A POSSIBLE TWO-WAY CONTRAST ON PLOSIVE ONSETS?

This phonological topic is based on the observation that Duhumbi has a relative paucity of non-aspirated, unvoiced plosive consonants. Whereas the are many attestations of aspirated onsets /kh, g, ph/ and voiced onsets /b, t, th/ there are much fewer attestations of onsets /k, p, t/, especially in word-initial position. It is observed that this observation is replicated in the other Western Kho-Bwa languages; by contrast, Puroik has relatively few attestations of aspirated plosive onsets (p.c. Ismael Lieberherr).

The situation in Duhumbi is similar for the affricates, where we find relatively many attestations of aspirated affricate /tsʰ/ but only few of unaspirated /ts/ (but characteristically none of voiced dz), and many attestations of aspirated affricate /tɕʰ/ and voiced /dʑ/, but only few of unaspirated /tɕ/. In addition, it is observed that there is inter-speaker variation in the realisation of the affricates, i.e. /ts ~ tsʰ/ and /tɕ ~ tɕʰ/, particularly in the case of polymorphemic lexemes that contain more than one affricate.

The sound files of all minimal pairs provided in this paper are also available in ZIP file format on Zenodo, accompanying this paper.

DISTINCTIVENESS AND DISTRIBUTION OF VELAR PLOSIVES

Duhumbi has distinctive velar plosives in three manners of articulation: voiceless unaspirated /k/ [k], voiceless aspirated /kh/ [kʰ] and voiced unaspirated /g/ [g]. These velar plosives all occur in onset position, with only the voiceless unaspirated velar plosive /k/ occurring in coda position as well. All three velar plosives have a palatalised allophone [kʲ, kʰʲ, kʲ] before rimes /-e, -ek, -eng/.

Examples of the distribution of the velar plosives before all the distinctive vowels in Duhumbi is provided in Table 1.

Table 1. Onset velar plosives.

onset	vowel	lexeme
/k/	/a/	*kang* {*da*} [kaŋ] ‘to be filled’
	/e/	*keng* {*da*} [kʲɛŋ] ‘to clear up (weather)’
	/i/	*kik* {*da*} [kiḵ] ‘to be ok’
	/o/	*kong-pu* [kɔŋpu] ‘finger millet; scabies’
	/u/	*kum* {*ta*} [kum] ‘to bend; to stay hidden’
/kʰ/	/a/	*khang* {*da*} [kʰaŋ] ‘to carry, lift up completely; to let cool off’
	/e/	*kheng* {*da*} [kʰʲɛŋ] ‘to grind; to pull’
	/i/	*khing* {*da*} [kʰiŋ] ‘to stand up’
	/o/	*khong-ba* [kʰɔŋbaː] ‘raw, untreated’
	/u/	*khung* {*da*} [kʰuŋ] ‘to climb’
/g/	/a/	*gang* {*da*} [gaŋ] ‘to lift up partially’
	/e/	*geng* {*da*} [gʲɛŋ] ‘to warm up’
	/i/	*ging* {*da*} [giŋ] ‘to soar, fly high’
	/o/	*gong* [gɔŋ] ‘fence; price’
	/u/	*gung* [guŋ] ‘clouded leopard’

In coda position, the unvoiced velar plosive /k/ can be found following all vowels. Examples of this are given in Table 2.

Table 2. Coda velar plosives.

rhyme	lexeme
-ak	*bak* {*ta*} [bak] 'to slide down; to resemble; to till'
-ek	*bek* {*da*} [bʲɛk] 'to mature, to ripen'
-ik	*bik* {*da*} [bik] 'to sweep'
-ok	*bok ong* {*da*} [bɔk ɔŋ] 'to trip over'
-uk	*buk* [buk] 'breath'

The acoustic distinction between the velar plosives can be illustrated through the waveforms and spectrograms, Figure 1-3. The unvoiced velar plosive in Figure 1 is characterised by both the lack of voicing and lack of aspiration indicated in Figures 2 and 3. The onset of voicing commences with the release of the unvoiced velar plosive, resulting in a VOT close to zero. For the voiced velar plosive, the onset of voicing well precedes the release of the plosive, resulting in a negative VOT, whereas for the aspirated velar plosive the onset of voicing is delayed by the aspiration, resulting in a positive VOT.

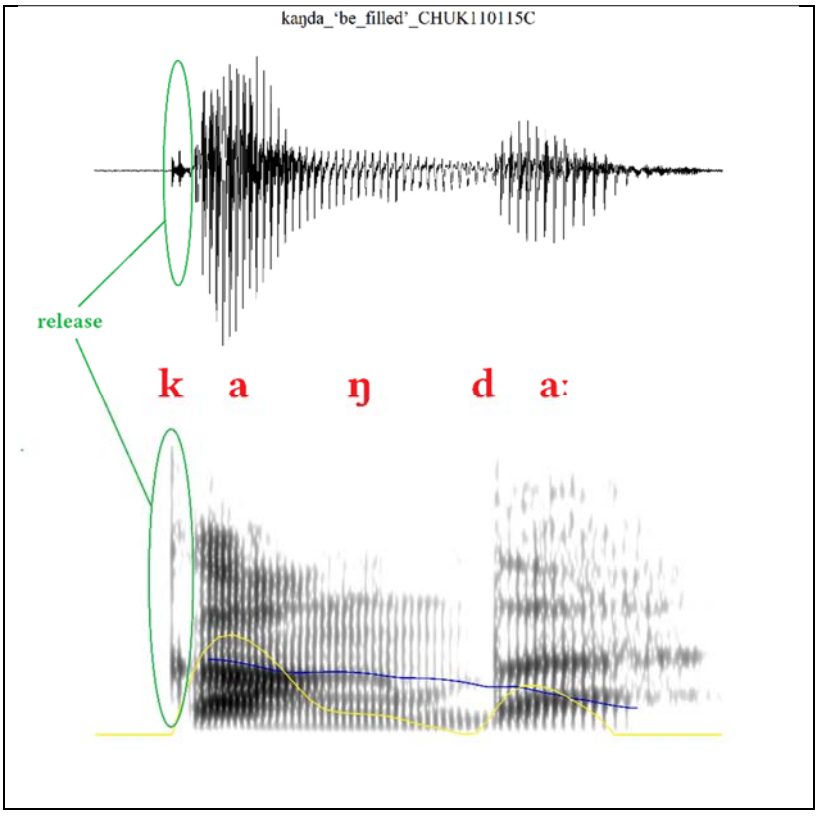

Figure 1. Spectrogram and waveform of kang {*da*} [*kaŋ*] *'to be filled'* [*CHUK110115C*]

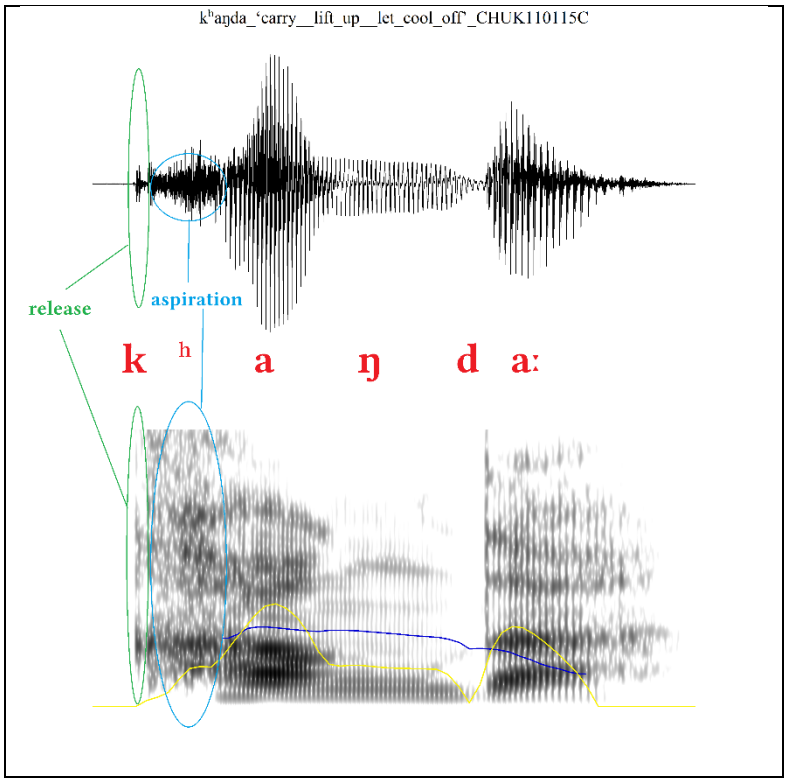

Figure 2. Spectrogram and waveform of khang {da} [kʰaŋ] 'to carry, lift up completely; to let cool off' [CHUK110115C]

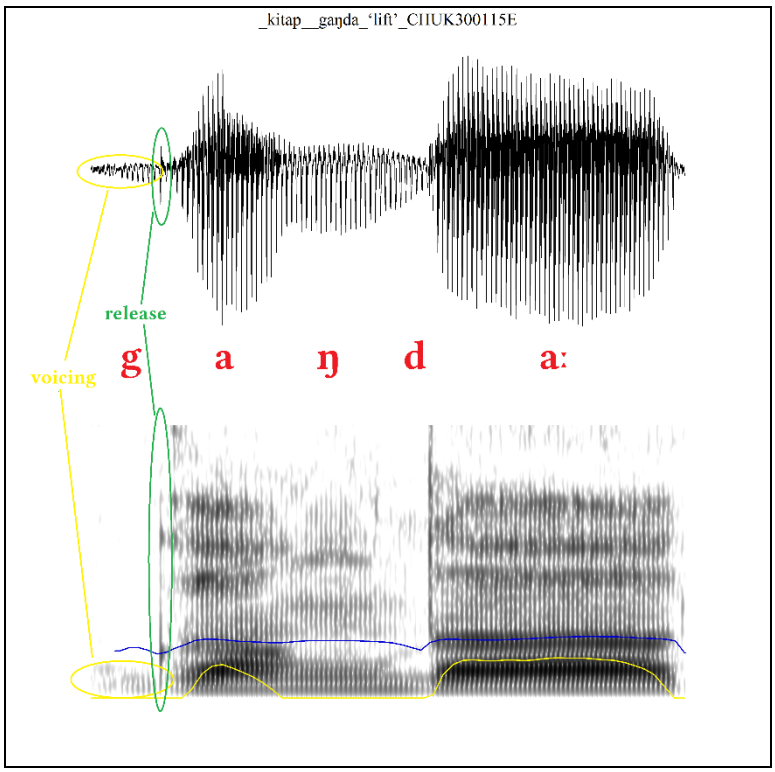

Figure 3. Spectrogram and waveform of gang {da} [gaŋ] 'to lift up partially' [CHUK300115E]

DISTINCTIVENESS AND DISTRIBUTION OF ALVEOLAR PLOSIVES

Duhumbi has distinctive alveolar plosives in three manners of articulation: voiceless unaspirated /t/ [t], voiceless aspirated /th/ [tʰ] and voiced unaspirated /d/ [d]. These alveolar plosives all occur in onset position, with only the voiceless unaspirated alveolar plosive /t/ occurring in coda position as well. All three alveolar plosives have a palatalised allophone [tʲ, tʰʲ, dʲ] before rimes /-e, -ek, -eŋ/, for the justification of which see ***Error! Reference source not found.***.

Examples of the distribution of the alveolar plosives before all the distinctive vowels in Duhumbi is provided in Table 3.

Table 3. Onset alveolar plosives.

onset	vowel	lexeme
/t/	/a/	*tat* {*da*} [tat] 'to supply; to approach'
	/e/	*tet* {*da*} [tɛt] 'to slip, to be slippery'
	/i/	*tit* {*da*} [tit] 'to pull down skin; skin to come off by itself'
	/o/	*tot* {*da*} [tɔt] 'to flatter'
	/u/	*tut* {*da*} [tʊt] 'to fall down'
/tʰ/	/a/	*thak* [tʰak] 'rope'
	/e/	*thek* {da} [tʰʲɛk] 'to patch up (clothes)'
	/i/	*thik-pa* [tʰikpaː] 'drop'
	/o/	*thok* [tʰɔk] 'beer filter'
	/u/	*thuk-pa* [tʰukpa] 'porridge'
/d/	/a/	*dap* {*da*} [dap] 'to repeat, to return, to reply; to cut'
	/e/	*dep* {*da*} [dɛp] 'to mould'
	/i/	*dip* {*da*} [dip] 'to pound with force'
	/o/	*dop* [dɔp] 'pair of oxen'
	/u/	*dut* {*da*} [dut] 'to forge; to smoke out'

In coda position, the unvoiced alveolar plosive /t/ can be found in all permitted rhymes and in a single coda consonant cluster. The /-rt/ cluster coda is described in more detail in ***Error! Reference source not found.***.

Table 4. Coda alveolar plosives.

rhyme	lexeme
-at	*tat* {*da*} [tat] 'to supply; to approach'
-et	*tet* {*da*} [tɛt] 'to slip, to be slippery'
-it	*tit* {*da*} [tit] 'to pull down skin; skin to come off by itself'
-ot	*tot* {*da*} [tɔt] 'to flatter'
-ut	*tut* {*da*} [tʊt] 'to fall down'
-rt	*durt* {*da*} [duɹt] 'to become rotten; overcooked; drenched'

The acoustic distinction between the alveolar plosives can be illustrated through the waveforms and spectrograms Figure 4-6. The unvoiced alveolar plosive in Figure 4 is characterised by both the lack

of voicing and lack of aspiration indicated in Figures 5 and 6. The onset of voicing commences with the release of the unvoiced alveolar plosive, resulting in a VOT close to zero. For the voiced alveolar plosive, the onset of voicing well precedes the release of the plosive, resulting in a negative VOT, whereas for the aspirated alveolar plosive the onset of voicing is delayed by the aspiration, resulting in a positive VOT.

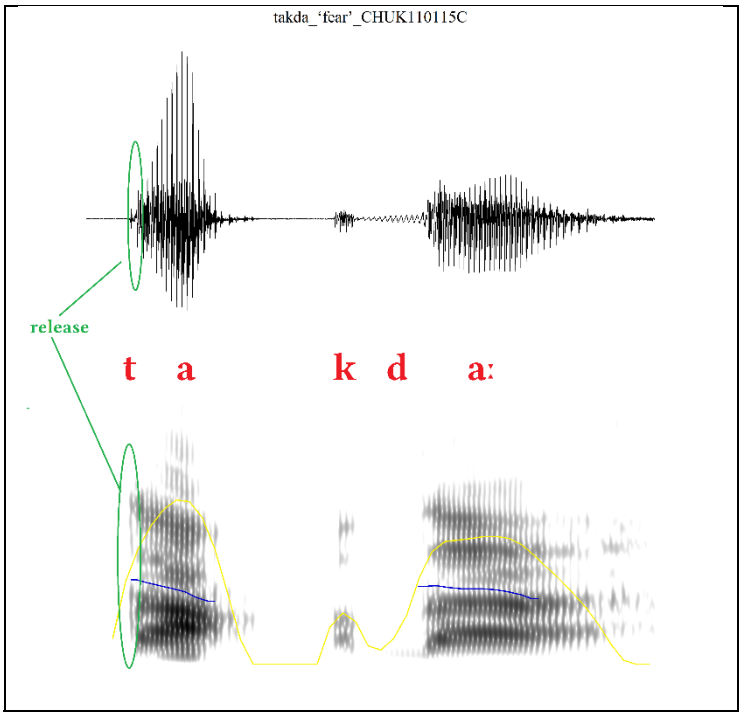

Figure 4. Spectrogram and waveform of tak {da} [tak̃] 'to be afraid' [CHUK110115C]

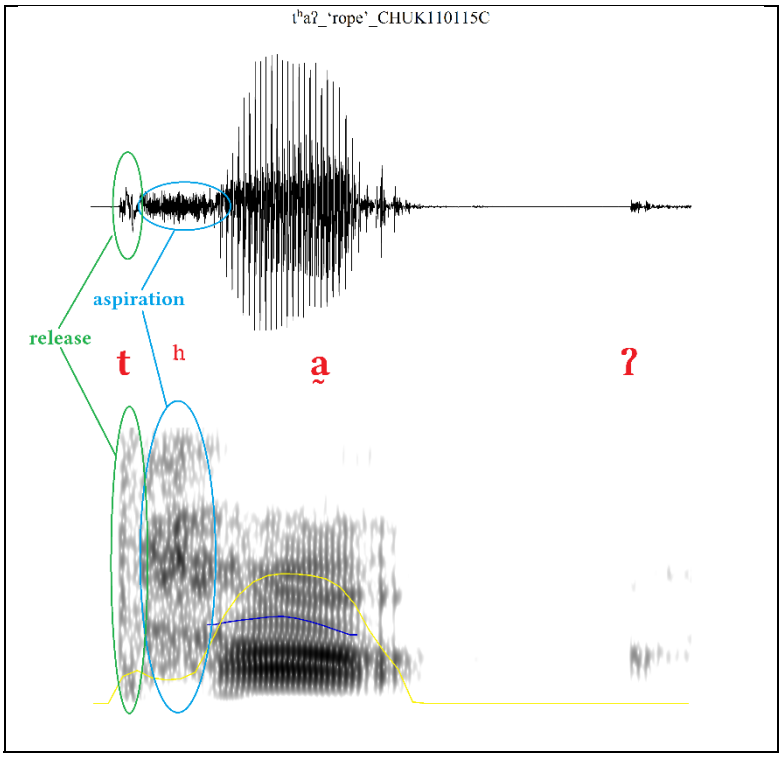

Figure 5. Spectrogram and waveform of thak [tʰa̰ʔ] 'rope' [CHUK110115C]

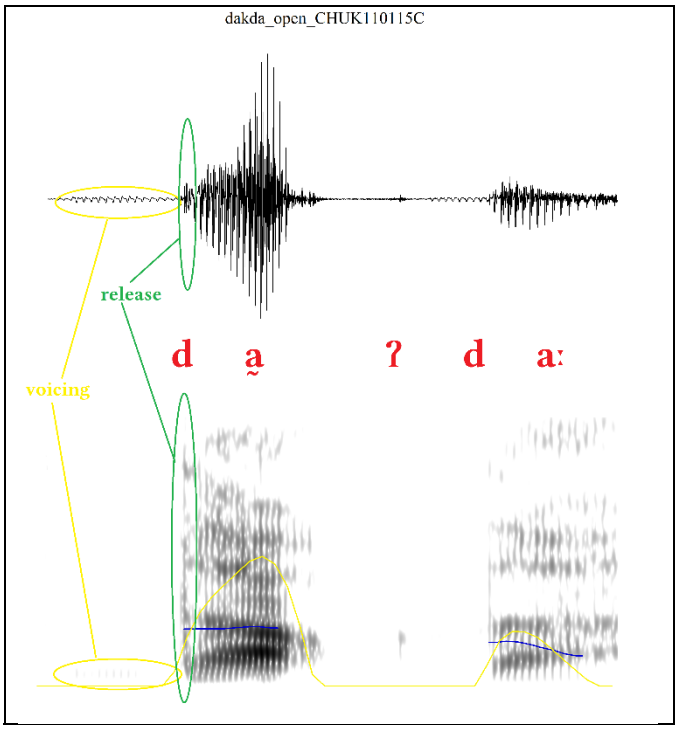

Figure 6. Spetrogram and waveform of dak {da} [da̰ʔ] 'to open' [CHUKn01n5C]

DISTINCTIVENESS AND DISTRIBUTION OF BILABIAL PLOSIVES

Duhumbi has distinctive bilabial plosives in three manners of articulation: voiceless unaspirated /p/ [p], voiceless aspirated /ph/ [pʰ] and voiced unaspirated /b/ [b]. These bilabial plosives all occur in onset position, with only the voiceless unaspirated bilabial plosive /p/ occurring in coda position as well. All three bilabial plosives have a palatalised allophone [pʲ, pʰʲ, bʲ] before rimes /-e, -ek, -eŋ/.

Examples of the distribution of the bilabial plosives before all the distinctive vowels in Duhumbi is provided in Table 5.

Table 5. Onset bilabial plosives.

onset	vowel	lexeme
/p/	/a/	*pang* {*ta*} [paŋ] 'to renounce'
	/e/	*peng* {*da*} [pʲɛŋ] 'to not pay attention'
	/i/	*pir* {*ta*} [piɪ] 'to press down'
	/o/	*pong-pong* [pɔŋpɔŋ] 'smalltalk'
	/u/	*pung* {*ta*} [puŋ] 'to heap up'
/pʰ/	/a/	*phang* {*ta*} [pʰaŋ] 'to feel a loss'
	/e/	*pheng* [pʰʲɛŋ] 'spindle'
	/i/	*phir* {*ta*} [pʰiɪ] 'to turn by hand'

	/o/	*hem-phong* [hɛmpʰɔŋ] ‘nose’
	/u/	*phung* {*da*} [pʰuŋ] ‘to be at loss’
/b/	/a/	*bang* {*da*} [baŋ] ‘to feed by hand’
	/e/	*beng-ka* [bʲɛŋka] ‘deafness’
	/i/	*biŋ* [biŋ] ‘name’
	/o/	*bong* {*da*} [bɔŋ] ‘to slash overhand’
	/u/	*bung* {*da*} [buŋ] ‘to bury’

In coda position, the unvoiced bilabial plosive /p/ can be found in all permitted rhymes and in a single coda consonant cluster. Examples of this are given in Table 6. The /-mp/ cluster coda is described in more detail in ***Error! Reference source not found.***.

Table 6. Coda bilabial plosives.

rhyme	lexeme
-ap	*tɕʰap* [tɕʰap] ‘shade’
-ep	*kep* [kɛp] ‘rib’
-ip	*khip* [kʰip] ‘cave’
-op	*khop* [kʰɔp] ‘nest’
-up	*thup* [tʰup] ‘village’
-amp	*camp* {*ta*} [tɕamp] ‘to surrender’

The acoustic distinction between the bilabial plosives can be illustrated through the waveforms and spectrograms Figures 7-9. The unvoiced bilabial plosive in Figure 7 is characterised by both the lack of voicing and lack of aspiration indicated in Figures 8 and 9. The onset of voicing commences with the release of the unvoiced bilabial plosive, resulting in a VOT close to zero. For the voiced bilabial plosive, the onset of voicing well precedes the release of the plosive, resulting in a negative VOT, whereas for the aspirated bilabial plosive the onset of voicing is delayed by the aspiration, resulting in a positive VOT.

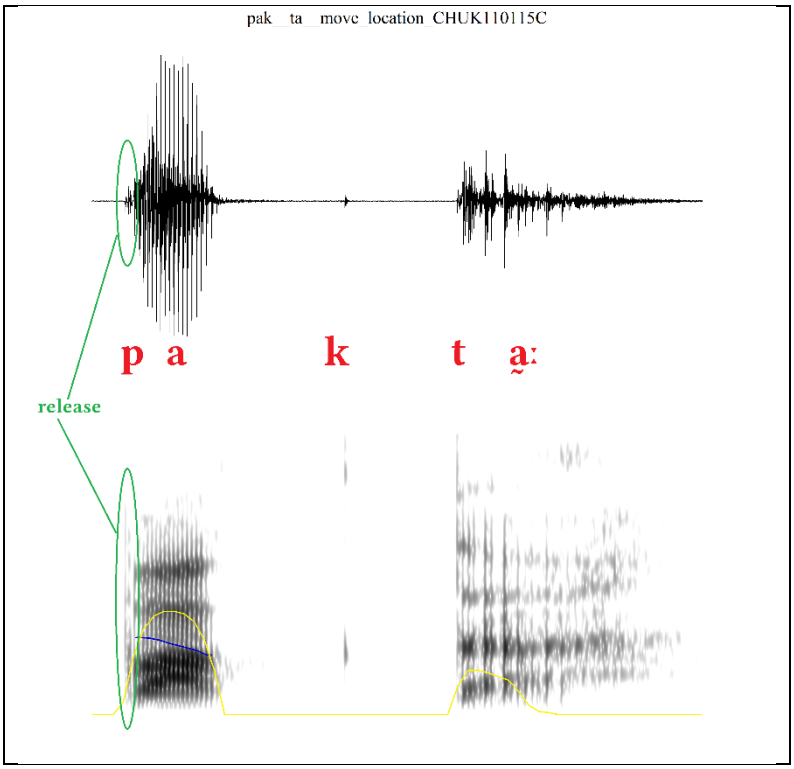

Figure 7. Spectrogram and waveform of pak {ta} [pak] 'to select and move'

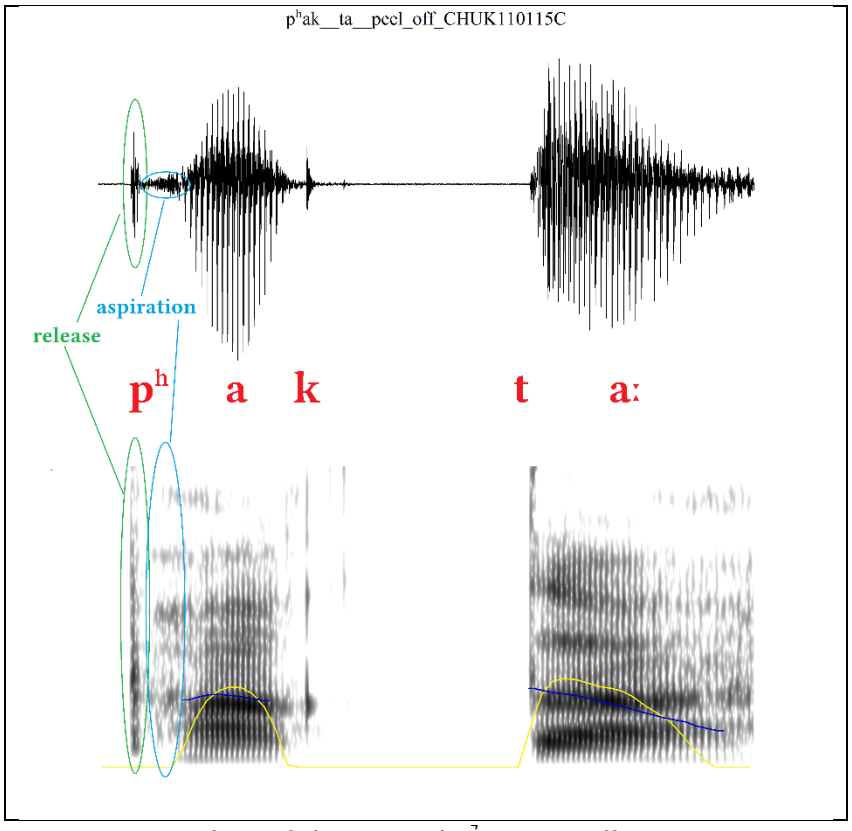

Figure 8. Spectrogram and waveform of pʰak {ta} [pʰak̚] 'to peel off'

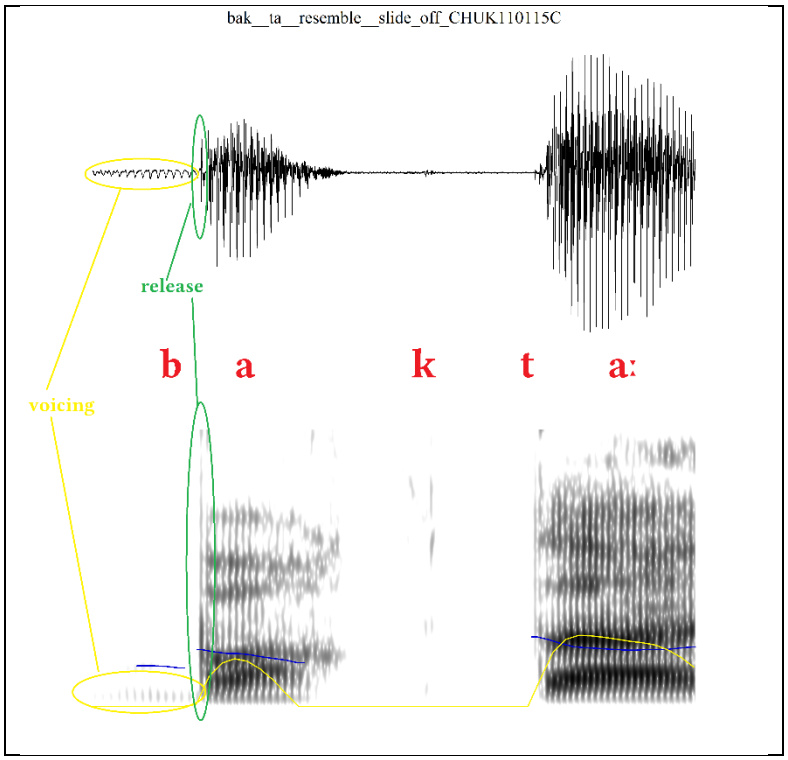

Figure 9. Spectrogram and waveform of bak {ta} [bak] 'to resemble; to slide down'

ORIGIN OF PLOSIVES

Although the Duhumbi plosives in their three manners of articulation are distinctive in contemporary Duhumbi, their distribution and occurrence as well as the cognates in the other Western Kho-Bwa languages and Tshangla and the Bodish languages indicates that this may not have always been the case. There are reasons to presume this, and these are discussed one by one below.

PAUCITY OF UNVOICED ONSETS

The number of attestations of unvoiced plosives /k, p, t/ is much more limited than that of their aspirated and voiced counterparts. For example, there are only 65 attestations of unvoiced bilabial plosive /p/ in onset position of a root, and 14 attestations of this are of the (borrowed) onset cluster /pr/.

LEXEMES WITH UNVOICED PLOSIVES ARE LOANS

A majority of the Duhumbi lexemes with syllable-initial and word-initial unvoiced, unaspirated plosives is of loan origin, and has no good cognates in the Sartang and Sherdukpen varieties that *may* suggest an inherited origin. The majority of the occurrences of the unvoiced plosives has direct cognates in the Bodish languages, Tshangla, or Hindi, and for many of these loans, the other Western Kho-Bwa languages, particularly those in less intense contact with Bodish and Tshangla such as Jerigaon and Khoina Sartang, have preserved native Kho-Bwa lexemes.

Very common is the attestation of unvoiced, unaspirated bilabial plosives in nouns and adjectives that were borrowed from Tibetan/Bodish and contain the Tibetan/Bodish nominaliser *-pa*, the

Tibetan/Bodish suffix *-pa* 'people of', or the Tibetan/Bodish masculine suffix *-po* (in its Duhumbi realisation as *-pu*).

Examples include *bruk-pa* [bɹukpa] 'Bhutanese' (<Tib. ḥbrug-pa); *brok-pa* [bɹɔkpa] 'nomad' (<Tib. ḥbrog-pa); *ge-pu* [gepu] 'king' (<Tib. rgyal-po); *lus-pu* [luspu] 'body' (<Tib. lus-po); *be-pa* [bepa] 'large frog' (<Tib. sbal-pa); *akpu* [akpu] 'crow' (<TT [akpu], TSB [akpakʰa]); *thuk-pa* [tʰukpa] 'porridge' (<Tib. thug-pa); *dong-pa* [dɔŋpa] 'cheek' (<Tib. gdoṅ-pa 'face, countenance'); *thik-pa* [tʰikpa] 'drop' (<Tib. thigs-pa); *hangpa* [haŋpa] 'steam' (<Tib. rlang-pa); *wuk-pa ~ huk-pa* [wukpa ~ hukpa] 'owl' (< Tib. ḥug-pa); *gon-pa* [gɔnpa] 'temple' (<Tib. dgon-pa); *ko-lok-pa* [kɔlɔkpa] 'knee' (<TT [kʰolɔkpa], BL [kʰolɔkpa]); *mukpa* [mukpa] 'cloud, fog' (<Tib. smug-pa 'fog, mist'); *tsikpa* [tsikpa] 'wall' (< Tib. rtsig-pa); *dikpa* [dikpa] 'sin' (<Tib. sdig-pa); *gospa* [gɔspa] 'need' (<Tib. dgos-pa); *totpa* [tɔtpa] 'praise' (<Tib. bstod-pa); *cur-pu* [tɕuɹpu] 'sour' (<Tib. skyur-po); *gang-pu* [gaŋpu] 'all, entire, whole, complete' (<WT gaṅ-po 'entire, whole'); *jam-bu* [ʤambu] 'smooth, soft' (< Tib. ḥjam-p); *ham-pa* [hampa] 'sometimes, suddenly' (<TT *ham-pa-ta-laŋ*); *kem-pa* [kɛmpa] 'thin, lean' (< Tib. skem-pa); *lot-pa* [lɔtpa] 'obnoxious' (<Tib. lod-pa 'a nuisance'); *nam-bar-dak-par* [nambaɹdakpaɹ] 'perfect' (TT, BL, TSD [nambaɹ dakpa]); *tong-pa* [*tɔŋpa*] 'empty' (< Tib. toṅ-pa); and *nyi-pa* [ɲipa] 'second month' (<Tib. gnyis-pa). \

Examples of loans include: *a-tuŋ* [atuŋ] 'maternal aunt' (<TSD [atuŋ]); *kak-tar* [kaktaɹ] 'hard; tough; strong' (<TSB [kaktaɹ]); *kam* [kam] 'yawn; hand-span', TT *glam* 'hand span'; *kamtang* [kamtaŋ] 'side dish' (<TSD [kamtaŋ]); *pak-tsa* [paktsa] 'animal hide jacket' (<Tib. pags-tshag); *pang-bu* [paŋbu] 'chest' (<Tib. paṅ 'bosom'); *ka* [ka] 'order, command (<Tib. bkaḥ-ḥgo); *kak* {*ta*} [kak] 'prevent' (<Tib. bkag-pa); *ka-kung* [kakuŋ] 'parched grains' (<TSD [kakuŋ]); *ka-ma* [kama] 'infertile' (<Tib. skams-pa 'barren, dry, infertile'); *kam-pa* [kampa] 'tongs' (<Tib. skam-pa); kana [kana] 'blind' (<As. কণা *kanā*); *kang* [kaŋ] 'marrow' (<Tib. rkaṅ); *kang* {*da*} [kaŋ] 'be filled' (<Tib. bkaṅ-pa < ḥgeṅs-pa 'to fill'); *kang-key* [kaŋkɛj] 'crab (<Tib. ka-rka-ta, TSB [kaŋkara]); *kang-rong* [kaŋɹɔŋ] 'river bed' (<TSB [kaŋroŋ] 'river bed'); *kang-thri* [kaŋʈʰi] 'chair' (<Tib. kaṅ-khri); *kap* {*da*} [kap] 'be together' (<TSB [kapɲi ~ kamɲi]); *kar* {*da*} [kaɹ] 'attach' (<Tib. skar-ba 'hang up'); *kar-ma* [kaɹma] 'star' (<Tib. kar-ma); *ka-ru* [kaɹu] 'cup' (<Tib. dkar-yol 'porcelain cup'); *ka-wa* [kawa] 'tree fork; vertical post' (<Tib. *ka-ba* 'pillar, column, post'); *kem* [kɛm] 'vermouth' (<TSB [kɛmpaɕiŋ]); *kem-nyak* [kɛmɲak] 'takin' (<TT [kɛmɲak]); *kep* [kɛp] 'rib' (<Tib. rked-pa 'waist, loins'); *key* {*da*} [kɛj] 'place, load' (<TSB [kaj]); *key-ru* [kɛjɹu] 'landslide' (<Tib. sgal-rud 'fallen mass'); *ke-zhong* [keʑɔŋ] 'type of basket' (<TT [keʑɔŋ] 'basket'); *kit-pu* [kitpu] 'happy' (<Tib. skyid-po); *ko* [kɔ] 'door' (<Tib. sgo, TSD [ko]); *ko-da* [kɔda] 'spade' (<Hin. कुदाल kudāl); *konbu* [kɔnbu] 'limited (< Tib. dkon po 'rare, scarce, scant'); *kor* {*da*} [kɔɹ] 'roam' (<Tib. skor-ba); *kor-sha* [kɔɹɕa] 'bean' (<TSD [kɔɹɕa]); *kukpa* [kukpa] 'fool, mute' (<Tib. lkugs-pa); *kum* {*ta*} [kum] 'bend' (<Tib. skum-pa 'to draw back, pull in, bend'); *pang-lep* [paŋlɛp] 'wooden board, plank' (<Tib. paṅ-leb); *pangthang* [paŋtʰaŋ] 'plain area' (<Tib. spaṅ-thaṅ); *par* [paɹ] 'picture, photo, print' (<Tib. par); *pat-pa* [patpa] 'leech' (<Tib. pad-pa); *pe* [pe] 'example' (<Tib dpe); *pecha* [petɕʰa] 'scripture, book' (<Tib. *dpe-cha*); *pema* [pema] 'lotus flower' (<Tib. pad-ma); *pempeling* [pɛmpeliŋ] 'butterfly' (<BL [pɛmpeliŋ], TT [pɛmpaliŋ]); *pempu* [pɛmpu] 'wing' (<TT [pɛmp]); *poktor* [pɔktɔɹ] 'hillock, lump' (< Tib. spo-to 'small grassy hill, clump, lump', TSB [pɔktɔr); *pon* [pɔn] 'chief' (< Tib. dpon); *pong-pong* [pɔŋpɔŋ] 'small-talk' (< TSD [pɔŋpɔŋ], TT [pɔŋpɔŋ]); *pos* [pɔs] 'incense' (< Tib. spos); *pu* [pu] 'body hair' (< Tib. spu, but Khis. *mul* 'body hair'); *pak* {*ta*} [pak] 'select and move' (< Tib. spag 'shift, transfer oneself', TSB [pak] 'select'; *pang*{*ta*} [paŋ] 'give up, refrain from' (< Tib. *spaṅs* PT of *spoṅ* 'abandon, renounce, give up'); *puŋ* [puŋ] 'hump' and *pung* {*ta*} [puŋ] 'heap up' (< Tib. spuṅ 'pile, heap, stack (n and v)'); *pup* {*da*} [pup] 'pitch, erect (tent), roof (house), cheat' (< Tib.

ḥbubs ‘pitch, set up, roof’, TSB [pup] ‘pitch, erect (tent)’; *pak-ʦe* [pakʦe] ‘abundance’ (< Tib. dpag-tsad ‘measure of distance approx. 8 km’); *pek* [pɛk] ‘slope’ (<TSB [pɛk]); *pus-ka* [pus-ka] ‘facial features’ (<TSD [pus]); *pun-pa* [punpa] ‘moss’ (<TSB [punpa]); *per* [pɛɹ] ‘iron’ (<TSB [pɛr]); *pi-shup* [piɕup] ‘leg guards’ (<TSB [biɕup], ‘leg-cover’; *pa-ro* [paɹɔ] ‘pigeon’ (<TSB [paro]); *pa-tong* [patɔŋ] ‘forehead’ (<TSB [patɔŋ); *pa-lang* [palaŋ] ‘alcohol container’ (<TSB/TSD [palaŋ]); *lang-pey* [laŋpɛj] ‘around’ (<TSD [laŋpai]); *tuk-pey ~ tuk-mey* [tukpɛj] ‘till, until’ (<TSD [tukpai); *tek-tek-pa* [tʲɛktʲɛkpa] ‘grasshopper’ (<TSB [tɛktɛkpa); *kong-pu* [kɔŋpu] ‘finger millet’ (<TSB/TSD [kɔŋpu]); *pan* [pan] ‘betel leaf’ (<Hin. पान paːn); *pan-ja-bi* [pandʑabi] ‘dragonfly’ (<Hin. पंजाबी ‘inhabitant of Panjab’ (in reference to the shape of the dragonfly’s head resembling a Punjabi turban); and *tirpa* [tiɹpa] ‘tarpaulin sheet’ (<Hin तिरपाल).

Other lexemes with unvoiced syllabic onsets, where the unvoiced onset can be found in the second or subsequent syllable and that are loans from Bodish and Tshangla (and in some cases Hindi) include: *bar-tak* [baɹtak] ‘leopard’ (<Tib. *bar-stag* ‘medium-tiger’); *cong-tan* [ʨɔŋtan] ‘fibre mat’ (<Tib. *stan* ‘seat, mat’); *chor-ten* [ʨʰɔɹtɛn] ‘stupa’ (<Tib. *mchod-rten*); *da-ta-wa* [datawa] ‘the present’ (<Tib. *da-lta-ba/pa*); *gap-ten* [gaptɛn] ‘saddle carpet’, (<Tib. *sga-gdan*); *jik-ten* [dʑiktɛn] ‘mundane’ (<Tib. *ḥjig-rten* ‘ordinary, perishable, external world’); *bra-ta-bru-tu* [bɹatabɹutu] ‘in bits and pieces’ (<TSB [bɹatabɹutu]); *cep-tang* [ʨɛptaŋ] ‘cake’ (<TSD [kɛptaŋ] ‘unleavened bread’); *jok-tang* [dʑɔktaŋ] ‘potato’ (<TSD [dʑɔktaŋ]); *hocu kop-tang* [hɔːʨu kɔp̚ taŋ] ‘lips’, cf. TSB [nowaŋ kɔptaŋ] ‘lips’; *kam-tang* [kamtaŋ] ‘side dish’, cf. TSD [kamtaŋ] ‘side dish’; *khak-tang tong* [kʰaktaŋ tɔŋ] ‘clump-breaking club’; *khak-tang* [kʰaktaŋ] ‘clump, cluster; section’ (<TSB [kʰaktaŋ]); *thar-pu* [tʰaɹpu] ‘this year’ (<TSD [tʰarpu]); *bat-pa-la* [batpala] ‘catfish’ (<TSB [batpala]); *ra-pa-ri-pi* [ɹapaɹipi] ‘occasionally’ (<TSB [raparepe] ‘blurred, unclear’); *bal-tin* [baltin] ‘bucket’ (<Hin. बालटी *baaltri*); *hap-ta* [hapta:] ‘week’ (<Hin. हफ़्ता *hapta*); *gol-pan* [gɔlpan] ‘scarf’ (< Hin. गुलूबंद *gulubaḍ*); and *chap-pal* [ʨʰappal] ‘slipper’ (< Hin. चप्पल *cappal*).

Attestations of the plosive onset clusters, /kr, khr, gr, pr, phr, br/ can unequivocally be shown to be loans from Bodish and Tshangla. Hence, the unvoiced onsets /kr, pr/ are loans. More information on this can be found in the supplementary material online (DOI: http://doi.org/10.5281/zenodo.1280268 and).

Limited number of presumably native attestations of unvoiced plosives

After all the plausible loans from the Bodish languages and Tshangla into Duhumbi are discounted, there remains a limited number of possibly native lexemes with unvoiced, unaspirated plosives /k, t, p/. In many instances, there are clear reasons why these unvoiced plosives occur in these lexemes.

Devoicing due to assimilation to root coda and lack of syllabic stress

As the onset of a second or third syllable of a polysyllabic word, unvoiced plosives occur quite frequently, but this is mainly due to two phonotactic reasons: assimilation of the voicing and aspiration of the onset to the unvoiced, unaspirated coda of the root or the preceding morpheme (often one of the plosives -k, -t, -p or the fricative -s), and since bound morphemes in Duhumbi usually do not carry stress, a lack of stress results in a devoicing of morphemes. The first phonotactic condition may also have triggered a deaspiration (or sometimes devoicing) of the alveolar onset. A similar explanation for the occurrence of unaspirated voiceless initials in Old Tibetan bound morphemes is made in Hill (2007: 479).

This observation applies to the attestation of unvoiced, unaspirated plosives in morphemes, where it is observed that the allomorphic variation between the unvoiced, unaspirated and the voiced unaspirated plosive onsets in morphemes is entirely dependent on the class of the verb, i.e. between the hard-stemmed Ta-class verbs and the soft-stemmed Da-class verbs, which is ultimately dependant on a historical coda *-s*. Hence, there is phonotactically conditioned allomorphic variation observed in, for example, the adverbal marker *-da* ~ *-ta* ADV; the present marker *-deʔ* ~ *teʔ* PRES; the patient nominaliser *-ʤu* ~ *- tɕu* PTN; the modifying serial verb *-dej* ~ *-tej* 'look'; the infinitive *-baʔ* ~ *-paʔ* INF; the nominaliser *-ba* ~ *-pa* NOM; the negated present *-baŋ* ~ *-paŋ* NEG:PRS; and the nominal suffix *-bi* ~ *-pi* 'people of'.

Examples of syllable-initial but word-internal attestations of unvoiced, unaspirated plosives in (presumably) native, inherited words include: *dem-ba-thak-tong* [dɛmbatʰaktɔŋ] 'swoopingly'; *buk-tum le* {*da*} [buktum le] 'to palpitate'; *buk-tuŋ* [buktuŋ] 'waist' (cf. Khis. *buk-thung* [buktʰuŋ] 'waist'); *buk-tur-ba* [buktuɹba] 'nightjar'; *bis-tang* [bistaŋ] 'tribal' (<[bi-staŋ], cf. Khoina [ɕtaŋ] 'Puroik' and Sherdukpen [staŋ] 'slave'); *bis-ti-ba* [bistiba] 'last year'; *ges-ten* [gɛstɛn] 'apron'; *gi-zing phek-tang* [giziŋ pʰʲɛktaŋ] 'buttocks'; *has-ta* [hasta] 'slowly'; *ko-taŋ* [kɔtaŋ] 'door opening' (cf. Khis. *ku-thung* [kutʰuŋ] 'door opening'); *khak-ti* [kʰakti] 'bitter gourd'; *khap-teq* [kʰaptɐ̯ʔ] 'counter'; *a-pa* [apa] 'father' (cf. Khis. aba [aba]), *thup-khi-pa* [tʰupkʰipa] 'year after next' (cf. Khis. [tʰupkʰiba]); and *nam-sang-pa* [namsaŋpa] 'next year' (cf. Khis. [namsaŋba]); *bang-tang* [baŋtaŋ] 'another; otherwise'*; be-la-ta* [beːlaːtaː] 'crossbreed cow'; *cha-ta-chi-ti* [tɕʰaːtaːtɕiti] 'blabbering; change of mind'; boj-to [bɔjtɔː] 'baking soda'; *dung-taq* [duŋtɐ̯ʔ] 'frog'; *bum-tang* [bumtaŋ] 'amaranth'; *dong-tang* [dɔŋtaŋ] 'fallen tree trunk'; *gizing tong-ka* [giziŋ tɔŋka] 'anus' and *hemphong tong-ka* [hɛmpʰɔŋ tɔŋkaː] 'nostril'; *guntsun tewa* [guntsun teːwaː] 'big tadpole'; *hin-tung* [hintuŋ] 'tooth'; *hin-tus* [hintus] 'spittle'; *hu-ti* [huti] 'small vase'; *kang-tis-ta* [kaŋtistaː] 'solely for the purpose of'.

Complimentary distribution between plosive onsets

The aspirated and the voiced plosives /b/ appear to occur mainly in a complimentary distribution across the lexicon. This is particularly visible with the verb stems, where plosives often occur in a kind of complimentary distribution with semantically related meanings in verb stems, which may be related to semantic differentiation as a result of previously prefixed homophonous verb roots. Examples include *phak* {*ta*} [pʰak] 'come peeled off (e.g. earth from a wall)' vs. *bak* {*ta*} [bak] 'slide down', *khang* {*da*} [kʰaŋ] 'lift up completely, carry' vs. *gang* {*da*} 'lift up partially'; *pung* {*ta*} [puŋ] 'heap up' vs. *bung* {*da*} [buŋ] 'bury'; *pir* {*ta*} [piɪ] 'press down' vs. *bir* {*ta*} 'flatten'; *keng* {*ta*} [kʲɛŋ] 'clear up (weather) vs. *geng* {*da*} [gʲɛŋ] 'warm up (near fire)'; *kak* {*da*} [kak] 'prevent something from happening' vs. *gak* {*ta*} [gak] 'block something'. What this interesting phenomenon implies has yet to be properly analysed.

Another example is the observation that there are hardly any occurrences of the unvoiced bilabial plosives /p/ and /ph/ followed by vowel /i/, namely only six occurrences of *pi-* including one Tshangla loan and one onomatopoeia and only 4 occurrences of *phi-* of which one in prefix, one in an onomatopoeia and two in probable Tshangla loans, but there are 12 occurrences of *bi-*, all native lexemes.

ALTERNATION BETWEEN PLOSIVE ONSETS BETWEEN KHISPI AND DUHUMBI

There are a few examples where Duhumbi has an unvoiced bilabial onset whereas Khispi has a voiced bilabial onset, including Duh. *apa* 'father' vs. Khis. *aba*; Duh. *tʰupkʰipa* 'year after next' vs. Khis. *tʰupkʰiba*; and Duh. *namsaŋpa* 'next year' vs. Khis. *namsaŋba*. In the opposite case, Khispi *saŋkopa* ~ *saŋgompa* 'spider' have Duhumbi variant *saŋgombu*.

PRESUMABLY NATIVE, INHERITED OCCURANCES OF UNVOICED PLOSIVE ONSETS

This leaves only a very limited number of lexemes with unvoiced, unaspirated stops that are either native or of unknown loan origin: *ka* {*da*} [ka] 'to chew'; *pej-be* [pɛjbe] 'down there' (but perhaps < *be-be* 'down-down'); *pa-sa* [pasa] 'quickly, fast, soon' (but perhaps from *bas* {*ta*} 'to hurry, to be in a hurry'); *pet* {*da*} [pɛt] 'stick' (perhaps TSB [pɛn] 'press'); *pir* {*ta*} [piɹ] 'hold tight by pressing down'; *peŋ* {*da*} [pʲɛŋ] 'not pay attention'; *pat* {*da*} [pat] 'work (as in provide labour to others and do work e.g. on the land or in house construction)'; *pir-kong* [piɹkɔŋ] 'narrow and small'; *pa-ten* [patɛn] 'paddy straw'; *ko-pi* [kɔpi] 'sprout, culm'; *pen-ma* [pɛnma] 'match teasing'; *tam-pi* [tampi] 'horsefly'; *pej-tʰo-lo* [pɛjtʰɔlɔ] 'bird *Leiothrix lutea*'; *pili* [pili] flute'; *tangkong* [taŋkɔŋ] 'marten'; *pok-pok-ma* [pɔkpɔkma] 'amaranth biscuit'; *pan-ba* [panba] 'plant fibre left in mouth after chewing'; *pa-tsar* [patsaɹ] 'slap with flat hand'; *kam-kow* [kamkɔw] 'hill partridge'; *ka-ti* [kati] 'small, young'; *kek-pa* [kʲɛkpa] 'tadpole'; *keng* {*ta*} [kʲɛŋ] 'weather to clear up'; *kes* [kɛs] 'tusk of elephant or wild boar'; *key* [kɛj] 'beeswax'; *kik* {*da*} [kik} 'be ok' (but Tib. ḥgrig-pa 'to suit, be ok, fit'); *kik* [kik] '*Lindera* sp.'; *ki-tong* [kitɔŋ] 'cup'; *ki tshik* {*da*} [ki tsʰik] 'be angry'; *ko* {*da*} [kɔ] 'to crow (rooster), to bellow (cow)'; *kopi* [kɔːpi] 'sprout; culm'; *kopinong* [kɔːpinɔŋ] 'bamboo porcupine trap'; and *korpu tshup* {da} [kɔɹpu tsʰup] 'to curl up'. -

For some of these lexemes, there are cognates in the other Western Kho-Bwa varieties that suggest an inherited origin: chew *ka* {*da*} 'chew', Sartang [kaʔ], Sherdukpen [ku], PWKB ***ka**, also PLB ***m-gʷya²** CHEW ; Bisu *kɔ̀* 'chew, bite into' ; Tujia *ka35* 'bite' ; *mɛs-kɔŋ* 'sorghum', Jerigaon Sartang [mə-kuŋ], PWKB ***(ma-) koŋ**; *ki-lik-pa* 'elbow', Sherdukpen [kə-li], Sartang [kə-li ~ kə-ri]; PWKB ***ki-li**, Proto-Chin ***ki(i)w** ELBOW.

A TWO-WAY DISTINCTION IN PLOSIVES BASED ON VOT

The unvoiced plosives /k, t, p/ are characterised by both the lack of voicing and lack of aspiration. The onset of voicing commences with the release of the unvoiced plosive, resulting in a Voice Onset Timing (henceforth VOT) close to zero. For the voiced plosives /g, d, b/, the onset of voicing well precedes the release of the plosive, resulting in a negative VOT, whereas for the aspirated plosives /kh, th, ph/ the onset of voicing is delayed by the aspiration, resulting in a positive VOT.

The above observations appear to indicate that at the Proto-Duhumbi level there was a distinction between unvoiced aspirated and voiced plosives, i.e. between *tʰ- and *d-, *kʰ- and *g-, *pʰ and *b-. There were no distinctive unvoiced unaspirated plosives †t-, †k-, †p-, although the unvoiced unaspirated plosives [t, k, p] occurred as allophones of either of the voiceless aspirated or voiced variant in syllable-final position. There is a phonological explanation for this distribution: the distinction, as measured in VOT, between an unvoiced unaspirated plosive and a voiced unaspirated plosive is significantly larger than that between either an unvoiced unaspirated plosive and an unvoiced aspirated plosive or an unvoiced unaspirated plosive and a voiced unaspirated plosive. It

is thus easier to create the distinction in speech and similarly to audibly distinguish between, for example, /ph/ and /b/ than between /p/ and /pʰ/ or between /p/ and /b/. If at the proto-level a two-way, rather than a three-way opposition between plosives has to be presumed, then, the opposition between *pʰ and *b is more natural than an opposition between *p and *b or between *p and *ph. This, however, does not mean a distinction in more than one phonological feature, i.e., not between both voicing and aspiration: it is a single opposition, namely, the distinction in Voice Onset Timing.

This result may seem rather surprising and is unlike earlier analysis for, for example, Old Tibetan. Starting with Shafer (1950/51: 722-723), despite the Tibetan orthography distinguishing unaspirated unvoiced, aspirated unvoiced and unaspirated voiced consonants, several authors have built up the case for non-phonemic aspiration in Old Tibetan. Hill (2007) makes a case for either non-phonemic aspiration in Old Tibetan, or a newly emerging distinction as a result of loans.

Although not yet examined in detail, there are indications that the above observations also hold for the affricates, i.e. that the distinction between /ts, tsh/ and /c, ch, j/ at the proto-level was a two-way distinction, perhaps between ***tsh** and ***dz** (***tsʰ** and ***dz**) and between ***ch** and ***j** (***tɕʰ** and ***dʑ**).

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