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Punjabi (Western, ISO-639-3 pnb) is an Indo-Aryan language (Indo-European, Indo-Iranian) spoken in Pakistan and India, and in immigrant communities in the UK, Canada, USA, and elsewhere. In terms of number of native speakers, it is ranked 10th among the world's languages, with more than 100 million speakers (Lewis, Simons & Fennig 2016). Aspects of the phonology of different varieties of Punjabi have been described in Jain (1934), Arun (1961), Gill & Gleason (1962), Singh (1971), Dulai & Koul (1980), Bhatia (1993), Malik (1995), Shackle (2003), and Dhillon (2010). Much of this literature is focused on Eastern varieties, and the phonology of Western Punjabi dialects has received relatively less attention (e.g. Bahri 1962, Baart 2003, 2014).

The lexicon of Punjabi includes loanwords from Arabic, English, Hindi-Urdu, Persian, Sanskrit, Turkish, and other contact languages. Most loanwords are fully integrated into the native phonology but some recent English loanwords (related to science and technology) are yet to be adapted. The word *Punjabi* itself is a combination of two Persian words, /pəɲdʒ/ پنج 'five' and /ab/ آب 'water', which literally means 'the land of five rivers' (Shackle 2003). Punjabi is written in two scripts: Gurmukhi – mainly used in India – and Shahmukhi – a modified Perso-Arabic script frequently employed by Punjabi speakers in Pakistan.

The many dialects of Punjabi are broadly classified into two groups: Eastern and Western. The Eastern dialects are primarily spoken in the Indian state of Punjab, whereas the Western

dialects cover the area of Punjab in Pakistan (Singh 1971); however, the distribution of speakers and varieties is more complicated (Shackle 1979). In 1947, during the partition of India and Pakistan, a large number of Punjabi speakers migrated from India to Pakistan and settled around Lahore, Sahiwal, Faisalabad, and Gujranwala. Similarly, Punjabi speakers from the Punjab state of Pakistan moved to India. The term Lahnda (also Lahanda, Lahandi, or Lahndi, meaning Western) has been used as an umbrella term covering North-Western (Hindko, Peshawari), North-Eastern (Pothwari/Pothohari, Awankari), and Southern (Siraiki or Multani) dialects that differ from the ‘Punjabi proper’ spoken in the Central and Eastern Punjab (Grierson 1916, Bhardwaj 2016). The status of Lahnda has been questioned, and the boundary between these varieties and Punjabi is unclear (Shackle 1979, 2006, Bhatia 2006, Bhardwaj 2016). Siraiki, that was once classified as a variety of Lahnda, is now considered a separate language, characterized by a five-way laryngeal contrast ($/p\ p^h\ b\ b^{\beta}\ \delta/$) (Shackle 1977, 2003). Dialects of Hindko also differ phonologically from each other, and from other Lahnda languages (Shackle 2006).

This paper describes the variety of Punjabi known as *Lyallpuri*, spoken in the urban areas of Faisalabad (formerly Lyallpur), as demonstrated by a 30-year-old male native speaker (the first author). The consultant was born and raised in a Punjabi-speaking environment in Faisalabad (Figure 1), and Lyallpuri is his first language. He is literate in Punjabi (Shahmukhi script) and has used Punjabi as his primary language for most of his life. The consultant also speaks Urdu and English, and has lived outside Pakistan as an adult, but regularly communicates with other Punjabi speakers. All analyses are based on recordings of this speaker. *Lyallpuri* forms part of the chain of Western dialects of Punjabi, and closely resembles varieties of Punjabi spoken in Lahore, Sahiwal, and Gujranwala, although the differences between these have not been systematically examined.



Figure 1 Location of Eastern and Western Punjab. The Lyallpuri variety of Punjabi is spoken in Faisalabad (Western Punjab), Pakistan.

Consonants

	Bilabial	Labio-dental	Dental	Alveolar	Retroflex	Palatal	Velar	Glottal
Plosive	p p ^h b		t t ^h ɖ		ʈ ʈ ^h ɟ	ʃ ʃ ^h ʒ	k k ^h g	
Nasal	m			n	ɳ			
Tap or flap				r	ɽ			
Fricative		(f) (v)		s (z)		ʃ	(x) (ɣ)	h
Approximant		ʋ				j		
Lateral approximant				l	ɭ			

Lyllapuri Punjabi uses 32 consonants, including five fricatives found only in loanwords (in parentheses). Most consonants are contrastive in word-initial, word-medial, and word-final positions. The consonants set in parentheses in the Consonants Table are contrastive in our consultant's speech but they are generally absent from the speech of Lyallpuri speakers residing in rural areas.

INITIAL		MEDIAL		FINAL	
p	par پار cross	tʃ ^h apa	چھاپا raid	nap	ناپ measurement
p ^h	p ^h aɽ پھاڑ torn	nep ^h a	نیپھا waistband	pāp ^h	پاپھ steam
b	bār بار outside	baba	بابا an old man	ɖəb	دب bury
t	ʈal ٲال beat (N) ¹	k ^h aʈa	کھاتا ledger	baʈ	بات talk
t ^h	t ^h al تھال platter	haʈ ^h i	ہاتھی elephant	saʈ ^h	ساتھ companionship
ɖ	ɖal ڊال lentil	saɖa	سادھ simple	jaɖ	یاد remember
t	ʈal ٲال stop	kàʈa	کائا loss	tʃaʈ	چاٲ fruit dish
t ^h	t ^h ər تھر cold	maʈ ^h a	مائھا weak	baʈ ^h	باٲھ sixty-two
ɖ	ɖak ڊاک mail	saɖa	ساڊا ours	laɖ	لاڊ love
ʃ	ʃal چال gait	gaʈʃa	گاچا fodder	kəʃ	گچ glass
ʃ ^h	ʃ ^h al چھال jump	bəʃ ^h a	بچھا spread	kəʃ ^h	کچھ armpit
ʒ	ʒal جال net	baɖʒa	باجا tuba	kaɖʒ	کاج buttonhole
k	kal کال call	ɖaka	ڊاکا robbery	pak	پاک clean
k ^h	k ^h aɖ کھاد fertilizer	ɖak ^h ā	ڊاکھان raisings (PL)	rək ^h	رکھ put
g	gal گال abuse	bagā	باگان gardens (PL)	sag	ساگ name of a dish
m	mal مال stock	mama	ماما maternal uncle	nam	نام name
n	nal نال with	ɖana	ڊانا grain	nan	نان bread

¹ Abbreviations used in this Illustration are as follows: 3FSG = third person feminine singular, 3PL = third person plural, F = feminine, HORT = hortative, IMP = imperative, N = noun, PL = plural, s.d. = standard deviation.

ŋ			kaŋa	کانا	one-eyed	huŋ	ہُن	now
r	raṭ	رات	sara	سارا	a female name	tʃar	چار	four
ɾ			saɾa	ساڑا	jealousy	saɾ	ساڑ	burnt
f	fal	فال	səfa	صفحہ	page	saf	صاف	clean
v	var	وار	ravi	راوی	river name			
s	sal	سال	masa	ماسا	little	ras	راس	suitable
z	zaṭ	ذات	məza	مزہ	enjoy	raz	راز	secret
ʃ	ʃal	شال	maʃa	ماشا	subunit of gram	laʃ	لاش	corpse
x	xas	خاص	ʃaxā	شاخاں	branches	ʃax	شاخ	branch
y	yar	غار	naɣa	ناغہ	absence	ɖay	داغ	stain
h	hal	حال						
ʋ	vaɾ	واڑ	pava	پاوا	cot leg			
j	jar	یار	maja	مایا	starch			
l	lal	لال	tala	تالا	lock	pal	پال	raise
l			pa[ɭa	پالا	cold	mɔ[مَل	rub

Obstruents

Lyallpuri Punjabi has a three-way laryngeal contrast in plosives (voiceless unaspirated, voiceless aspirated, and voiced unaspirated) at five places of articulation (labial, dental, retroflex, palatal and velar). The three-way laryngeal contrast is illustrated in a series of labial plosives in Figure 2. Plosives are contrastive in all word positions.

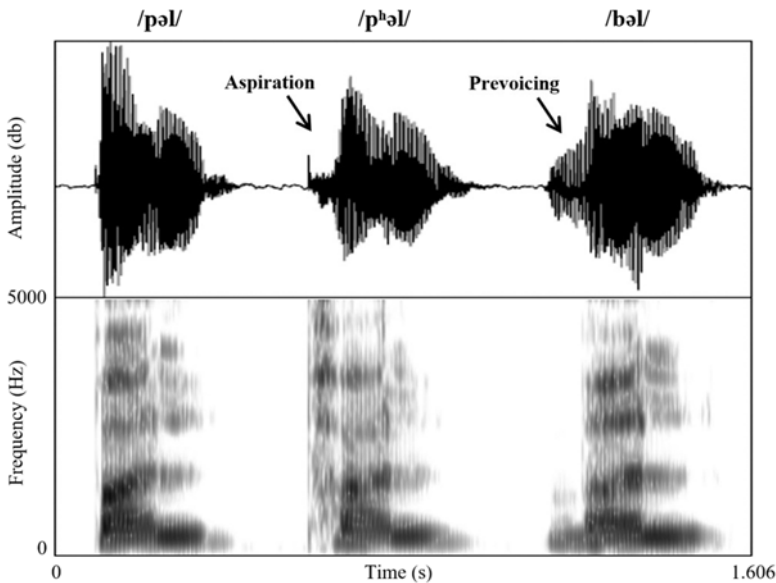


Figure 2 Waveforms and spectrograms of word-initial labial plosives, illustrating the 3-way laryngeal contrast. Left-to-right: /pəl/ پل 'moment', /pʰəl/ پھل 'fruit', and /bəl/ بَل 'curl'. Aspirated release (/pʰ/) and prevoiced (/b/) intervals are indicated.

There is a three-way coronal contrast in plosives: dental, retroflex, and palatal (e.g. /t̪ t̠ tʃ/). /t̪ t̠ tʃ/ have been characterized as palatal (Arun 1961, Bhatia 1993) and palatoalveolar (Dulai & Koul 1980). Retroflex plosives are characterized by shorter closure duration, shorter release burst (or VOT) duration, and greater convergence of second and third formants from preceding vowels, compared to their dental counterparts (Hussain et al. 2017, Hussain 2018). Retroflex and dental plosives produced in intervocalic contexts are illustrated in Figure 3.

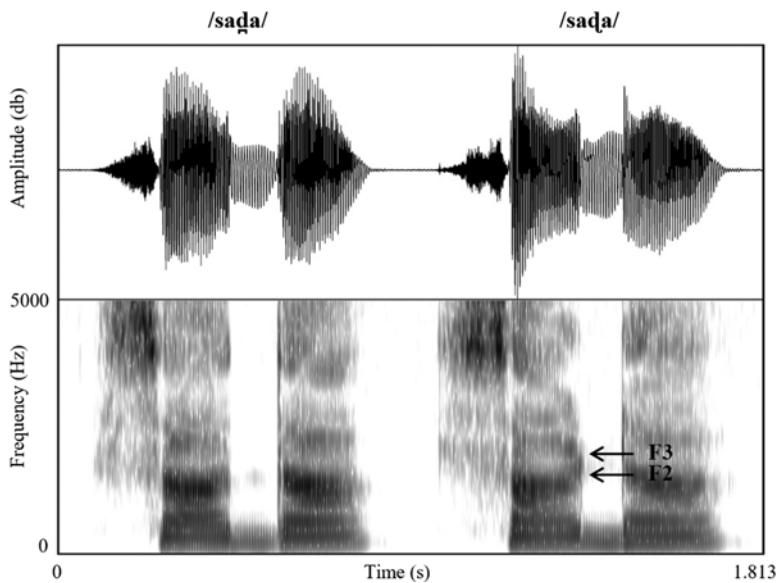


Figure 3 Waveforms and spectrograms of word-medial voiced dental and retroflex plosives. Left-to-right: /saɖa/ سادہ 'simple', /saɖ̠a/ ساڊا 'ours'.

Eight fricatives are contrastive in the idiolect of our consultant: /f v s z ʃ x ɣ h/. Labiodental /f v/, voiced alveolar /z/, and velar fricatives /x ɣ/ are only found in loanwords from Arabic, English, Persian, and Urdu (Dulai 1989, Bhatia 1993, Bukhari 2008, Bhardwaj 2016), and not all speakers maintain all contrasts. /h/ can occur word-initially but not word-medially and finally. Fricatives /s ʃ h/, found in the native lexicon, are illustrated in word-initial position in Figure 4.

Nasals

Lyallpuri Punjabi contrasts nasals at three places of articulation: labial /m/, dental /n/, and retroflex /ɳ/. Labial and dental nasals can occur in all word positions, whereas retroflex /ɳ/ only occurs word-medially and word-finally. Palatal and velar nasals occur as allophones of /n/ and are found in homorganic clusters with palatal and velar plosives (see details in the 'Consonant phonotactics' section below).

Approximants

There is a four-way liquid contrast in Lyallpuri Punjabi: /r/ – /l/ – /ɽ/ – /ɭ/. Rhotics are prototypically realized as taps in the speech of our consultant. /r/ and /l/ can occur in all word positions, but the retroflex tap /ɽ/ and lateral /ɭ/ contrast with alveolar /r/ and /l/ only word-medially and word-finally. Figure 5 illustrates the contrast between alveolar /r/

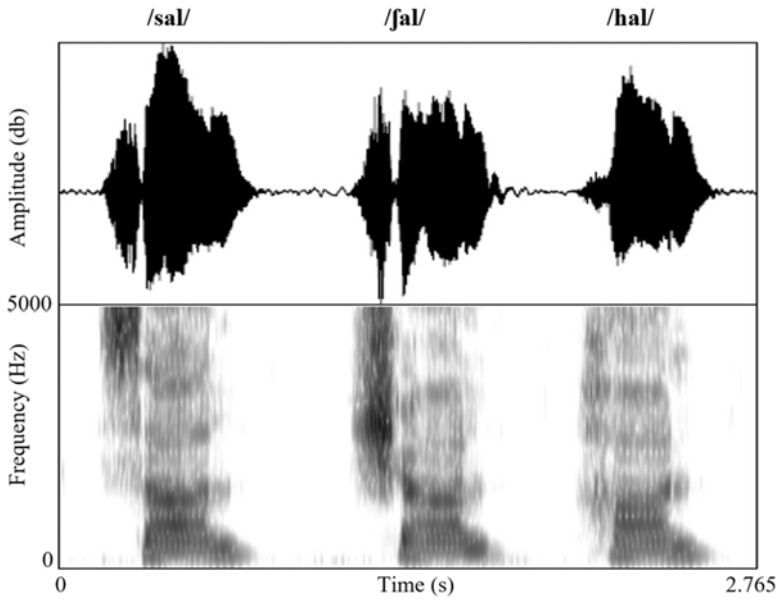


Figure 4 Waveforms and spectrograms illustrating word-initial fricative contrasts. Left-to-right: /sal/ سال 'year', /jal/ شال 'shawl', and /hal/ حال 'condition'.

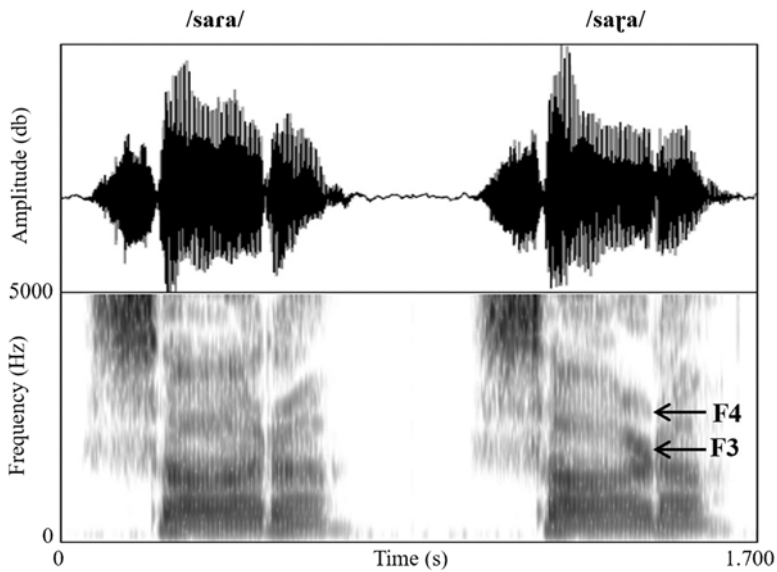


Figure 5 Waveforms and spectrograms illustrating word-medial rhotic contrasts: /sara/ ساره 'a female name' (left) and /sarɑ/ سارآ 'jealousy' (right).

and retroflex /ʈ/ taps. The retroflex tap /ʈ/ is characterized by earlier lowering of third and fourth formants into a shorter, less attenuated interval of occlusion. Labial /b/ and palatal /j/ approximants are contrastive word-initially and word-medially, but not word-finally.

Geminates

SINGLETON			GEMINATE		
p	/təpə/	ٹپا jump	/təp:a/	ٹپا traditional song	
p ^h	/ɖəp ^h i/	جاپھی Kabaddi player ²	/ɖəp ^h :i/	جپھی hug	
b	/ləbə/	لبا find	/ləb:a/	لپا found	
t	/pətə/	پتا address	/pət:a/	پپا leaf	
t ^h	/hət ^h i/	ہتھی elephant	/hət ^h :i/	ہتھی hammer handle	
ɖ	/səɖi/	صدی century	/səɖ:i/	صدی called (F)	
t	/kətə/	کتا cut	/kət:a/	کتا buffalo's calf	
t ^h	/kat ^h a/	کاٹھا Indian jujube ³	/kat ^h :a/	کتھا together	
ɖ	/vəɖə/	وڈا harvest	/vəɖ:a/	وڈا big	
k	/tʃəkə/	چکا carry	/tʃək:a/	چکا bicycle rim	
k ^h	/pək ^h a/	پکھا ignite fire	/pək ^h :a/	پکھا fan	
g	/ɖəgə/	جگہ place	/ɖəg:a/	جگا a nick name	
tʃ	/bətʃə/	بچا save	/bətʃ:a/	بچہ child	
tʃ ^h	/bətʃ ^h a/	بچھا spread	/bətʃ ^h :a/	بچھا cow's calf	
ɖʒ	/səɖʒə/	سجا decorate	/səɖʒ:a/	سجا right	
s	/kəsə/	کسا rub	/kəs:a/	کسا jerk (N)	
m	/kəmi/	کمی shortage	/kəm:i/	کمی low caste	
n	/gənə/	گنا count	/gən:a/	گنا sugarcane	
l	/kəli/	کلی paint	/kəl:i/	کلی alone (F)	

Nineteen consonants of Lyallpuri Punjabi have contrastive geminate forms: /p p^h b t t^h ɖ t t^h ɖ k k^h g tʃ tʃ^h ɖʒ s m n l/. Geminate consonants are always preceded by central vowels (/ɪ ə u/). Geminate plosives are characterized by longer closure duration compared to singletons; duration varies with place of articulation but, overall, mean total duration of geminate plosives is approximately 40% greater than singleton equivalents (Hussain 2015). Contrastive singleton and geminate plosives are illustrated in word-medial contexts in Figure 6.

² Kabaddi is a popular sport in rural areas of Punjab, India and Pakistan. /ɖəp^hi/ is a type of player in Kabaddi.

³ /kat^ha/ refers to a type of Indian jujube fruit (red date).

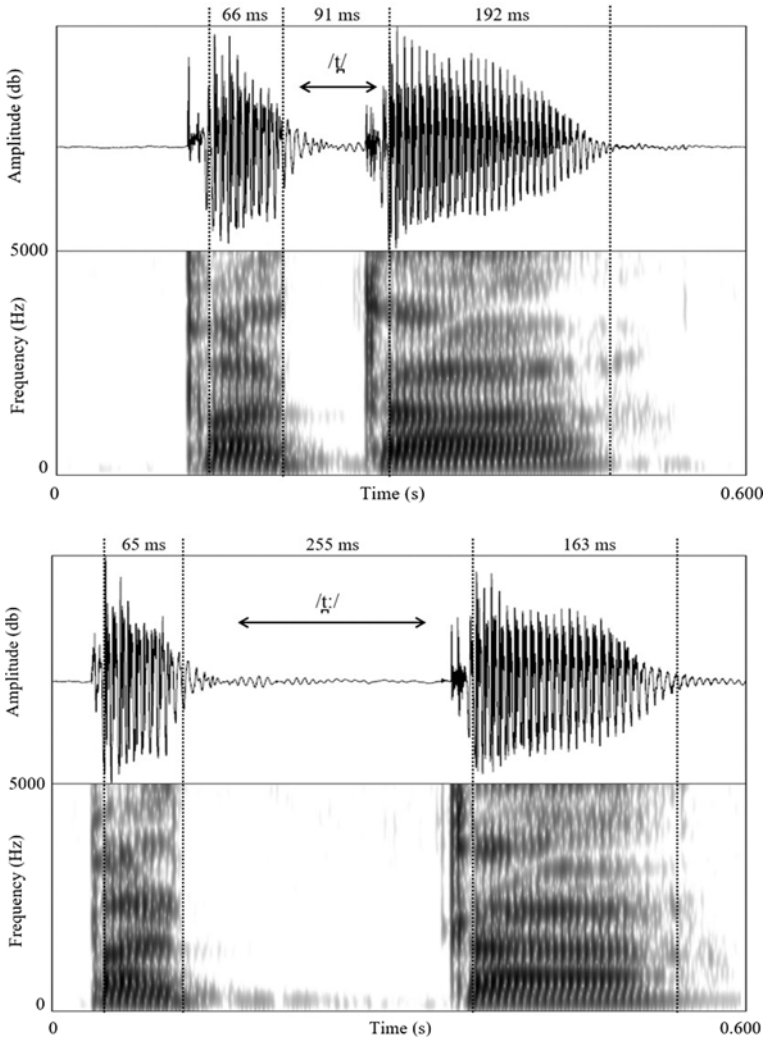
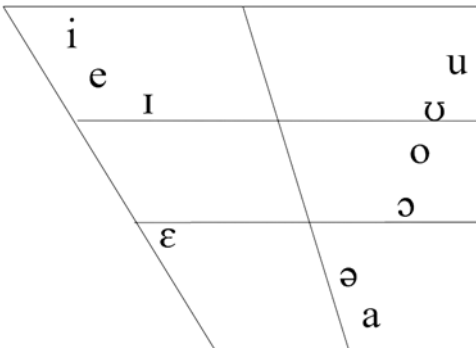


Figure 6 Waveforms and spectrograms of voiceless unaspirated singleton /t/ in /pəṭa/ پٲا 'address' (top) and voiceless unaspirated geminate /t:/ in /pəṭ:a/ پٲا 'leaf' (bottom).

Vowels



INITIAL				MEDIAL			FINAL		
i	iḍ	عید	Muslim festival	pir	پیر	Monday	si	سی	sew
ɪ	ɪk	اک	one	p ^h ɪr	پھر	retract			
e	eḍa	ایدا	his	ber	بیر	berry	se	سے	porcupine
ɛ	ɛʃ	عیش	luxury	pɛr	پیر	foot	sɛ	سہ	tolerate
a	as	آس	hope	par	پار	cross	sa	سا	breath
ə	əsi	آسی	we	pəɾ	پر	feather			
o	os	اوس	dew drops	tʃor	چور	thief	bo	بو	smell
ɔ	ɔk ^h a	اوکھا	difficult	tʃɔl	چول	rice	bɔ	بو	sit
ʊ	ʊḍas	اُداس	sad	pur	پُر	town			
u	uṅa	اُونَا	low	pur	پُور	fill	su	سُو	calved

Lyallpuri Punjabi contrasts ten oral vowels in closed syllables. Oral vowels can be categorized as central /ɪ ə ʊ/ and peripheral /i e ε a o ɔ u/. Peripheral vowels are typically longer than central vowels, and only peripheral vowels occur in all word positions. Peripheral vowels may be analyzed as bimoraic, and central vowels as monomoraic (see section ‘Syllable structure’ below). Figure 7 illustrates the distribution of word-medial vowels according to mean first and second formant frequencies (Table 1).

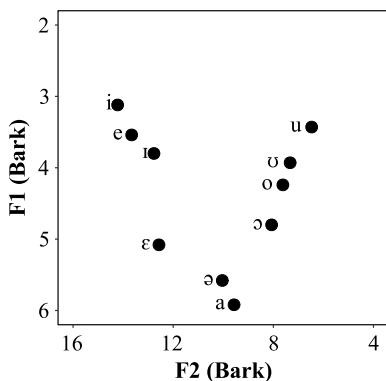


Figure 7 Acoustic distribution of word-medial oral vowels. Mean values (Bark) of first (vertical axis) and second (horizontal axis) formants at vowel midpoints. Average of five tokens, elicited using words in center column of vowel contrasts table.

Table 1 Mean first and second formant frequencies for Punjabi vowels produced in word-medial position, in Hz and Bark.

Vowel	F1 (Hz)	F2 (Hz)	F1 (Bark)	F2 (Bark)
/i/	309	2397	3.12	14.22
/ɪ/	378	1930	3.80	12.77
/e/	351	2203	3.54	13.66
/ε/	519	1872	5.08	12.57
/a/	621	1184	5.92	9.57
/ə/	579	1276	5.58	10.04
/o/	424	856	4.24	7.62
/ɔ/	486	926	4.80	8.07
/ʊ/	391	813	3.93	7.33
/u/	340	692	3.43	6.47

In addition to oral vowels, Lyallpuri Punjabi has a contrastive set of nasal vowels. All seven peripheral oral vowels contrast with their nasal counterparts (Bhatia 1993, Shackle 2003), but central vowels do not show nasal vs. oral opposition. Oral/nasal vowel contrasts are illustrated in (1) (adapted from Shackle 2003: 588).

(1) *Oral vs. nasal vowels in Lyallpuri Punjabi*

ORAL			NASAL		
/p ^h əɾi/	پھڑی	grasped	/p ^h əɾĩ/	پھڑیں	to grasp (HORT)
/tʃupe/	چوپے	sucked	/tʃupẽ/	چوپیں	to suck (HORT)
/hɛ/	بے	is	/hẽ/	بیں	what?
/ga/	گا	sing	/gã/	گان	cow
/tʃo/	چو	milking	/tʃõ/	چوں	from
/so/	سو	hundred	/sõ/	سوں	sleep
/kəru/	کرو	he will do	/kəɾũ/	کروں	I shall do

Lyallpuri Punjabi uses thirteen contrastive oral diphthongs. /ɛ ɔ/ do not occur as a first or second member of any diphthongs, and central vowels /ɪ ə ʊ/ do not occur as a second member of any diphthongs. /ɪ ʊ/ also have constraints as a first member of the diphthongs. There are no diphthongs with nasal vowels either as a first or a second member. Monosyllabic words contrasted by diphthongs are illustrated in (2).

(2) *Lyallpuri Punjabi diphthongs*

/sui/	سوئی	small needle	/sue/	سوئے	big needle
/soi/	سوئی	slept (3FSG)	/lau/	لاؤ	will remove
/gəi/	گئی	went (3FSG)	/ləu/	لؤ	will take
/mai/	مائی	old lady	/k ^h ou/	کھوؤ	will snatch
/soe/	سوئے	slept (3PL)	/toa/	ٹوا	pit hole
/pae/	پائے	wore (3PL)	/ɟua/	جوا	gambling
/ɟao/	جاؤ	Go! (IMP)			

Prosodic features

Syllable structure

In Lyallpuri Punjabi, syllables consist maximally of one onset consonant and two coda consonants (C)V(V)(C)(C). The vast majority of words are monosyllabic or disyllabic. Peripheral vowels are bimoraic, and the central vowels are monomoraic. There is a word minimality constraint which requires that lexical items must contain at least two moras of structure (i.e. they are a foot). Representative examples of possible syllable types are presented in (3).

(3) *Lyallpuri Punjabi syllable types*

V	/a/	آ	Come! (IMP)
VC	/am/	عام	common
CV	/k ^h a/	کھا	Eat! (IMP)

CVC	/dʒəl/	جَل	burnt
VCC	/əmb/	أَمب	mango
CVCC	/məst/	مَسْت	mentally ill

Consonant phonotactics

Word-initial clusters are not found in the native Punjabi lexicon. Words with final consonant clusters are rare, but can be found in Arabic, English, Persian, and Urdu loanwords, with the structures illustrated in (4). The realization of final consonant clusters depends on speech rate, speaker literacy, and bilingualism (Gill & Gleason 1962).

(4) *Word-final clusters*

(a) Fricative + plosive

/sʌst/	سُست	lazy
/gəʃt/	گشت	wander around

(b) Rhotic + plosive

/mærd/	مرد	man
/mɪrtʃ/	مرچ	pepper

Plosives can occur as the first or second member of heterorganic word-medial consonant sequences. If the first consonant is a plosive, the second consonant can be a plosive, liquid or nasal. Word-medial plosive (voiced) + plosive (voiced) sequences occur across morpheme boundaries, seen in (5a) below. In heterorganic nasal + plosive sequences, the plosive is always voiceless in roots, as in (5d), but at morpheme boundaries, nasal + voiced plosive sequences are permitted (e.g. /tʃʊm.ɖɑ/ ‘kiss + present singular masculine marker’). Heterorganic word-medial consonant sequences are exemplified in (5).⁴

(5) *Heterorganic word-medial consonant sequences*

(a) Plosive + plosive

/ləb.ɖi/	لَبْدِي	search (F)
/bətʃ.ɖɑ/	بَتچا	escape

(b) Plosive + liquid

/nok.ri/	نوکری	job
/tʃʰət.ri/	چھتری	umbrella

(c) Plosive + nasal

/tʃʊk.ŋɑ/	چُکنا	carry
/bəd.ɖɑm/	بَدنام	notorious

⁴ See Arun (1961), Gill & Gleason (1962), and Malik (1995) for further discussion of consonant phonotactics.

(d) Nasal + plosive

/tʃim.t̪a/ چمٹا tong

/tʃəm.t̪a/ چمچا spoon

(e) Fricative + plosive

/tʃəs.ka/ چسکا addicted

/kəʃ.t̪i/ کشتی boat

Homorganic word-medial consonant sequences are also permitted in Lyallpuri Punjabi, most commonly nasals + plosives, illustrated in (6).

(6) Homorganic word-medial consonant sequences: nasal + plosive

/gən.d̪a/ گندا dirty

/gən.d̪a/ گنڈا onion

/mən.d̪a/ منجا cot

/kən.ga/ کنگا comb

/kʰəm.ba/ کھمبا pole

Stress and tone

Stress is not contrastive in Lyallpuri Punjabi. All words have at least one stressed syllable. Stress assignment is sensitive to syllable weight, which is determined by the length of the nucleus (central vowels are short; peripheral vowels are long) and the structure of the rime. Three categories of syllable weight are necessary to account for the distribution of stress: light (monomoraic: (C)V, e.g. /pə.d̪a ٻجا ‘fifty’),⁵ heavy (bimoraic: (C)V, e.g. /d̪a/ جا ‘Go! (IMP)’), and superheavy (trimoraic: (C)VC, e.g. /mas/ ماس ‘skin’; or (C)VCC, e.g. /tʃərs/ چرس ‘weed’). In disyllabic words, the leftmost superheavy syllable is stressed, shown in (7a) below. If there is no superheavy syllable, then the penultimate syllable is stressed. In trisyllabic words as in (7b), stress is always placed on the penultimate or antepenultimate syllable, but not on the final syllable.⁶

(7) Patterns of stress assignment, illustrated on disyllabic and trisyllabic words with differing syllable weights: light (L: short-central vowel, no coda), heavy (H: long-peripheral vowel only, or short-central vowel + coda), and super-heavy (S: long-peripheral vowel + coda)

(a) DISYLLABIC

'LH /tʃʰu.ri/ چھری knife

'HH /d̪a.la/ جالا cobweb

'SH /mal.t̪a/ مالٹا orange

(b) TRISYLLABIC

'LLH /tʃʰu.t̪i.jã/ چھٹیياں holidays (PL)

'HLH /pa.t̪i.jã/ پائیياں torn (PL)

'HHS /xa.ne.val/ خانپوال city name

⁵ The first syllable /pə/ is a light (CV) syllable.

⁶ See Dhillon (2010) for detailed analysis of Punjabi prosodic structure and tonal alignment.

'SS	/mal.ɖar/	مالدار	wealthy	H'HH	/bəd.'ma.fi/	بدماشی	rascality
L'S	/tə.'lak/	طلاق	divorce	L'HH	/pə.'pi.ʈa/	پیپتا	papaya
H'S	/məz.'buʈ/	مضبوط	strong	L'SH	/bə.'gaɾ.na/	بگاڑنا	mess up
				'SHH	/'kar.xa.na/	کارخانہ	workshop
				'SLH	/'ban.ɖə.rā/	باندران	monkeys (PL)

A notable feature of Lyallpuri Punjabi, as in other dialects, is the development of three contrastive tones: high (´), mid (not generally marked) and low (˘) (Bahl 1957, 1969, Gill 1960, Baart 2014). Tones always align with the stressed syllable (Bailey 1914, Dhillon 2010), and can occur on both open and closed syllables. Tonal syllables are always stressed, but not vice versa. Monosyllabic and disyllabic words contrasting only in tones are illustrated in (8). Pitch tracks characterizing the three tones are presented in Figure 8.

(8) *Three-way tonal contrast in Lyallpuri Punjabi*

MONOSYLLABIC			DISYLLABIC		
High	/tʃá/	چا tea	/kə́ɾi/	کڑی	curry
Mid	/tʃa/	چاہ enthusiasm	/kəɾi/	کڑی	a small bangle
Low	/tʃà/	چا peek	/kə̀ɾi/	گھڑی	watch

Mid tone is the default tone and occurs on vowels where there is no tone specification at the phonetic level (Bhatia 1975). In the high tone, pitch is raised at the end of the vowel (Figure 9). Low tone generally has a falling-rising contour (Campbell 1981), but typically achieves a lower f0 target than the other two tones. The three tones are also characterized by temporal differences (Gill 1960): low tones have the longest duration, and high tones the shortest (Figure 9).

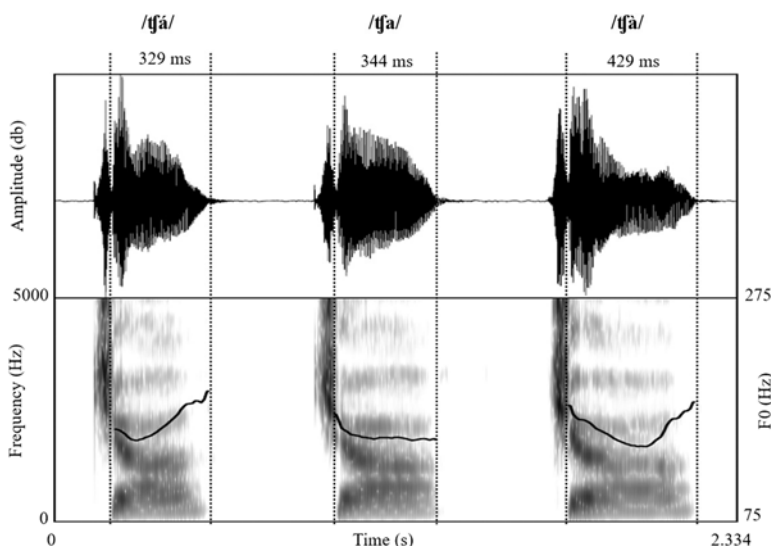


Figure 8 Waveforms and spectrograms of /tʃá/ چا 'tea' (left), /tʃa/ چاہ 'enthusiasm' (middle) and /tʃà/ چا 'peek' (right), bearing high, mid, and low tones, respectively. F0 has been superimposed on each spectrogram (solid line) to illustrate pitch trajectories for each tone (left y-axis: frequency range of spectrogram; right y-axis: f0 range).

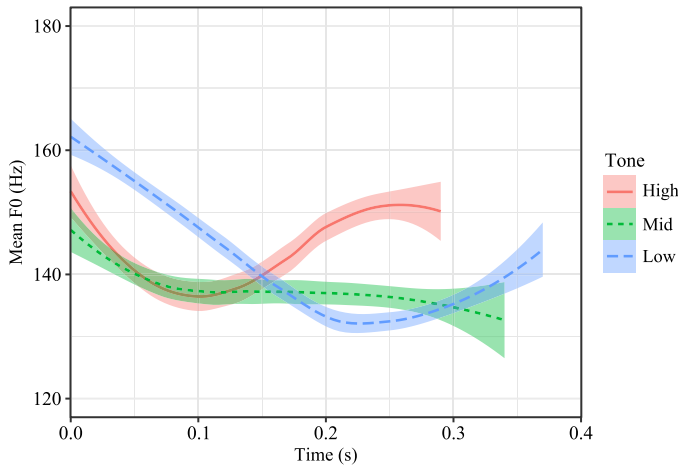


Figure 9 (colour online) Mean pitch trajectories of high (/tʃá/ [tʃa425] چا 'tea'), mid (/tʃa/ [tʃa32] چاه 'enthusiasm'), and low (/tʃâ/ [tʃa513] چا 'peek') tones (average of five repetitions of each word). F0 was calculated at 10 ms intervals throughout each vowel /a/. Ribbons around mean pitch tracks indicate 95% confidence intervals.

Transcription of the North Wind and the Sun

This passage was translated from English to Lyallpuri Punjabi. Only high (´) and low (˘) tones are marked.

Phonemic transcription

ʃumal ɖi hæva ʔe surəʒ vɪʔ rəpʰ:ət peja si pəi kon bəʔa ʔəkəʔvər e
 ʔe fer ik musafər aja jinē kəmbəl ɖi buk:əl mari hoi si
 onā ne ʃəʔt la læi pəi ʔɛʔa pəlā musafər ɖa kəmbəl luva ɖevə o bəʔa ʔəkəʔvər hove ga
 fer ʃumal ɖi hæva pura zor la ke ʔəl:i pər o ʔɛm:ā zor la ke ʔəlɖi si musafər əpna kəmbəl
 onā i kəs ke buk:əl mar lɛɖa si
 axər ʃumal ɖi hæva ne har ke bəs kiʔi
 fer surəʒ gərmi nal ʔəmkeja ʔe musafər ne ʔʰeʔi nal əpna kəmbəl lá ɖiʔ:a
 ʔe ɛʒ ʃumal ɖi hæva nū mənəna peja pəi ɖonā vɪʔ:ə surəʒ bəʔa ʔəkəʔvər e

Orthographic version (Shahmukhi script)

The following translation of the passage is written in Shahmukhi script (right-to-left). It should be noted that voiced aspirates and word-medial and word-final /h/ that have been lost in the speech of Lyallpuri Punjabi speakers, are still written in the Shahmukhi script.

شمال دی ہوا تے سورج وچ رپھڑ پیا سی پئی کون بوہتا طاقتور اے۔
 تے فیر اک مسافر آیا جینیں گمبل دی بگل ماری ہوئی سی۔
 اوناں تے شرط لا لئی پئی جیہڑا پہلاں مسافر دا گمبل لُوا دیوے او بوہتا طاقتور ہووے گا۔
 فیر شمال دی ہوا پورا زور لا کے چلی، پر او جتاں زور لا کے چلدی سی مسافر اپنا گمبل اوناں ای گس کے بگل مار
 لیندا سی۔
 آخر شمال دی ہوا نے بار کے بس کیتی۔
 فیر سورج گر می نال چمکیا تے مسافر نے چھیتی نال اپنا گمبل لا دیتا۔
 تے اینج شمال دی ہوا نوں مننا پیا پئی دونوں وچوں سورج بوہتا طاقتور اے۔

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