

# Phonology of T'ap'anta Abaza: examples from Inzhig-Chkun and Gumlokt

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# 1 Introduction

## 1.1 General information about Abaza

In this article we describe two varieties of Tapanta dialect of Abaza (ISO-639-3 *abq*, glottocode *abaz1241*) spoken in two villages in the Karachay-Cherkess Republic: Inzhig-Chkun (in Abaza /jən'dʒəgʲ-tʃk'wən/) and Krasniy Vostok (in Abaza /g'wəm'lɔkt/). Abaza is a language of the Abkhaz-Abaza group of Northwest Caucasian family of languages. After the Caucasian War (1817–1864) a lot of Abaza, Abkhaz, Ubykh and Adyghe people were forced either to resettle from higher mountains or to immigrate to the Ottoman Empire. As a result Abaza people were split into those who remain in Russia (mostly in the Karachay-Cherkess Republic, see Figure 1 created with *lingtypology* (Moroz 2017)) and who moved to Turkey. According to the 2010 Russian census, there are slightly less than 38 thousand speakers of Abaza in Russia. The exact number of speakers in other countries, mainly in Turkey (Chirikba 2012: 21–23), is unknown. The data analyzed in this study were collected in 2018, 2019 and 2021 during a field trip to the villages. Even though traditionally Abaza is treated as a separate language with two dialects T'ap'anta and Shkharawa (Genko 1955: 5–7; Tabulova 1976: 3–4; Lomthathidze 2006: 98), some of the researches consider Abkhaz and Abaza to be a dialect continuum (e. g. Hewitt 1979: 1; Colarusso 1988: 7–9; Chirikba 1996). However varieties of Inzhig-Chkun and Gumlokt belong to the same dialect, those lects have their own differences, e. g. Abaza language is /abaza bəzʂa/ in Inzhig-Chkun and /abaza bəzʂa/ in Gumlokt.

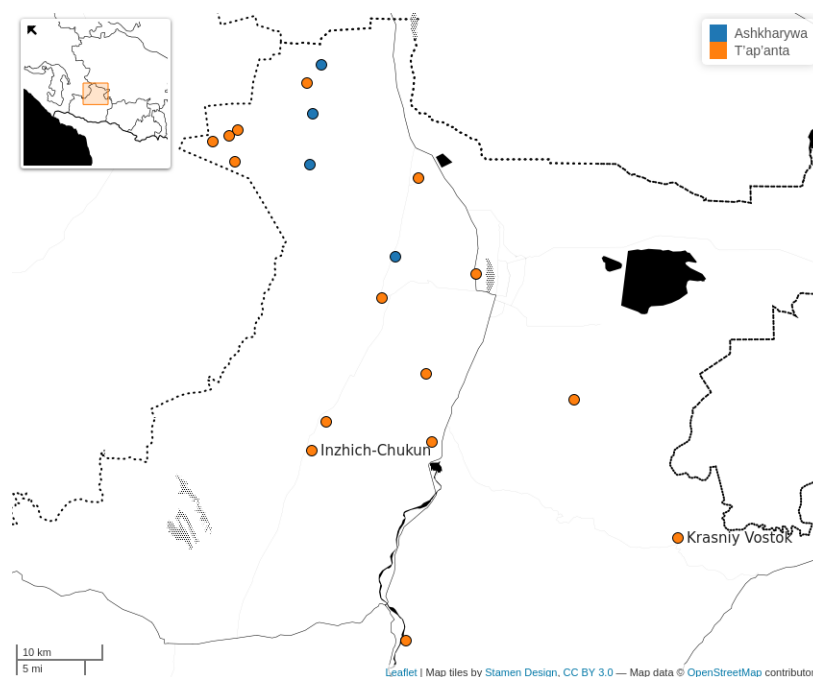


Figure 1: Abaza settlements of the Karachay-Cherkess Republic colored by the dialect (mostly based on (Chirikba 2020)). In Abazakt, Adyghe-Khabl, Ersakon, Khumara, and Psauche-Dakhe Circassians are predominant. In Koydan Karachay are predominant.

## 1.2 State of research

Phonological inventory of Abaza can be found in multiple sources (Bouda 1940; Lomthathidze 1944, 2006; Genko 1955; Allen 1956; Tabulova 1976; Colarusso 1988; O'Herin 1992, 2021; Chirikba 1996; Arkadiev 2019), however more detailed phonological description is limited to (Bouda 1940; Lomthathidze 1944; Genko 1955; Catford 1972; Tabulova 1976; Colarusso 1988; Arkadiev 2019) and lack any acoustic analysis that appears just recently (Mamonova, Moroz 2019). It is also worth mentioning works by V. Chirikba (Chirikba 1985, 2020), where he provides data from huge amount of Abaza settlements, explores correspondences of post-alveolar sibilants among them and compare obtained data with data from Abkhaz and Adyghe.

## 2 Phonological inventory

### 2.1 Consonants

Phonological inventory of T'ap'anta is present in Table 1. I illustrate<sup>1</sup> consonant inventory with some examples in Appendix 1.

Table 1: Joint consonant system of Inzhig-Chkun and Gumlokt. Parenthesis denote the system that is common for Gumlokt, where the vast majority of speakers use labialised post-alveolar segments.

	aspirated plosives	ejective plosives	voiced plosives	voiceless affricates	ejective affricates	voiced affricates	voiceless fricatives	voiced fricatives	nasals	approximant	tap	laterals
labial	p <sup>h</sup>	p'	b				f	v	m	w		
dental	t <sup>h</sup>	t'	d	ts	ts'	dz	s	z	n			
alveolar											r	
post-alveolar (labialized)				tʂ <sup>(w)</sup>	tʂ' <sup>(w)</sup>	dʂ <sup>(w)</sup>	ʂ <sup>(w)</sup>	ʐ <sup>(w)</sup>				
retroflex				tʂ	tʂ'	dʂ	ʂ	ʐ				
alveolo-palatal				tɕ	tɕ'	dʑ	ɕ	ʑ				
lateral												l ɭ
palatal	c <sup>h</sup>	c'	ɟ				ç			j		
plain velar	k <sup>h</sup>	k'	g									
labialized velar	k <sup>hw</sup>	k' <sup>w</sup>	g <sup>w</sup>				x <sup>w</sup>					
plain uvular	q <sup>h</sup>	q'					χ	ʁ				
palatalized uvular		q' <sup>j</sup>					χ <sup>j</sup>	ʁ <sup>j</sup>				
labialized uvular	q <sup>hw</sup>	q' <sup>w</sup>					χ <sup>w</sup>	ʁ <sup>w</sup>				
plain pharyngeal							ħ	ʕ				
labialized pharyngeal							ħ <sup>w</sup>	ʕ <sup>w</sup>				
glottal		ʔ										

The main difference between Inzhig-Chkun and Gumlokt consonant systems is in post-alveolar consonants. All speakers of Inzhig-Chkun and some minority in Gumlokt use non-labialized post-alveolars (e. g. ʂ, see Figure 2). The majority of speakers in Gumlokt use labialised post-alveolars (e. g. ʂ<sup>w</sup>). Everything become even more complicated, since some post-alveolars in Inzhig-Chkun correspond to retroflex segments in Gumlokt. It looks like there is some proto-phonemes that merged together in most Abaza dialects except Gumlokt and Apsua (Ashkharywa dialect, (Lomthathidze 2006: 47, 445–446)): in Apsua in the same position labialized retroflex fricatives are observed (cf. 1–2).

- (1) ʂə (Inzhig-Chkun), ʂə (Gumlokt), ʂ<sup>w</sup>ə (Apsua) — 'door'
- (2) ʐə (Inzhig-Chkun), ʐə (Gumlokt), ʐ<sup>w</sup>ə (Apsua) — 'old'

<sup>1</sup>In this work we will use two transcription systems. First system is our interpretation of Abaza phonology using IPA. Second is standard Abaza orthography. The IPA transcription used in this work differ from traditional Caucasian transcription, however Northwest Caucasian researchers still can retrieve desired information from orthographic correspondences. Unfortunately IPA alphabet still allows a lot of space for interpretation, so my system is differ from other recent phonological phonetic discriptions illustration of Northwest Caucasian languages (see (Gordon, Applebaum 2006; Andersson, Vaux, Pysipa (Şener) 2021)). I refuse to use symbols like ʃ, ʒ, ɕ or ʑ one can find in the literature for special post-alveolars sounds present in all Northwest Caucasian and continue to use symbols ʂ and ʐ after the following sources (Ladefoged, Maddieson 1996: 161–164; Catford 1997; Testelets et al. 2009; Applebaum, Gordon 2011; Paschen 2015).

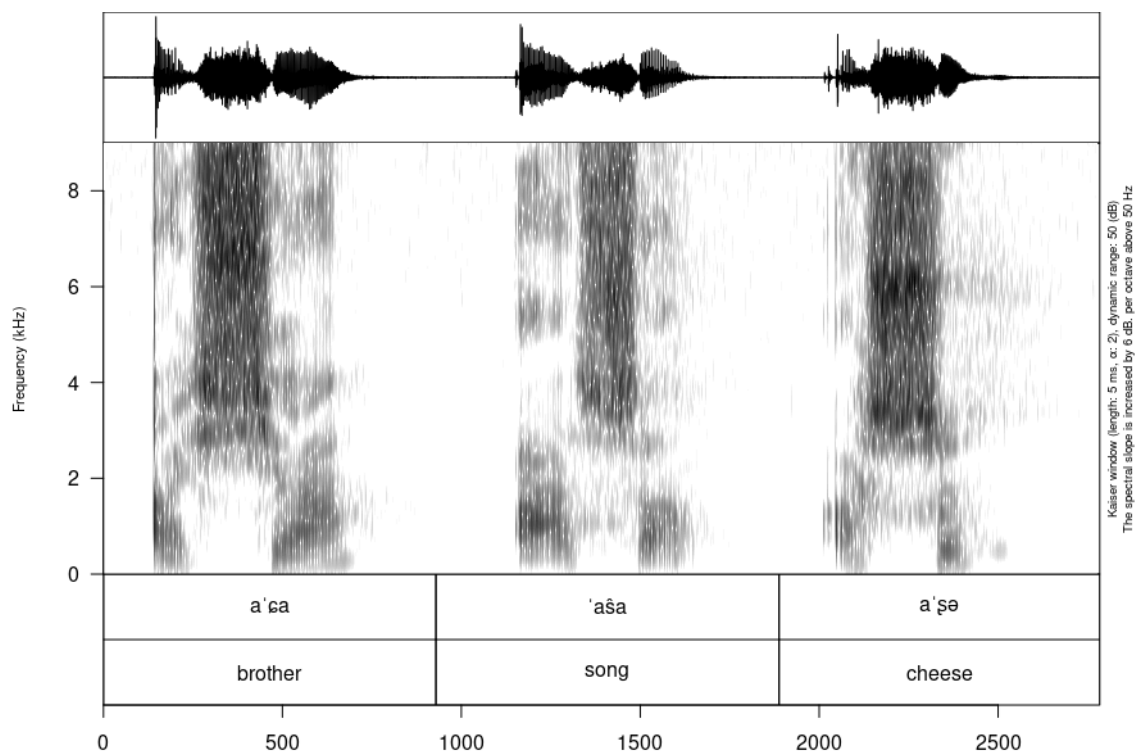


Figure 2: Fricatives by female speaker with non-labialised post-alveolars.

Presented examples show that the post-alveolar correspondences between Inzhig-Chkun and Gumlokt not predictable without Gumlokt or Apsua data (see Table 2), so we decided to collect some lexicon that could be useful for further historical and dialectal investigation (see Appendix 2).

Table 2: Post-alveolar correspondences between Inzhig-Chkun and Gumlokt.

	Inzhig-Chkun	minority in Gumlokt	majority in Gumlokt	orthography
bullock	tʂə	tʂə	tʂʷə	чвы
apple	tʂ'a	tʂ'a	tʂʷa	ч'ва
one person	za'dʒə	za'dʒə	za'dʒʷə	зджы́
you (2pl)	ʂa'ra	ʂa'ra	ʂʷa'ra	шварá
cow	ʒə	ʒə	ʒʷə	жвы
hay	tʂa	tʂa	tʂa	чва́
oak	dʒtʂə	dʒtʂə	dʒtʂə	джьч'вы
to go out	w'dʒəltʂ'	w'dʒəltʂ'	w'dʒəltʂ'	уджы́лц'л
door	ʂə	ʂə	ʂə	швы
old	ʒə	ʒə	ʒə	жвы

It is worth mentioning that in (Chirikba 2020) based on different resources Vyacheslav Chirikba discovered even bigger variation. There are four sibilant subsystems in (ibid.: 27), however our field data support only two types: with labialised post-alveolars (majority) and with non-labialised post-alveolars (minority). In order to check my hypothesis I performed small experiment asking 31 Gumlokt speakers (15 female and 16 male speakers) for two words: ʒ(ʷ)ə 'cow' and tʂ(ʷ)a 'apple'. As

I found indeed there is a variation across speakers I worked with, however only Gumlokt 2 (with labialised post-alveolars, 25 people) and Gumlokt 1 (with non-labialised post-alveolars, 6 people) sibilant subsystems from (ibid.) were attested (see Figure 3). It also visible from the experiment results that non-labialised post-alveolars are tend to appear in speech of older females, but this is just a preliminary result that should be checked with greater number of stimuli and speakers.

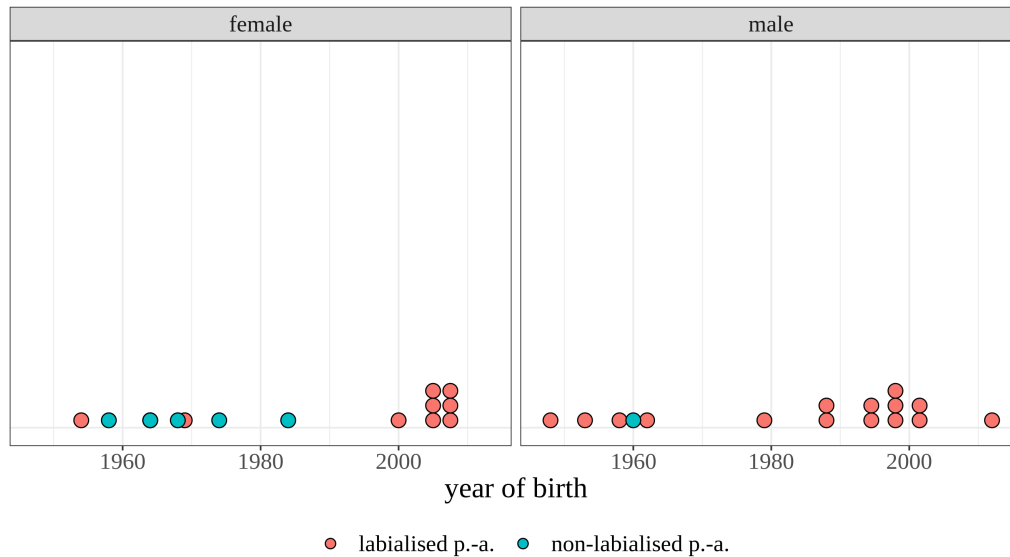


Figure 3: Results of experiment. Each dot represents one person colored by result and faceted by gender.

Except of my interpretation of alveolar and retroflex consonants (see the footnote on the page 3) the main difference between my phonological description and older ones is in the palatal area: I treat segments  $c^h$ ,  $c'$ , and  $j$  as palatal, however more traditional interpretation is palatalized velars:  $k^j$ ,  $k'$ , and  $g^j$ .

Articulation of labialization in T'ap'anta is different for different places of articulation (see (Catford 1972) for the similar observations for Abkhaz):

- /w/-labialisation — this kind of labialization is more or less independent of the main place of articulation. This kind of labialisation is typical for velar and uvular places fricatives and stops;
- /ɥ/-labialisation — this kind of labialization is typical for pharyngeals. It looks like the tongue body is retracted (due to pharyngeal place of articulation) and raised, that results /ɥ/-like sound;
- /y/-labialisation — this kind of labialization is typical only for post-alveolars in Gumlokt. The main place of articulation somehow merged with the additional place of articulation that produces a long hole for /y/-like sound.

There is also so called weaken labialised post-alveolars mentioned in literature (Chirikba 1985, 2020; Lomthathidze 1944), but we didn't noticed such sounds neither in Inzhig-Chkun nor Gumlokt.

## 2.2 Vowels

The vowel inventory traditionally analyzed as two core vowels  $a$  (low) and  $\text{ə}$  (mid) (see (Bouda 1940; Lomthathidze 1944, 2006; Genko 1955; Allen 1956; Tabulova 1976; Colarusso 1988; O'Herin 1992, 2021; Chirikba 1996; Arkadiev 2019)). There are additional vowel colors that appear in numerous loanwords or due to contraction of vowel and glide (cf. (1)–(4)):

- (1)  $i < \text{əj}$  or  $j\text{ə}$ ;
- (2)  $e < \text{aj}$ ;
- (3)  $u < \text{əw}$  or  $w\text{ə}$ ;
- (4)  $o < \text{aw}$ .

In order to show vowel space I collected a list of monosyllabic words in Inzhig-Chkun and Gumlokt (see Appendix 3).

### 3 Stress

T'ap'anta Abaza stress was discussed in my unpublished report from previous expeditions and became a basis for (Arkadiev 2019). Unfortunately I've changed my opinion, so I will try to sum up my current opinion on the topic. Our stress model based on the ideas presented in (Dybo 1977; Spruit 1986).

Stress in Abaza is distinctive (see example (5) and other examples in Appendix 4).

(5) sa'ra 'T vs. 'sara 'lamb'

Each Abaza morpheme (even borrowed) can be represented by combination of open syllables with vowel a or ə. According to some test discussed below each syllable assigned to one of the accentual classes: dominant or recessive. The main stress rule is formulated in (Spruit 1986: 37–40): stress falls on the first D element followed by R or word boundary (see () and ...), otherwise stress is on the first syllable (see ...).

## Appendix 1: List of consonant examples

Example words for consonants from Table 1. First example before slash is from Inzhig-Chkun and some speakers from Gumlokt, example after slash are common for most speakers from Gumlokt.

transcription	orthography	translation
p <sup>h</sup> a	па	son
p'aj	пай	dirt
ba	ба	you (2sgf)
fa'ra	фарá	to eat
ma	ма	here you are (giving something)
wa	ya	you (2sgm)
't <sup>h</sup> aba	таба	frying pan
't'at'a	тáтla	soft
da	да	tendon
tsa	ца	barn
ts'a	цla	louse
dza	дза	rib
sa	ca	I
'ŋwaza	гIвáза	twins
na'ŋa	нагIá	slope
ba'ra	барá	you (2sgf)
tša / tš <sup>w</sup> a	чва	skin
tš'a / tš <sup>w</sup> a	чIва	apple
dža'ra / dž <sup>w</sup> a'ra	джварá	vomiting
ša / š <sup>w</sup> a	шва	you (2pl)
a'ža / a'ž <sup>w</sup> a	ажvá	word
'tšaba	тшáба	gelding
tš'a	шIa	mouth
'p <sup>h</sup> adza	пáджа	firstborn
ša'ba	шabá	dried-up
'zac'a	жáкIа	beard
tea'ra	чарá	to eat
'te'ate'a	чIáчIa	kidney
'dzadza	джáджъa	curly
ca	ща	blood
za'ra	жъарá	to deceive
la	ла	dog
l'a'g'an	лaгъан	basin
'mac <sup>h</sup> a	мáкъa	grindstone
'c'ana	кIáна	lump
'jaba	гъáба	(body) side
'çap <sup>h</sup> ad	тлапáд	stocking
ja'ra	йарá	he (3sgm)
k <sup>h</sup> ət <sup>h</sup>	кыт	village
k'a'ra	кIарá	something
'gara	гápa	cradle
k <sup>h</sup> wa	ква	rain
k'wa	кIва	bosom
g <sup>w</sup> a'ban	гвабáн	mattress
'x <sup>w</sup> at <sup>h</sup> a	хвáта	rug
q <sup>h</sup> a	хъa	head

transcription	orthography	translation
q'a'la	къалá	town
χa'ra	харá	to give a present
'vava	гъáгъа	broad, wide
'q'jara	къъарá	to wave
χ <sup>i</sup> a'ra	хъарá	to give birth
ʋa'sa	гъъасá	nutwood
q <sup>h</sup> wa	хъва	ashes
q <sup>w</sup> a'ra	къварá	to stay too long
χ <sup>w</sup> a	хва	mountain
tš <sup>w</sup> a'ʋ <sup>w</sup> a	чвагъвá	ploughed up
ħa	χla	we
a'ʕa	arlá	raw leather
ħ <sup>w</sup> a	χlwa	pig
ʕ <sup>w</sup> a	rlwa	dry
a'ʔaɕa	аъáща	situation



## Appendix 2: Post-alveolar/retroflex correspondences to Inzhig-Chkun's post-alveolars in Gumlokt

transcription	orthography	translation
za'džwə	заджв́ы	one person
džwdžwə	джвджвы	saliva
hadžw	хІаджв	stack
šwa'ra	шварá	you
alaršwa'ra	аларшварá	to turn on
'ašwa	áшва	song
g <sup>w</sup> lašw	гвлашв	indifferent
'jašwa	гъяшва	orphaned
k'ašwa'ra	кІашварá	to fall
k <sup>w</sup> rašw	кврышв	patch
lašw	лашв	blind
marat <sup>h</sup> a'šwar <sup>h</sup> a	мараташвар́та	west
nab'kašw	набгъяшв	one year old foal
p <sup>h</sup> əšw <sup>t</sup> h amamk <sup>w</sup> a	пышвт амáмкІва	without break
wə'dzəšwa	удзы́шва	green
wə'našwa	унáшва	advice
q <sup>h</sup> šwa	хъвшва	food (cooked)
ts'a'šwa	цІашвá	trump card
'šwabəz	шва́быж	very
'šwapχa	шва́пха	example
'šwaχda	швахъá	Monday
šwoc <sup>h</sup>	швуокъ	gun
šwər	швыр	fruit
ʃə	шы	door
a'ʃə	ашы́	cheese
aj'ʃa	айшá	traditional table
'ajʃa	áйша	bitter
bzə'ʃə	бжашы́	not fully painted
ʃk'ə	шкІы	hundred
bəz'ʃa	бызшá	language
g <sup>w</sup> aʃ	гваш	gate
la'ʃan	лашáн	time for weeding
mʃə	мшы	bear
rʃa'ra	ршарá	to scare
nəʃ	ныш	clay
t <sup>h</sup> araʃ	тарáш	gate
q <sup>hw</sup> ʃə	хъвышы	medicine
q <sup>h</sup> əʃ	хъыш	window
təaʃ	чаш	patty
ʃa'ɣwə	шагІв́ы	fearful
ʃaga'la	шагалá	pack of jackal
ʃp'a	шпІа	thick
ʃʔa	шъа	document
ʃər	шыр	animal
tš <sup>w</sup> a	чІва	apple
amts'tš <sup>w</sup> a'ra	амцІчІварá	to rob
a'q <sup>h</sup> atš <sup>w</sup> ra	ахъáчІвра	to stitch

transcription	orthography	translation
ja'ts <sup>w</sup> a	йачІв́а	star
ja'ts <sup>w</sup> a	йачІв́а	grey
k <sup>w</sup> aj'ts <sup>w</sup> a	квайчІв́а	black
mətɕ <sup>w</sup>	мычІв	shy
p <sup>h</sup> ətɕ <sup>w</sup>	пычІв	initial
wa'ts <sup>w</sup> ə	уачІвы́	tomorrow
ts <sup>w</sup> ra	чІвра	to turn sour
ts <sup>w</sup> ə	чІвы	bolt
ts <sup>w</sup> ə	чвы	bullock
'ts <sup>w</sup> aʒ <sup>w</sup> ara	чв́ажвара	to speak
an'ts <sup>w</sup> az	анчв́ажь	birthmark
'aɕ <sup>h</sup> atɕ <sup>w</sup> acara	áx <sup>h</sup> ачващара	to find respectable
a'ts <sup>w</sup> ədʒra	ачвы́дзра	to lose something
bnatɕ <sup>w</sup>	бначв	aurochs
ts <sup>w</sup> a	чва	skin
ts <sup>w</sup> ra	чвра	to cut (wood)
ts <sup>w</sup> a	чва	color
dzətɕ <sup>w</sup>	дзычва	swan
ʒ <sup>w</sup> ts <sup>w</sup> a	жвчва	overdone (about food)
'q'ətɕ <sup>w</sup> ga	къы́чвга	hatchet
ma'ts <sup>w</sup> ə	мачв́І	finger
ma'ts <sup>w</sup> əsra	мачвы́сра	glare (about lightning)
an'ts <sup>w</sup> a	анчв́а	God
'nətɕ <sup>w</sup> a	ны́чва	hemp
p <sup>h</sup> ərtɕ <sup>w</sup>	пы́рчв	mane
'pɕatɕ <sup>w</sup> ja	пи́а́чвгъа	strong wind
ts <sup>w</sup> a'ra	чвар́а	dream
t <sup>ɸ</sup> a'ts <sup>w</sup> a, t <sup>h</sup> a'ts <sup>w</sup> a	т <sup>ɸ</sup> Іачв́а, т <sup>h</sup> Іачв́а	family
q <sup>h</sup> ətɕ <sup>w</sup>	хъы́чв	bird comb
ts <sup>w</sup> a	чва	skin
ts <sup>w</sup> a'ba	чваб́а	wax
ts <sup>w</sup> a'h <sup>w</sup> a	чвахІв́а	stripe
ts <sup>w</sup> bza	чвб́за	lover
ts <sup>w</sup> ja	чвѓа	evil
ts <sup>w</sup> c <sup>h</sup> ac	чвќа́ц	shabby
ts <sup>w</sup> ts'a'ra	чви́цІар́а	to scatter
ts <sup>w</sup> əɕ	чвыш	pale
alar'tɕa	алартш́А	alloyed
la'tɕa	латш́А	ferment
ma'tɕa	матш́А	dishes
psla'tɕa	пслатш́а	fish
'ak <sup>w</sup> tɕaga	áквтшага	watering-pot
t <sup>h</sup> atɕa'ra	татшар́а	to pour
tɕa	тша	hay
atɕ'ɕa'ra	ашІшар́А	to be afraid of
'ak <sup>hw</sup> tɕ'ara	áквшІара	to sit down
a'tɕ'əja	ашІ́йя	what
bəl'tɕ'ə	былш́Іы	fuel
dzts'ə	джыш́Іы	oak
nq <sup>w</sup> ga'tɕ'ə	нкъвгаш́Іы	sick person

transcription	orthography	translation
pssŋa'ts'ə	пссгІашІы	bird
χa'ts'ə	хашІы	task
ž <sup>w</sup> ə	жвы	cow
a'ž <sup>w</sup> a	ажв́а	word
baž <sup>w</sup>	бажв	abundant
'g <sup>w</sup> əž <sup>w</sup> k'ra	гвыжвкІра	to be angry
ž <sup>w</sup> ba	жвба	nine
ž <sup>w</sup> ŋ <sup>w</sup> a'q <sup>h</sup> a	жвгІвахъ́а	shoulder
ž <sup>w</sup> ŋ <sup>w</sup> a	жвгІва	cow that didn't gave birth
ž <sup>w</sup> ŋ <sup>w</sup> and	жвгІванд	sky
ž <sup>w</sup> p'a	жвп́а	thick
ž <sup>w</sup> ra	жвра	drink
ž <sup>w</sup> ts'ə	жвцІы	swallow
ts'əž <sup>w</sup>	цІыжв	tick
χts'əž <sup>w</sup>	хцІыжв	accidental bullet
'tš <sup>w</sup> až <sup>w</sup> ara	чв́ажвара	to speak
'caž <sup>w</sup> əŋ <sup>w</sup>	щ́ажвыгІв	bloodsucker
p <sup>h</sup> əž <sup>w</sup> 'bana	пыжвб́ана	hedgehog
ž <sup>w</sup> ra	жвра	to boil, to drink
ž <sup>w</sup> tš <sup>w</sup> a	жвч́ва	overdone (about food)
a'zə	ажы	old
'ŋatš'zara	гІашІжара	to tear off
zə'ba	жаб́а	ten
'zɬaga	жж́ага	harrow
t <sup>h</sup> az <sub>ɬ</sub>	таж	grandmother
wasə'raz <sub>ɬ</sub>	уасар́аж	wise
wzə	ужы́	now

### Appendix 3: List of monosyllabic words for the vowel space research

transcription	orthography	translation
mʁə	мгъы	thorn
mza	мза	lamp
mzə	мзы	moon
mzətɕ	мзыч	tree pitch
mɣ <sup>h</sup> æ	мхъа	sterile
mtsa	мца	fire
mtsə	мцы	lie
mtɕɪ	мчы	strong
mtɕ <sup>h</sup> tɕət	мштшыт	piece of wood
mʂə	мшы	day
mʔa	мъа	belt
p <sup>h</sup> a	па	son
p <sup>h</sup> ɛɕ	пещ	room
sbəb	сбыб	blister
psq <sup>h</sup> a	псхъа	dead body
psə	псы	soul
ptɕtɕə	птштшы	broken
p <sup>h</sup> ud	пуд	cheap
pɣa	пха	heat
pɣdzə	пхдзы	sweat
pɣtə	пхты	scab
pɣəz	пхыз	sleep
pʂa	пша	wind
pʂdza	пшдза	beautiful
pʂk <sup>h</sup> a	пшка	soft
pʂəɣ <sup>h</sup>	пшыхъ	breeze
pɕba	пцба	four
p <sup>h</sup> ədʒ	пыдръ	buckle
p <sup>h</sup> əts	пыц	tooth
sa	са	I
sk <sup>hw</sup> ɕə	сквшы	year
sk <sup>hw</sup> ɕəzɕ <sup>h</sup>	сквшызкъ	thousand years
ssa	сса	small
staz	стажъ	let me come down
sə	сы	snow
səs	сыс	lamb
tc <sup>h</sup> i	тк <sup>h</sup> и	strict
tdzə	тдзы	hous
t <sup>h</sup> op <sup>h</sup>	топ	ball
tʂbəɣ	тшбыг	scythe
tʂzi	тшжы	horse meat
tʂpsaɣ	тшпсАх	to change (imp)
tʂpɛæ	тшпцА	to rest (imp)
tʂpəts	тшпыц	horse tooth
tʂrədʒ	тшрыдз	to disappear (imp)
tʂtɕə	тштцЫ	to dip into something (imp)
tɕɣ <sup>h</sup> æ	тшхъа	forage
tɕə	тшы	horse

transcription	orthography	translation
tʂət	тшыт	piece
tʂəχ <sup>w</sup> χ	тшыхvx	to wound yourself (imp)
tʂəχʂ	тшыхш	koumiss
tʂəʂʂ	тшыпш	to make up yourself (imp)
tʂəeχ	тшыщх	to kill yourself (imp)
tʂəee	тшыщц	to stroke yourself (imp)
tʰəpʰ	тып	shelter of branches
tʰəχ	тых	shoo! (to a cat)
χ <sup>w</sup> ba	хвба	five
χ <sup>w</sup> it	хвит	free
χzə	хзы	whey
χpa	хпа	three
χʂə	хшы	milk
qʰ <sup>w</sup> da	хъвда	neck
qʰ <sup>w</sup> daʂ	хъвдаш	white neck (bird)
qʰ <sup>w</sup> dzə	хъвдзы	millet
qʰ <sup>w</sup> dzəts	хъвдзыц	grain
qʰpʂʂa	хъппша	get dry
qʰtək <sup>w</sup> psa	хъчквпса	lace pillow cover
qʰtɕi	хъчы	pillow
qʰəχ <sup>j</sup>	хъыхъ	headache
qʰəʂ	хъыш	light
χə	хы	bullet
χ <sup>j</sup> apɕ	хъапц	gold
χ <sup>j</sup> zə	хъзы	name
χ <sup>j</sup> ta	хъта	frost
ts'ba	цлба	lack of something
ts'ɕa	цлгъа	cord
ts'da	цлда	cord
ts'χə	цлхы	night
ts'ɕi	цлщы	sole
tʂa	ца	corn bin
tsba	цба	six
tʂæ	цкъа	clean
tsχa	цха	honey
tʂæc	чакъ	doubt
tʂ <sup>w</sup> ɸ <sup>j</sup> i	чвгъьы	bull
tʂ <sup>w</sup> jæ	чвгъа	evil
tʂ <sup>w</sup> cæe	чвкъащ	unfortunate
tʂqa	чхъа	ear
tʂ'ic	чыкъ	shortish
tʂ'tbzə	шлбжъы	call
ʂ <sup>w</sup> χə	швхы	carrot
ʂ <sup>j</sup> a	шъа	document
ʂta	шта	motherland
ʂʂa	шша	fat
ɕta	щта	track
ɕχa	щха	bee
ɕqa	щхъа	pasture
ɕa	ща	blood

transcription	orthography	translation
ɕʌ	щъа	prop

#### **Appendix 4: List of minimal pairs for the stress research**

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