowel duration before stops

Vowels (sec)	YM	YF	OM
LONG	0.136	0.190	0.203
SHORT	0.122	0.149	0.125

While the differences are quite striking between YM and YF/OM, the small size of our dataset makes it premature to draw any strong conclusions.

2.3.3 Examples of occurrence

/i/ – a close front unrounded vowel

/ipidʒ/ [ipidʒ] ~ [ipitʃ] ‘behind’
/k^hissa/ [k^hissa] ‘pocket’

/k^hili/ [k^hil̪i] (YM) ‘neck’

/ikkatis/ [ɪkkati(s)] ‘thirty one’
/dil/ [d̪il] ~ [d̪il] (YM) ‘heart, soul’
/a:ri/ [a:ri] ‘dough’

/i:/ – a close front unrounded long vowel

/i:d/ [i:d] ~ [id̪] ~ [it̪] ~ [i(:)] ‘one’
/li:m/ [li:m] ‘pine (tree)’

/ti:r/ [ti:r] ‘arrow’
/mistri:/ [mist̪ri:] ‘carpenter’

/e/ – a mid-close front unrounded vowel

/ettej/ [ette(j)] [1PLi]
/brest/ [b^(h)reʃt] ‘Thursday’
/bja:le/ [b(ʈ)ja:le] ‘breakfast’

/ei/ [eɪ] ‘four days after today’
/bēfur/ [bēfur] ‘flute (wooden)’
/k^hurke/ [k^hurke] ‘wrist’

Figure 5: Vowel duration before stops in monosyllables for YF (left) and YM (right)

/e:/ – a mid-close front unrounded long vowel. /e:/ is attested in our data only in medial position
 /d̪e:k/ [d̪^he:k] ‘fence’ /je:l/ [je:l] ‘medicine’

/u/ – a close back rounded vowel

/unni/ [ʉnni(:)] (OM) ‘nineteen’
 /ar̪fuk/ [ar̪f̪ük] ~ ‘mirror’
 [ar̪f̪üg]
 /daddu/ [dad(d)u] ‘paternal grandfather’

/uʉg/ [uʉ(g)] ‘owl’
 /buka/ [b^(h)uka] (YM) ‘liver’
 /nu/ [nʉ] [3SG.PROX]

/u:/ – a close back rounded long vowel

/u:n̩m/ [u:n̩^əm] ‘take’
 /du:r/ [du:(r)] ~ ‘far’
 [du:(ʉ)]

/u:/ [u:] ‘flower’
 /hu:d̪ʒ/ [hʉ:d̪ʒ] ~ ‘cow’
 [h̪u:d̪ʒ]

/o/ – a mid-close back rounded vowel

/oʃaŋ/ [oʃaŋ] ‘dew’
 /boʃits/ [boʃits] ‘butterfly’

/od̪ʒim/ [od̪ʒim] ‘to play’
 /ba:ro/ [ba:ro] ~ ‘outside’
 [bar̪o]

/o:/ – a mid-close back rounded long vowel

/ho:d̪/ [ho:d̪] ‘bread’

/ho:m/ [ho:m] ~ [hom] ‘bear’
 (YM)

/a/ – an open, central unrounded vowel

/aṭʰ/	[aṭʰ] ~ [aṭʰ]	‘eight’	/aŋgu:r/	[aŋgu:r]	‘grape’
/bal/	[bal] ~ [ʋal]	‘head’	/dʒab/	[dʒab]	‘rain’
/ara/	[a(:)ra]	‘saw(N)’	/na/, /ŋa/	[na] ~ [ŋa]	‘five’

/a:/ – an open central unrounded long vowel

/a:g/	[a:g]	‘cave’	/ja:/	[ja:] ~ [ja(:)] (YM) ‘mother’	
/ba:ro/	[ba:ro] ~ [ba:rɔ]	‘outside’	/ga:r/	[ga:(r)] ~ [ga:(ɹ)] ~ [gar] (YM)	‘tooth’

2.3.4 Nasal vowels

As mentioned above, there is a restricted set of Kanashi lexical items with nasal vowels, in which there is no nasal consonant following the vowel – at least not synchronically. In the present analysis, nasal vowels are not regarded as phonemes. If they should be regarded as phonemes, they constitute a marginal phenomenon in the Kanashi phonological system.¹⁴

mīc	‘female’	tēis	‘for the sake of’
[sirāō]	‘vein, artery’	[sōts]	‘place’
[pūī]	‘cat’	[ūṭ]	‘camel’

2.3.5 Evidence of contrast

/i/ – /i:/	/dil/	[dīl] ~ [dɪl] (YM)	‘heart, soul’	/ti:r/	[ti:r]	‘arrow’
/e/ – /e:/	/teg/	[tɛg]	‘big’	/dɛ:k/	[dʰɛ:k]	‘fence’
/o/ – /o:/	/om/	[om]	‘path’	/ho:m/	[ho:m]	‘bear(N)’
/u/ – /u:/	/gud/	[gud] ~ [gød] (YM), [gøtʰ] (YM)	‘hand’	/bu:t/	[bu:t]	‘boot, shoe’
/a/ – /a:/	/tsʰam/	[tsʰām]	‘bridge’	/tsʰa:m/	[tsʰā:m]	‘hear, listen’
/i/ – /e/	/tʰig/	[tʰig] ~ [tʰik]	‘sweet’	/teg/	[tɛg]	‘big’
/i/ – /o/	/tʰig/	[tʰig] ~ [tʰik]	‘sweet’	/dʒog /	[dʒog]	‘hot’

¹⁴ The top two items are from D. D. Sharma (1992: 337, 347). The original transcription is retained.

/i/ – /a/	/a:ri/	[a:ri]	‘dough’	/ara/	[a(:)ra]	‘saw(N)’
/i/ – /a/	/raund̪a/	[raund̪a]	‘stepson’	/raund̪i/	[raund̪i]	‘step-daughter’
/e/ – /a/	/seb/	[seb] ~ [sɛv]	‘apple’	/sab/	[sab]	‘all’
/e/ – /u/	/le/	[le]	‘tongue’	/gu/	[gu]	[1SG.NOM]
/u/ – /o/	/-mug/	[mug]	[1PL]	/mog/	[mog]	‘birdseed’
/u/ – /o/	/kum/	[kum]	‘pillow’	/kone/	[kone] ~ [kɔne] ~ [koni]	‘edge’
/o/ – /a/	/to/	[tö]	[be.FIN]	/ta/	[ta]	‘nose’

2.3.6 Distribution of vowels

In Table 3, the positions in which the vowel phonemes are attested are indicated.¹⁵ “+” denotes that the phoneme is found in that position, “(+)” indicates that the phoneme rarely occurs in this position (5% or less of its highest number of occurrences in some other position), and “–” denotes that it is not found in our material.

Table 3: Distribution of vowels

	Word-initial	Word-medial	Word-final
/a/	+	+	+
/a:/	(+)	+	+
/e/	(+)	+	+
/e:/	–	+	–
/i/	(+)	+	+
/i:/	+	+	+
/o/	(+)	+	+
/o:/	–	+	+
/u/	(+)	+	+
/u:/	(+)	+	–

¹⁵ The information in the table refers to occurrence in lexical citation forms, not in text word types, so it should be taken as indicative only.

2.3.7 Diphthongs

D. D. Sharma (1992) states that Kanashi lacks diphthongs, but rather has sequences of vowels, but without providing any supporting arguments. Adjoining vowels (in the sound files) in our material are almost always heard as diphthongs and not as two distinct syllables. The diphthongs found in our material are listed in Table 4.¹⁶

Table 4: Diphthongs in Kanashi

[iu]	/ɕiu/	‘living being’	[ue]	/k ^h ue/	‘why’
[ui]	/bui/	‘m.name’	[ua]	/ɖabua/	‘money’
[ia]	/ɖɛtʃialga/	‘red sweet potato-?PL’	[ai]	/sutʃai/	‘truth’
[ai]	/rudʒai/	‘quilt’	[oa]	/soar/	‘monday’
[ei]	/tʃeit/	‘a.month.name’)	[ao]	/taoli/	‘towel (< English)’
[eo]	/deodar/	‘cedrus deodara (tree)’	[ũĩ]	/pũĩ/	‘cat’
[oi]	/boits/	‘younger sibling’	[õũ]	/ɖõũɾi/	‘pair’
[ou]	/louk/	‘jump(N)’	[au]	/bau/	‘o.brother’

[au] is, at times, also heard as [av] and [aʊ] as in /sauda/ [sauda] ~ [ʃavda] ‘sweets, candy’. Similarly, [ai] is sometimes heard as a vowel–glide sequence (e.g. /bais/ [bais] ~ [bajs] ‘twenty two’; /sutʃai/ [sutʃai] ~ [sutʃaj] ‘truth’). /oi/ is, at times, phonetically more like [ɔi] or [oj], as in /koile/ [koile] ~ [kɔile] ‘charcoal’, and /ei/ can be realized more like [ɛi], as in /ei/ [ei] ~ [ɛi] ~ [ɛ̃i] ‘fourth day after today’. [ue] is also realized as [ue].

3 Phonotactics

3.1 Syllable structure

The syllable structures attested in our material are shown in Table 5. CV and CVC are the most frequently occurring syllable structures.

¹⁶ Duttamajumdar (2015) includes long vowels in her description of diphthongs in Kanashi. In some cases there is a slight difference in the vowel quality between our materials. The sequences described here as [oi] and [ou] are transcribed by Duttamajumdar (2015) as [ɔi] and [ɔu], respectively.

Table 5: Syllable structures

Syllable structure	Kanashi	Gloss
CV	/ja/	‘skin, hide’
	/gu/	[1SG.NOM]
CVC	/pod/	‘ash, dandruff’
	/kum/	‘pillow’
CCV	/kra/	‘hair’
	/bja:le/	‘breakfast’
CCVC	/kra:n/	‘brain, mind’
	/pra:d/	‘finger, toe’
CVCC	/garts/	‘arrow’
	/polk/	‘strong (person)’
V	/u:/	‘flower’
	/a:ri/	‘dough’
VC	/a:g/	‘cave’

3.2 Consonant clusters

3.2.1 Word-initial consonant clusters

Word-initial consonant clusters are of the form [stop + sonorant]. The following consonant clusters are found in our material.

[g]	/gjara/	‘eleven’	[kr]	/kra/	‘hair’
[gl]	/gliŋ/	‘barley beer’	[pj]	/pja:ɖ/	‘onion’
[gr]	/gra:maŋ/	‘village’	[pl]	/plen/	‘fill’
			[pr]	/pra:d/	‘finger, toe’

3.2.2 Word-final consonant clusters

The following consonant clusters are attested word-finally.¹⁷ In addition, at times, the vowel of the word-final syllable is not audible, creating an appearance of a cluster (e.g. /ɖʒaŋgal/ [ɖʒaŋgəl] ~ [ɖʒaŋgal] ~ [ɖʒaŋgal] ~ [ɖʒaŋgl] ‘forest’; /himat/ [himt] ~ [himət] ‘courage’. Such instances of apparent consonant clusters are not included here.

¹⁷ Clusters in parentheses are attested only once in our material.

[ks]	/tɛks/ (< English)	‘tax’	[nk]	/nenk/	‘thus’
[(ŋʃ)]	/dʒaŋʃ/	‘weak’	[nt]	/ʃa:nt/	‘calm’
[mp]	/bukamp/	‘earthquake’	[rʃ]	/barʃ/	‘year’
[nd]	/gund/	‘glue’	[(rd)]	/mord/	‘gentleman’
[nd]	/k ^h and/	‘sugar’	[rg]	/suarg/	‘heaven’
[ŋg]	/rang/	‘color; paint’	[rk]	/nark/	‘bad’
[st]	/brest/ [b ^(h) rɛst]	‘thursday’	[(sk)]	/rask/	‘edge, pointed’

3.3 Geminates

In order to examine the status of geminates in Kanashi, we compared YF’s recordings of words with the structure (C*)VCCV(C*) and (C*)VCV(C*). We have 34 words in our materials with geminates, distributed over 70 tokens. For singleton consonants we have 89 words, with 177 tokens. The following geminates are found.

[pp]	/duppe/	‘sun’	[bb]	/dubbem/	‘to be drowned’
[tt]	/ettej/	[1PLI]	[dd]	/didd/	‘there’
[kk]	/ikkattar/	‘seventy one’	[ll]	/gallas/	‘eagle’
[ss]	/massi/	‘mother’s sister’			

Acknowledging the fact that phonological categories are not directly demonstratable by phonetic measurements, and that we have not found any minimal pairs for consonant length in our material, there is still a measurable difference in their articulation in Kanashi. We examined the measurements of (i) stops, (ii) fricatives and (iii) laterals¹⁸ separately after manually marking the duration. The duration of geminates and singleton consonants was measured using a script. For stops, the boundaries were identified using the beginning/ending of formants and the sharp increase/fall in amplitude. The duration includes burst, if such was present. For fricatives, the boundary was identified using the shape of the formants and the presence of aperiodic turbulence (and also the lack of voicing, as no voiced fricatives were investigated due to their uncertain phonemic status). For laterals, the identification was made mainly using formants and changes in amplitude. The results are provided below with a focus on stops.¹⁹ An illustrative example pair can

¹⁸ Since we had only one example of nasal geminates ([mm] in [dumme] ‘fog’), we have not included nasal geminates in our present analysis.

¹⁹ Words/tokens of stops: total – 89/180, voiced geminates – 13/30, voiceless geminates – 14/24, voiced singletons – 16/33, voiceless singletons – 46/93.

be seen in Figure 6. It shows a significant difference in the duration of articulation of singleton and geminate in the same environment.²⁰

Figure 6: Articulation of double and singleton medial stops ([kutta:] ‘dog’ ~ [kuta:b] ‘book’)

The mean values are provided in Table 6 and a box plot of the values in Figure 7. They show that voiceless stops heard as geminates have a considerably longer duration than those of corresponding singleton segments: on average, a geminate is 1.53 times longer than a singleton. The difference is smallest in voiced stops. This is a slightly lower ratio than what is reported for e.g. Hindi (1:1.96 in Hindi for all manners of consonant of singleton and geminates; Ohala 2007), but, on the other hand, it is higher than what is reported for Norwegian (1:1.22–1.38 in non-stops in the medial position; Kawahara 2015). In the box plot in Figure 7 we can also note that there is limited overlap between the two categories. It should, however, be kept in mind that consonant duration is only one of the phonetic correlates of the phonological category of consonant length. A more comprehensive study of other phonetic factors (e.g. the duration of surrounding vowels) should be conducted to determine the phonological status of geminates in Kanashi.

Table 6: Duration of singletons and geminates

Duration (sec)	ALL	VOICED	VOICELESS
Geminate	0.152342	0.119682	0.193167
Singleton	0.121181	0.105545	0.12602
Ratio C:CC	1:1.26	1:1.13	1:1.53

²⁰ The duration of the voiceless segments is shown in Figure 6 by the period of silence between the two vocalic peaks (the latter also coincide with the dotted (blue) line showing the fundamental frequency).

Figure 7: Duration of double and singleton medial stops in the speech of YF

As with voiced aspirated stops, here too, there are some issues complicating the inclusion of geminates into the phonological analysis of Kanashi. The first is that there appears to be a clear difference between speakers. In the speech of YM, consonants that in the speech of YF are heard as geminate are not perceived as geminate. They show no real durational difference in instrumental measurements (Saxena et al. 2018a). Thus, the presence of geminates appears not to be constant across speakers, which brings up the question which language consultant’s speech should be taken as the norm. (We do see some intra-speaker variation in our data, but not to the same extent as when it comes to voiced aspirates.) Some examples are given in Table 7.

Table 7: Inter-speaker variation: geminates

YF	YM	
[daddu]	[dadu]	‘paternal grandfather’
[ɖubbem]	[ɖubem]	‘to be drowned’
[mat ^h a]	[mat ^h a]	‘forehead’
[haɖɖaŋ]	[haɖaŋ]	‘bone’
[duppe]	[dup(p)e]	‘sun’

Just as with the voiced aspirated stops, geminates, too, appear to be found mainly in words of IA origin. At this stage it is not possible to state if these variations are found only in IA borrowings, and if so, if only in the older loanwords or also in the more recent borrowings. What we can say is that these features (geminate and voiced aspirated stop) may have originated in IA borrowings.

Here we see three slightly different patterns depending on the nature of the consonants: (i) geminated stops: here both the contours and blue lines are disconnected with separate “pitches”; (ii) geminated sibilants: here while the contours are connected, the blue lines are separated; and (iii) geminated sonorants (nasals and liquids): here the contours for sonorants are more or less one big segment, and the blue lines too are un-interrupted. See Figure 8 for two examples each of the three groups.

Figure 8: Geminate consonants. Top: stops ([duppe] ‘sun’ : [k^hobba] ‘snowshoe’); middle: sibilants ([assi] ‘eighty’ : toffim ‘to fight’); bottom: sonorants ([t^holla] ‘leg, foot’ : [d^homme] ‘fog’)

4 On word-final consonants in Kanashi

Kanashi exhibits variation in the realization of (voiced) stops when they occur in the word-final position. For example, voiced stops are often realized as voiceless aspirated stops. And at times, the final stop consonant is not audible at all in fast speech.

/pod/	[pod] ~ [pot ^h]	‘dandruff, ash’	/parsed/	[parsed] ~ [pərsət ^h] (YM)	‘sweat(N)’
/tʃime/	[tʃime]	‘daughter’	/tʃi:nd/	[tʃi:nd] ~ [tʃi:n]	‘fingernail’

4.1 Devoicing in Kanashi: a quantitative analysis

In order to obtain a fuller picture of the voicing variation in word-final stops in Kanashi, we conducted a set of quantitative analyses of our sound recordings. We took into consideration words ending in VC (i.e. no consonant clusters). Aspirated and non-aspirated VOICELESS²¹ stops were grouped together, since the latter appear to occur word-finally mainly as variants only in some very restricted cases (e.g. in some numerals).

Measurements were made for all three speakers. For YM, all words with final stops were used (57 tokens, 18 words). For YF, the words were chosen to be balanced for place of articulation plus those where we also have recordings from at least one of the other speakers (38 tokens, 23 words). For OM, all words with final stops were used (14 tokens, 12 words). We measured:

1. Duration of the vowel preceding the stop. This was measured from onset of second and third formants to the abrupt decrease in intensity. It was assumed that phonologically long and short vowels are evenly distributed over final VOICED and VOICELESS stops and that this therefore has no effect. It has been found that vowels preceding voiced stops are generally longer (Dmitrieva et al. 2010).
2. Duration of closure. This was measured from the end of the vowel to the release of the stop, indicated by a sudden spike in intensity. It has been found that voiceless stops are generally longer (Dmitrieva et al. 2010).

²¹ VOICED and VOICELESS in small caps refer to what we have taken to be the underlying phonological category of the stop.

3. Duration of voicing into closure (absolute and as proportion of total closure time). This was measured as the duration of the periodic waveform into the closure.
4. Number of glottal pulses during the closure (measured using Praat's automatic count).

4.1.1 Analysis results: measurements

Measurements for YM

The average values for these tokens are shown in Table 8.

Table 8: Word-final voicing: YM

	VOICED	VOICELESS
Vowel duration	0.119	0.116
Burst duration	0.066	0.069
Closure duration	0.073	0.087
Voicing duration	0.035	0.027
Voicing proportion	0.500	0.324
Number of pulses	3.275	2.353

There appears to be a difference between VOICED and VOICELESS stops in YM's speech. Vowel duration and total closure duration are shown in Figure 9, and the voicing proportion is shown in Figure 10 (left panel). While there appears to be a difference, the values of VOICED and VOICELESS stops largely overlap.

For comparison, the values for intervocalic stops in YM's speech (tokens = 42) are provided in Table 9.

Table 9: Intervocalic stops: YM

	VOICED	VOICELESS
Vowel duration	0.071	0.065
Burst duration	—	0.030
Closure duration	0.048	0.071
Voicing duration	0.047	0.028
Voicing proportion	0.982	0.414
Number of pulses	5.636	2.581

Figure 9: Vowel duration (left) and closure duration (right) for YM

The box plots in Figure 10 show the difference in voicing proportion between final and medial stops in YM’s speech.

Figure 10: Proportion of voicing during closure in final (left) and medial (right) stops for YM

In short, a comparison of voiced stops word-finally and intervocalically suggests that in intervocalic stops the distinction between VOICED and VOICELESS is robust. VOICED stops retain voicing throughout the closure. Not unexpectedly, the VOICELESS stops have on average a somewhat greater portion of voicing, but are still distinct from VOICED items in always having a portion of voicelessness. On the other hand, in the word-final position, all but one VOICED stop retain voicing throughout the closure phase, although it should be noted that the total number of tokens

is quite small. For the VOICELESS tokens, there is considerable variation, but all tokens have at least a portion of voicelessness. The most distinctive feature of intervocalic VOICELESS stops in this sample appears to be that they have a voiceless release phase before voiced onset in the following vowel, which is not the case for VOICED stops.

Measurements for YF

YF sometimes appears not to articulate the final stop at all: it is neither audible nor visible in waveforms or spectrograms (see Section 4.2). Such tokens are not included in the set of tokens measured here. This is since the measurements used here are impossible or difficult to measure here. This happens with both VOICED and VOICELESS stops, though it appears to be more common with VOICELESS stops. The average values for these tokens are shown in Table 10.

Table 10: Word-final voicing: YF

	VOICED	VOICELESS
Vowel duration	0.198	0.137
Burst duration	0.086	0.076
Closure duration	0.094	0.132
Voicing duration	0.057	0.033
Voicing proportion	0.632	0.306
Number of pulses	6.000	5.882

Box plots of the distributions are provided in Figure 11. In general, the difference between VOICED and VOICELESS is greater in these tokens and the overlap is not as great: the values between the first and third quartiles barely overlap at all, although the extreme values do.

In summary, the signs of an ongoing sound change of final devoicing can be seen in YM's speech: words with phonologically VOICED final stops are often realized as voiceless. There is a difference in averages, but as the box plots show us there is also considerable overlap in the phonetic realization of the phonological categories. In the speech of YF, the phonetic difference between VOICED and VOICELESS appears to hold also in the final position, but we can see some signs of devoicing also here. At this stage, the reason for this difference between speakers is not known. A plausible partial explanation may be YF's literacy and greater proficiency in Hindi.

Figure 11: Vowel duration (left), closure duration (middle), and proportion of voicing during closure (right) for YF

4.2 Consonant deletion

Consonant lenition and deletion in the word-final position are widely attested in Kanashi. In this, Kanashi shows a similar development to several other ST languages, where the Proto-ST series of codas /p/, /t/, /k/ have merged into a single glottal stop (Matisoff 2003). This development has been known to also have an influence on tonogenesis (Haudricourt 2018). While fricatives, affricates or /l/ in the word-final position are always audible in Kanashi, we find varying degrees of consonant deletion in: voiceless stops (Section 4.2.1), nasals (Section 4.2.2), and alveolar trill (Section 4.2.3).

4.2.1 Voiceless stops

The omission of final consonants is documented more often with voiceless stops. It occurs most commonly in disyllabic words ending in *-a:t*, though not exclusively. One thing that is noticeable in items where the final consonant is not audible is that they show a higher final pitch than those ending with voiceless final stops words that are phonologically vowel-final. This may indicate that there is some form of glottal gesture involved in the realization of these items.²²

Figure 12 shows the average pitch of monosyllabic items ending in (from top to bottom at the lefthand side of Figure 12): (1) voiced stops; (2) vowels; (3) voiceless stops; and (4) omitted voiceless stops.²³ The averages are based on mean pitch across successive fifths (1–5) of the duration of the vowel. This is since due to back-

²² Grierson (1928) suggests a possibility of glottalization.

²³ Words/tokens: voiced – 18/39; vowels – 26/69; voiceless – 10/23; omitted – 5/8.

ground noise there is sometimes perturbations in Praat's pitch measurements and a mean period across a period of time is therefore likely more accurate.

Figure 12: Average pitch

This difference is also illustrated in Figure 13 with the two phonetic realizations of /ja:k/ 'yak' in the speech of the same speaker: the (blue) dotted line shows the pitch (fundamental frequency).

Figure 13: Intra-speaker pronunciation variation (YF: final stops): [ja:(ʔ)] ~ [ja:kʰ] /ja:k/ 'yak'

4.2.2 Nasals

Nasal consonants are not completely omitted, but they often seem to be very indistinct, making it difficult to ascertain if there is only nasalization on the preceding vowel or if there is also a nasal consonant. This is more evident in disyllabic lexical items, and is especially common with those ending in *-aŋ*.

An example of a very indistinct word-final nasal consonant is *butaŋ* ‘ghost’. We see the difference more clearly when we compare this with the monosyllabic *ɕa:ŋ* ‘gold’ where the word-final nasal consonant is fairly clearly identifiable. Both occurred in YF’s speech (Figure 14).

Figure 14: Intra-speaker pronunciation variation (YF: final /ŋ/): [butã(ŋ)] ‘ghost’ : [ɕã:ŋ] ‘gold’

4.2.3 The alveolar trill /r/

The alveolar trill /r/, too, is not, at times, articulated explicitly in the word-final position. Examples: /la:r/ [la:(r)] ~ [la:(ɪ)] ‘rice (uncooked)’ and /du:r/ [du:(r)] ~ [du:(ɪ)] ‘far’. This may be compared with, for example, /ha:r/ [ha:r] ‘necklace’, where the final /r/ is a clear trill (Figure 15).

Summing up, Kanashi seems to show signs of losing its word-final consonants (stops, alveolar trill and nasals). If true, this change is still at a relatively initial stage as the language consultants, when asked to pronounce the word slowly, provided the form with a word-final consonant.

Figure 15: Intra-speaker variation (final /r/): /la:r/ [la:(i)] ‘rice (uncooked)’ : [ha:r] ‘necklace’

5 Placing the Kanashi sound system in its context

In this section we will discuss how the Kanashi sound system relates to the sound systems of some closely related West Himalayish languages: Bunan (Widmer 2017), Darma (Willis Oko 2019), Kinnauri (Saxena 2017; 2022),²⁴ Pattani (S. R. Sharma 1991) and Lahuli (Singh 1989). All these languages are spoken in Himachal Pradesh (India), except Darma, which is spoken in the easternmost part of the Indian state of Uttarakhand and the adjacent area in western Nepal (see Figure 16).

In its consonant inventory, Kanashi appears to be fairly similar to other West Himalayish languages. Voiceless aspirates – a feature not reconstructable to Proto-Sino-Tibetan (DeLancey 1985) – are shared by most related languages. Voiced aspirates, on the other hand, present a more varied picture. They are found in Lahuli and Pattani, but not in Bunan. In Darma and Kinnauri voiced aspirates are not accorded phonemic status. In both languages they are mainly found in words of IA origin and there is a lot of variation between voiced and voiceless aspirates. As seen above this is the case also in Kanashi. Matisoff (2003) notes that many ST languages of Nepal have developed voiced aspirates due to contact, first restricted to loanwords but later also extended to ST vocabulary.

²⁴ Information provided here on Kinnauri is based on Anju Saxena’s fieldwork. See also Saxena (2017; 2022).

Figure 16: Location of Kanashi and related languages (Uttaranchal is a former name of Uttarakhand)

One difference between Kanashi and Kinnauri concerns nasal consonants. Kanashi has a retroflex nasal consonant phoneme, while Kinnauri has a palatal nasal, but not a retroflex nasal consonant as a phoneme. In both languages this consonant (palatal nasal/retroflex nasal) is rather infrequent.

The West Himalayish languages considered here show variation concerning the number of places of articulation in obstruents and nasals. Most of the languages surveyed here have stops at four to five places of articulation and affricates at two to three. An exception is Dama, which Willis Oke (2019) analyses as lacking affricates but instead having stops at six places of articulation. She notes that previous authors have analyzed the alveolar and palatal stops as affricates and that they are similar in their articulation to affricates (Willis Oke 2019). Retroflex stops are common in all branches of Himalayish (Matisoff 2003). Kanashi seems to differ from the other languages surveyed here in that Kanashi – based on our current knowledge – has sibilants at two places of articulation, while Lahuli, Pattani, and Bunan have three places of articulation. Dama appears to deviate from the other languages in having a uvular fricative. The lack of voiced fricatives that we have observed in Kanashi is also found in several of the related languages.

As for sonorants, the languages surveyed here are fairly similar to Kanashi. Pattani and Lahuli have a retroflex rhotic. For nasal consonants, the places of

articulation vary between three and five. However, the (almost) lack of the velar nasal in the word-initial position in Kanashi is not a characteristic of either Bunan or Darma.

Final devoicing is also fairly common in these languages. Bunan only allows /p/, /t/, /k/ in the final position. In Kinnauri the intensity of /b/, /d/, /g/ in the word-final position is either less or the consonant is realized as voiceless. Just as in Kanashi, in Kinnauri too, voiced stops in non-word-initial position are often realized as voiced fricatives. According to Matisoff (2003: 313), “[f]inal stops in Sino-Tibetan, as in virtually all mainland Southeast Asian languages of the Tai-Kadai, Hmong-Mien, and Mon-Khmer families, are unreleased, with no contrasts in voicing or aspiration in that position”.

Kanashi is also fairly similar to its genetically related languages concerning its vowel system, with the exception that Darma has the vowel /ɛ/, while Kinnauri, Lahuli, Pattani, and Darma have a /ə/. Unlike Kanashi and Kinnauri, in Darma, length is not distinctive and in Bunan only marginally so, with only two long vowel phonemes /i:/ and /a:/. Nasal vowels exist in several of the languages, but if they have phonemic status, generally they have very low functional load.

The behavior of /u/ observed in Kanashi has similarities in related languages. For example, the fronting of /o/, /u/ to /ø/, /y/ in Bunan in certain environments, e.g. following palatal or alveo-palatal consonants and in the case of /u/ also following /l/. In Darma, /u/ is realized as a high, central unrounded vowel when in closed syllables with nasal codas or following palatal consonants.

When it comes to syllable structures, Kanashi appears to allow for both more complex onsets and codas than Bunan or Darma. In Bunan, the syllable canon is $C_1RVC_2C_3$, where R is a resonant /r/ or /j/ and C_3 is /s/. Darma does not allow final consonant clusters and as onsets only C + /w/, /j/. Kinnauri is more similar to Kanashi here, allowing a wider array of both initial and final clusters. The Proto-ST syllable canon can, according to Matisoff (2003) be reconstructed as $(P_2)(P_1)C_i(G)V(:)(C_f)(S)$, where G is a glide /j/, /w/ and C_f is a restricted set of final consonants. P and S refer to consonantal affixes, where Matisoff notes about the prefixes that “[they], especially those that were stops, and especially when preceding a stop C_i , were undoubtedly vocalized by an epenthetic schwa for ease of pronunciation. Strictly speaking such forms are ‘sesquisyllabic’ (i.e. ‘a syllable and a half’ long) rather than simply monosyllabic.” (Matisoff 2003: 11).

Many ST languages have phonemic tone and/or voice register distinctions. However, there are differences between the subbranches as well as areal differences. Hildebrandt (2007) surveys the tonal systems of seventeen languages and the distribution along the so called Indosphere and Sinosphere as well as a buffer zone between them, following Matisoff (1999) and Bickel & Nichols (2003). These spheres are to be construed as forming areas of cultural and linguistic similar-

ity. The Sinosphere is east of the Brahmaputra river and is characterized by early influence from the Han culture, monosyllabicity and complex tone systems. The Indosphere lies west of the Brahmaputra and is characterized by Hindu-Buddhist traditions and its languages are atonal (or incipiently tonal) and polysyllabic. The so-called buffer zone lies in-between and is, both culturally and linguistically, a sort of hybrid of the two other spheres. Kanashi lies clearly in the so called Indosphere. Thus, from that point of view, it is not surprising that Kanashi is atonal and polysyllabic.

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