Amna Latif

Phonemic Inventory of Siraiki Language and Acoustic Analysis of Voiced Implosives

Abstract: *Siraiki is the language of the inhabitants of the Indus Valley and belongs to the Indo-Aryan family. This paper deals with the phonemic inventory of Siraiki and the acoustic analysis of voiced implosives. Although not many documented inventories could be found yet two were considered as the basis. Multani Siraiki was the dialect chosen. Experiments are carried out in order to prove the inventory.*

1. INTRODUCTION

Siraiki is a regional language of Pakistan, which dates back to the 5th century BC (Gardezi, 1996) or according to other sources 1400 A.D. (Rahman) but Bakhsh wrote his book on Siraiki in 1200 A.D. which proves that the language existed a long time back. This language was found to be prevalent and surviving in the archaic centers of the Indus Civilization i.e. Mohenjodar, Kot Deji, Taxila, Harappa, Dderawar and Multan (Ahsan, 1990). In Pakistan it was recognized as a separate language in the 1981 census during the regime of General Zia-ul-Haq (Feroz).

Siraiki is a member of the Indo-Aryan language family (Refer Appendix A). Since it belongs to the North-Western Zone languages, its dialects blend into Punjabi and Sindhi having 85% lexical similarity with Sindhi and 68% with Dhatki, Odki and Sansi (Baart, 2001). It is written in Perso-Arabic script.

It is spoken in Pakistan, India and United Kingdom (Baart, 2001). In Pakistan in particular it is spoken in Southern Punjab and Northern Sindh, Indus River Valley, Jampur area, Derawali in Dera Ismail Khan, Tank, Bannu, Dera Ghazi Khan and Jangli in Sahiwal, comprising 9.8% of the population (Baart, 2001). Refer to Appendix B for the Siraiki Area in Pakistan.

There are several names and dialects associated with Siraiki, the most common dialect being Multani. Refer to Appendix C.

The meaning of the word Siraiki has many interpretations given by researchers. One of them is that Siraiki is derived from the words 'Asurki', which is derived from a word of Sanskrit 'Surya' meaning the sun. Asury was the nation who worshipped the sun and ruled Multan. A more detailed explanation of interpretations can be found in (Ahsan, 1990).

Despite the fact that Siraiki has ancient roots, not much literature can be found on it. Siraiki speakers have learned to converse in it, majority of whom do not even know its script.

2. LITERATURE REVIEW

Since this language has a scarcity of literature, its phonemic inventory is mentioned in only a few places as in (Massica, 1991 and Shackle, 1976). It has been stated that Siraiki has phonetic coincidence with Sindhi (Ahsan, 1990).

This paper presents the phonemic inventory of Siraiki with acoustic analysis of voiced implosives. The dialect selected is Multani Siraiki.

Siraiki contains the set of /≡,⌊,·,♥/ (Massica, 1991) also contained in the set of Sindhi and are referred to as voiced implosives (Catford, 1988, Ladefoged, 1996 and Mughal, 1999). Implosives or glottalic suction stops (Catford, 1988) are "oral stops articulated with a glottic ingressive air stream so that outside air is pulled into the mouth upon release of the oral closure" (Trask, 1996).

The glottic ingressive air stream is characterized by the downward movement of larynx creating a negative oral pressure in the air between the glottis and the oral closure. In case of voiced implosives as in Siraiki the glottis is closed and is set for voicing, as the larynx is lowered it generates low pressure above it causing a "leakage of air" (Catford, 1988) upwards through the glottis making it vibrate and produce voice. Figure 1 shows the mechanism of voiced glottalic suction stop (Catford, 1988).

In addition to voiced implosives it also contains retroflex nasal and 15 aspirated sounds /πH, βH, τ0H, δ0H, ⊏H, ⏐H, κH, γH, τΣH, δZH, μH, νH, ρH, }H, λH/.

Furthermore this paper will also present the acoustic analysis of voiced implosives in comparison with oral stops/plosives, retroflex nasal in comparison with nasal stops and retroflex flap, palatal nasal with nasal stop. Collin (Massica, 1991) claims that /τΣ/ of Siraiki is different to that of English, which also has to be verified.

All the sources claimed a set of nine vowels in Siraiki namely /ʊ,o,ɒ,i,e,æ,ɒ,ɒ,ɒ/ɒ/ (Massica, 1991 and Shackle, 1976), the /□/ vowel was not included, which had to be proven and existence of nasalized vowels would also be checked.

In contrast with voiced oral stops, the documentation about the acoustic analysis of bilabial and alveolar voiced implosives for Sindhi (Ladefoged, 1996) states that the amplitude of vibration of voiced implosives increased during the time of oral closure. This had to be verified.

3. METHDOLOGY

A group of native Multani Siraiki speakers were surveyed; furthermore many scholars and well-known books were consulted listed in the reference section.

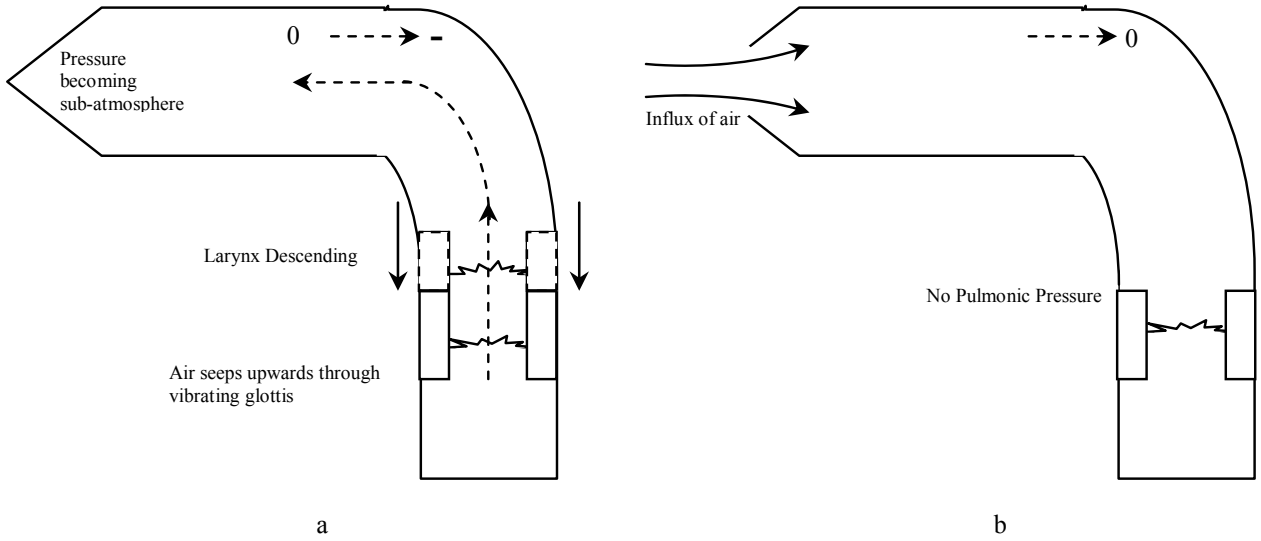

Figure 1 Mechanism of voiced glottis suction stop (Voiced Implosives)

The speakers were given a list of words in the form "CVC" (where C is a consonant and V is a vowel) to be recorded.

All recordings were done in an anechoic chamber. Acoustic analysis was carried out on speech processing software: Praat 3.9.35 by SIL. and Win Snoori 1.3 by Loria-Babel Technologies. The equipment consisted of a HI-FI (high fidelity) microphone, a Teac integrated stereo amplifier and two high quality speakers with 8-ohm impedance.

I considered the parallel distribution to confirm the phonemic inventory of Siraiki. Therefore I took minimal pairs for all the sounds. Refer to Appendix D for the list of minimal pairs.

In addition to minimal pairs acoustic analysis of voiced implosives were considered to distinguish them from oral stops.

To investigate the phonetic characteristics of retroflex nasal /|/, firstly I took minimal pairs and then performed its acoustic analysis by comparing spectrograms of /n/, /|/ and /}/.

To verify the existence of palatal nasal /ȷ/, four words were chosen in the context of voiced palatal affricate and voiced palatal implosive coming after the nasal i.e._δZ and _·, which are as follows and then its acoustic analysis was performed.

/δZ↔νδZ/ marriage procession
/π□νδZ/ five
/ϖ↔ν·↔|/ to go away
/δZςν·/ marriage dinner

The feature [+compact] is used to distinguish palatal nasal /ȷ/ from alveolar nasal /ν/ implying that the power of the signal is located in the middle, which means that F2 is closer to F1. Jakobson and Halle's distinctive feature system explains the acoustic description [+compact] as "Energy concentrated in the central area of spectrum" and articulatory description of [+compact] as "High ratio of front resonance chamber to back" (Clark and Yallop, 1992).

Since the Urdu /τΣ/ is similar to that of English hence I considered words of Urdu and Siraiki for recording. Spectrograms of /τΣ/ were also observed to find the difference between one spoken in Siraiki and the other in Urdu.

For the confirmation of the aspirated forms /πH, βH, τ0H, δ0H, ȡH, |H, κH, γH, τΣH, δZH, μH, νH, ρH, }H, λH/ minimal pairs were considered. Refer Appendix D.

To prove the existence of the vowel /□/, many native Siraiki speakers were consulted. Minimal pair was considered first (Refer to Appendix D) and then following words were finally chosen and recorded to check whether the formant values of /□/ were the same as documented (Pickett, 1999).

/βH□ρα/ good for nothing
/□κH/ difficulty
/π□}ι/ steps of ladder
/π□|ι/ one-fourth
/□τ0↔ρι/ see

To find nasal vowels minimal pairs were considered. Refer to Appendix D.

4. RESULTS

4.1 Comparison of Voiced Implosives and Voiced Plosives

By comparing the spectrograms of voiced implosives and oral stops, it was observed that the documented facts available were correct i.e. the amplitude of the voiced implosives increased during the oral closure indicating the lowering of the larynx. In addition to this the duration of oral closure of voiced implosives was less than that of their plosives respectively. Refer to Appendix E for spectrograms of voiced implosives and their respective plosives.

4.2 Comparison of /ν/, /ǀ/and /}/

For retroflex nasal /ǀ/, the spectrograms were studied and I observed falling F3 as is the case of retroflex flap /}/, the break was very dampened as in case of nasals and the duration of break as compared with retroflex flap was small. Refer to Appendix F for spectrograms of /ν/, /ǀ/and /}/

4.3 Analysis of /τΣ/

In case of the voiceless affricate /τΣ/, the spectrogram of /τΣ/ in Urdu was found similar to that in Siraiki. Refer to Appendix G for spectrograms of /τΣ/

4.4 Analysis of /ﻝ/

While investigating the palatal nasal /ﻝ/, it was found that formants dropped while entering the nasal and formants rose at release of nasal. F2 was found to be closer to F1 according to the documentation. The duration of palatal nasal was longer than that of alveolar /n/. Similar to alveolar nasal the formants were dampened. The /δZ/ coming after the palatal nasal was also nasalized, hence its burst could not be truly visible. Refer to Appendix H for spectrograms of palatal nasal /ﻝ/

4.5 Existence of vowel /□/

While observing the spectrograms recorded to verify the existence of the vowel, it was found that the formant values of the vowel coincided with that of the vowel /□/ found in (Pickett, 1999). Refer to Appendix I

4.6 Phonemes found in Siraiki

Therefore the conclusion of the above stated experiment results are as follows:

The articulation places for the Siraiki system of sounds are: bilabial, labio-dental, dental, alveolar, retroflex, palatal, velar, uvular and glottal.

The voiceless stops are /π, τ0 , τ, κ/ with their corresponding voiced stops /β, δ0 , δ, γ, ?/.

Bilabial, alveolar, palatal and velar voiced implosives /≡, ⎣, ·, ♥/

Voiceless and voiced palatal affricate /τΣ/ and /δZ/

There are five nasals namely bilabial, alveolar, retroflex, palatal and velar /μ, ν, ǀ, ﻝ, N/. An alveolar trill /ρ/, retroflex flap /} /. /ǀ/ and /ﻝ/ do not occur word initially but do occur word medially and finally.

Voiceless and Voiced fricatives include labio-dental, alveolar, palatal, velar and glottal /ϕ, ϖ, σ, ζ, Σ, Z, ξ, ⊗/.

An alveolar lateral /λ/ and a palatal approximant /φ/.

There are fifteen aspirated phonemes namely: /πH, βH, τ0H, δ0H, τH, ǀH, κH, γH, τΣH, δZH, μH, νH, ρH, }H, λH/ which occur in abundance. Table 1 consists of the consonants found in Siraiki Language.

Siraiki Vowel System consists of ten vowels, having three short vowels /ς,□, I/ and seven long vowels /υ, ο, □, α, ι, ε, Θ/. Figure 2 presents the vowel inventory of Siraiki Language.

Furthermore there are nasal vowels as well /υ(, ο(, α(, ι(, ε(, Θ(/.

Table 1 Consonants of Siraiki

	Bilabial	Labio-dental	Dental	Alveolar	Retroflex	Palatal	Velar	Uvular	Glottal
Plosive	π, β		τ0, δ0	τ, ǀ			κ, γ		?
	πH, βH		τ0H, δ0H	τH, ǀH			κH, γH		
						τΣ, τΣH, δZ, δZH			
Nasal	μ, μH			ν, νH	ǀ	ﻝ	N		
Fricative		ϕ, ϖ		σ, ζ		Σ, Z	ξ, ⊗		η
Trill				ρ, ρH					
Flap					}, }H				
Lateral				λ, λH					
Approximate						φ			
Implosives	≡			⎣		·	♥		

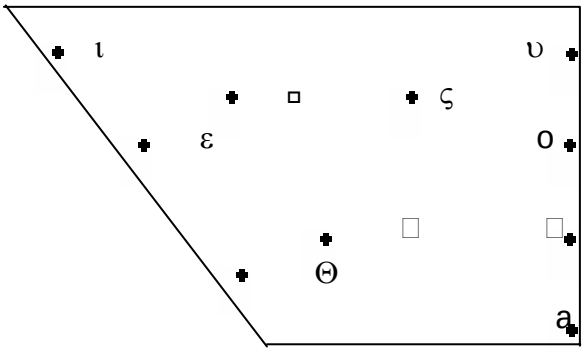

Figure 2 Vowel Inventory of Siraiki

5. DISCUSSION

5.1 Comparison of Punjabi and Sindhi with Siraiki

Siraiki has similarities with many languages. Siraiki and Sindhi have the same origin, Varachada, which is a very ancient language itself (Grierson, 1967). It was the language of the inhabitants of the Indus Valley. This language is also referred by the names of Dardic or Paishacha, language of an Iranian tribe Dardi. The voiced implosives common in both languages may be an influence of the Paishacha language (Ahsan, 1990). They also have relations with Sanskrit and Prakrit, a dialect of Sanskrit. Siraiki is the only language that tends to share the features of the Dardic language on the one hand and Sindhi, Balochi and Pashto on the other hand.

Some sources claimed and in particular U.V. Gangovsky that Siraiki is a dialect or branch of Punjabi. Since Punjabi itself is very diverse and much of the vocabulary of Punjabi is shared by Siraiki hence Siraiki is considered according to the sources as a dialect of Punjabi.

Persian also has a great impact on Siraiki. Since Dardic was an Iranian language, this creates a link between Persian, Sindhi and Siraiki.

The grammar of Siraiki is vast. Many researchers and linguists are however working on it. Although results have proven the existence of certain vowels still the vowel system of Siraiki needs to be studied more deeply. There is room for future enhancement in every area.

6. ACKNOWLEDGEMENT

For the preparation of this paper Prof. Aamir Faheem, Govt. College Multan, played a very important role firstly by providing the *"Siraiki Quaida"* and secondly in pointing out literary sources of Siraiki Language. Dr. Ahsan Wagha's son Mr. Waseem Wagha in Islamabad was very helpful in providing valuable material written by his father and him. Dr. Tahir Taunsvi, Chairman Board of Intermediate and Secondary Education Faisalabad and Secretary General Siraiki Academy Multan, was another important source for the identification of hundreds of rare books written on Siraiki from his own collection. Masood Jhandir Research Library, Sardarpur Jhandir, Mailsi district Vehari
established in 1890 for giving me a chance to search through hundreds of Siraiki books. It is worth mentioning that one of the books that I consulted there on Siraiki was approximately 800 years old. Mr. Zahoor Dharaijah of Jhoke Publishers for providing the Siraiki Newspapers and other Siraiki books published by them. I also had a discussion with Shaukat Mughal, Govt. Education College Multan and author of many Siraiki books, who was highly supportive in all aspects.

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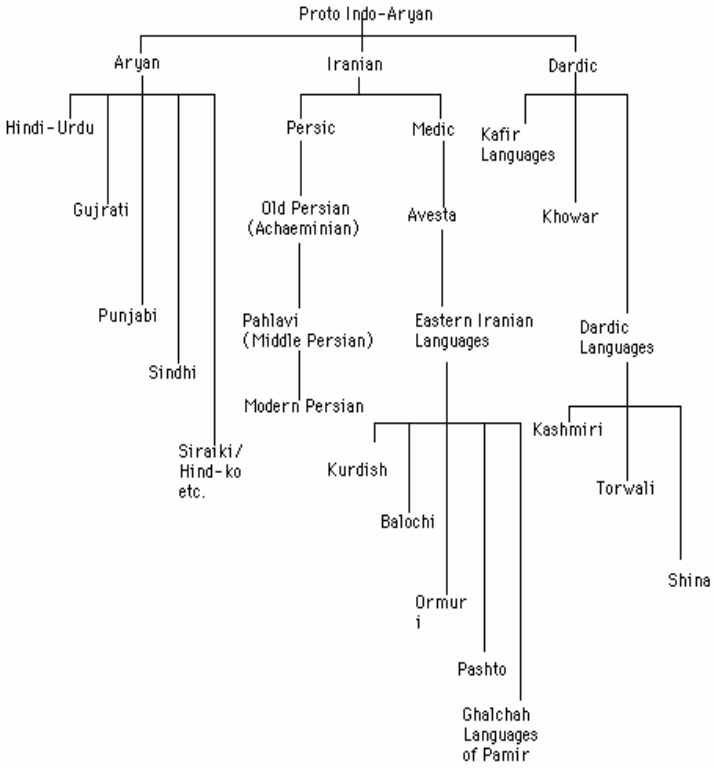
APPENDIX A

Indo Aryan family tree



APPENDIX B

Siraiki Speaking Area

Area: 143978 Sq. Mile
Population:22486746
Divisions: Dera Ghazi Khan, Dera Ismail Khan, Multan, Sargodha, Bahawalpur

Siraiki Speaking Area [19]

APPENDIX C

C.1 Names associated with Siraiki

Riasiti
Bahawalpuri
Multani
Southern Punjabi
Saraiki
Hindko
Lahnda
Thalochari

C.2 Dialects of Siraiki

Derawali
Multani (Khatki)
Bahawalpuri (Riasati, Reasati)
Jangli
Jatki

APPENDIX D

D.1 List of minimal pairs to prove the phonemic inventory given in the results

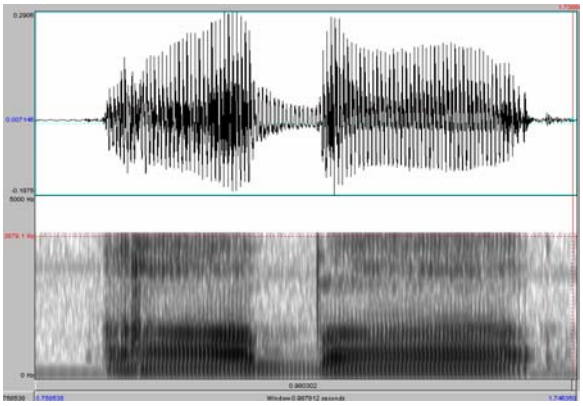
No.	Minimal pair	Meaning
1	/β□σ/ /≡□σ/	bus enough
2	/□οπα/ /□ο≡α /	driver weight of 4 kg
3	/⎪ □ηα/ /⎩□ηα/	drop a tribe of Jat
4	/δZαλ/ /·αλ/	to do patience a tree
5	/ρ□τΣ/ /ρ□·/	failed satisfied
6	/γολ/ /♥ολ/	round search
7	/β□ρ/ /π□ρ/	width of cloth a protrusion on horse
8	/σ□νδ0H/ /σ□ν⎪ /	joint deserted place
9	/·□τ0/ /·□□/	goat hair farmer
10	/γαρ/ /καρ/	cave work
11	/δZ□λεν⌡δα/ /τΣ□λεν⌡δα/	to tolerate to hit
12	/μασι/ /βασι/	mother's sister stale, inhabitant
13	/μιτ0α/ /νιτ0α/	friend to make intention
14	/πα⎪/ /πα}/	paste root
15	/ρ□⎪/ /ρ□ν/	battlefield wife
16	/ϖε⎩// /ϖ□ν/	go kind of
17	/ρ□N/ /ρ□ν/	color wife
18	/φαλ/ /ϖαλ/	omen hair
19	/σορ/ /ζορ/	to increase fire strength
20	/σαλ/ /Σαλ/	year shawl
21	/ξΘρ/ /⊗Θρ/	welfare, health other
22	/παρ/ /πα}/	other side root
23	/·□τ°/ /·□□/	goat hair farmer
24	/π□□/ /πH□□/	fiber of thigh injury
25	/β□ρ/ /βH□ρ/	width of cloth twice
26	/π□τ°/ /π□τ°H/	title of honor weight
27	/π□□/ /π□□H/	fiber of thigh female child
28	/δ°ςρ/ /δ°Hςρ/	pearl beginning
29	/⎪ ορ/ /⎪ Hορ/	cotton thread cattle herd
30	/π□κα/ /π□κHα/	ready bee hive
31	/γαρα/ /γHαρα/	clay for plastering houses River Sutlej + River Bias
32	/τΣI□ι/ /τΣI□Hι/	white sticks of cotton plant
33	/βςδZα/ /βςδZHα/	to show disrespect by spreading palm to beckon
34	/νIμι/ /νIμHι/	impregnated I am not
35	/νι(/ /νHι(/	O! not
36	/κερι/ /κερHι/	ashes who
37	/ρ□}/ /ρ□}H/	restlessness of camel crop
38	/μαλ/ /μαλH/	wealth plank of wood used to level the fields
39	/ρ□τ°/ /λ□τ°/	blood leg

D.2 List of minimal pairs of vowels

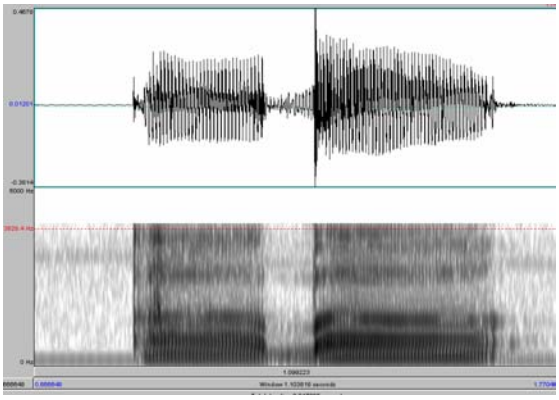
No.	Minimal Pairs	Meaning
1	/βHυρα/ /βHορα/ /βH□ρα/ /βHαρα/	brown color piece, basement good for nothing heavy
2	/βHI·□ |/ /βHç·□ |/ /βH□·□ |/	get wet fry break, run
3	/μιλ/ /μελ/ /μΘλ/	mile change dirt
4	/κHαδ°α/ /κHα(δ°α/	ate eating
5	/□ςρε/ /□ςρε(/	may you go may he go
6	/ϖΘ(δα/ /ϖε(δ°α/	going going

APPENDIX E

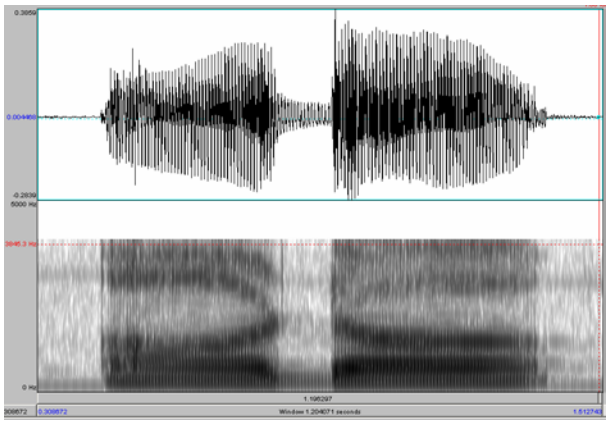
Spectrograms of voiced implosives and their respective oral stops



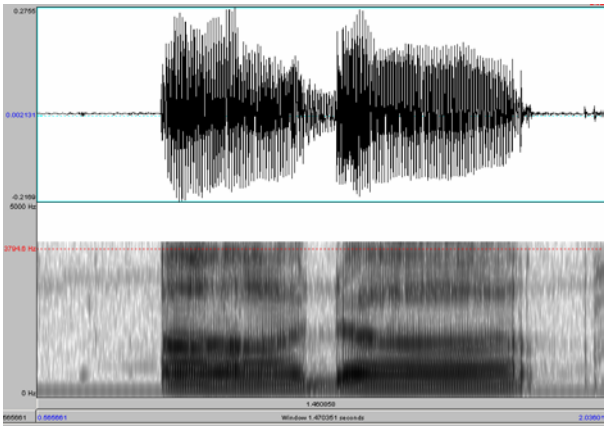
a) /αβα/



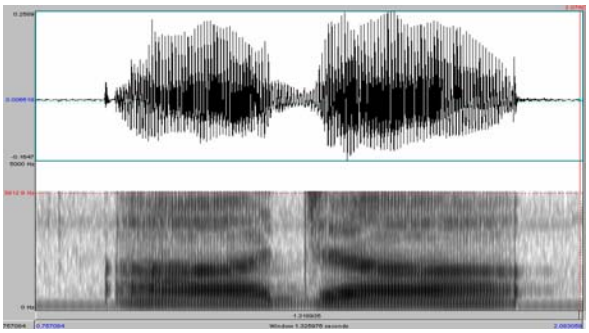
b) /α≡α/



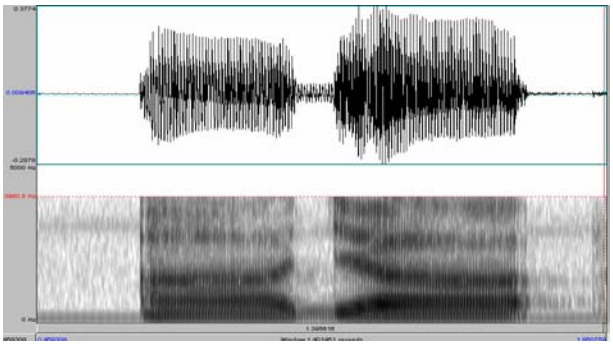
c) /α| α/



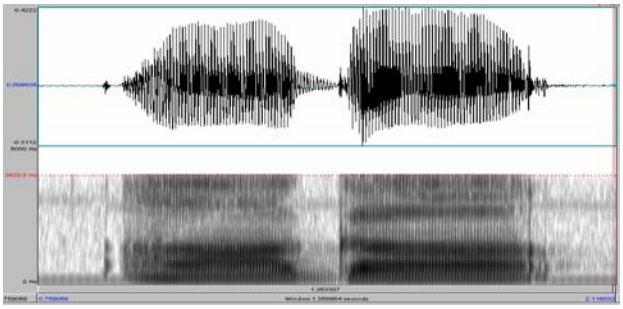
d) /α⌊α/



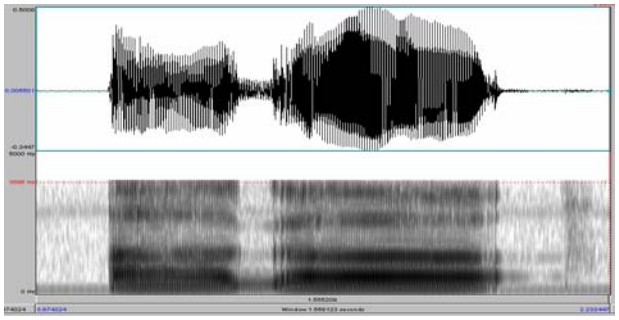
e) /αδZα/



f) /α·α/



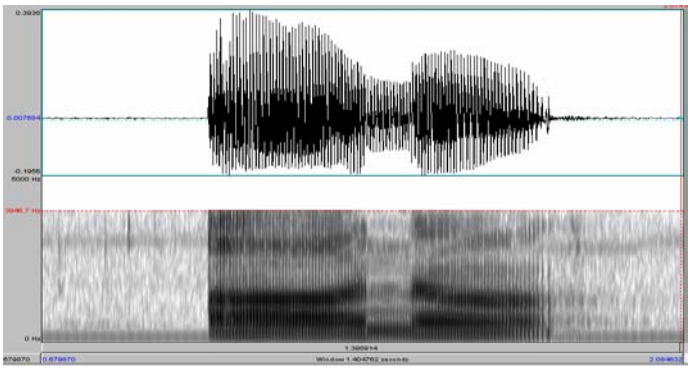
g) /αγα/



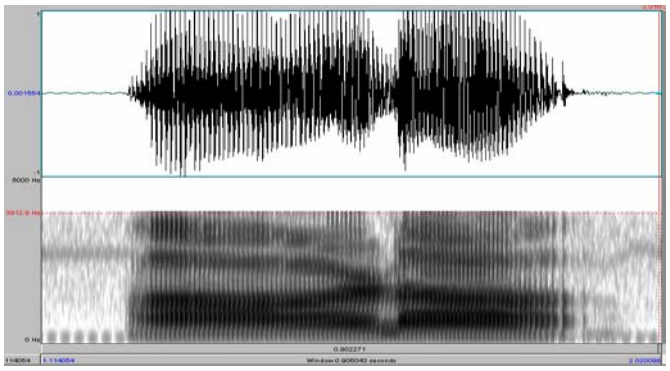
h) /α♥α/

APPENDIX F

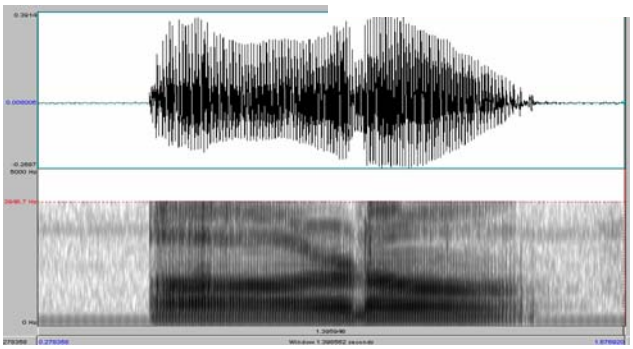
Spectrograms of alveolar nasal /ν/, retroflex nasal /⏐/ and retroflex flap /}/



a) /ανα/



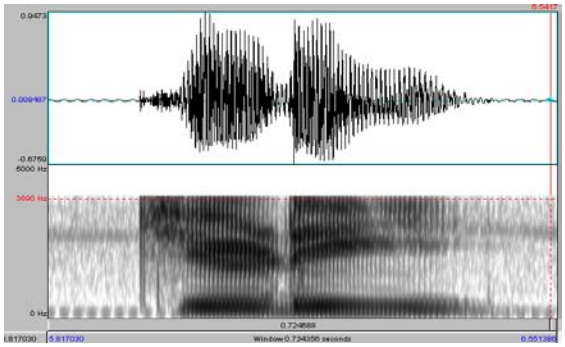
c) /α}α/



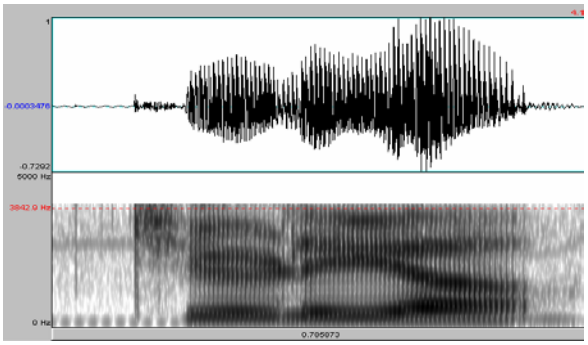
b) /α α/

APPENDIX G

Spectrograms of voiceless affricate /τΣ/ in Urdu and Siraiki



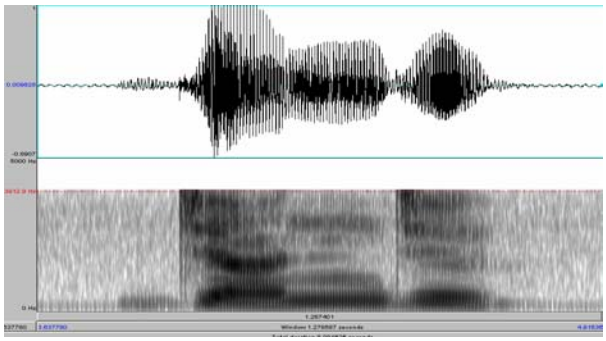
a) /τΣI}ι/



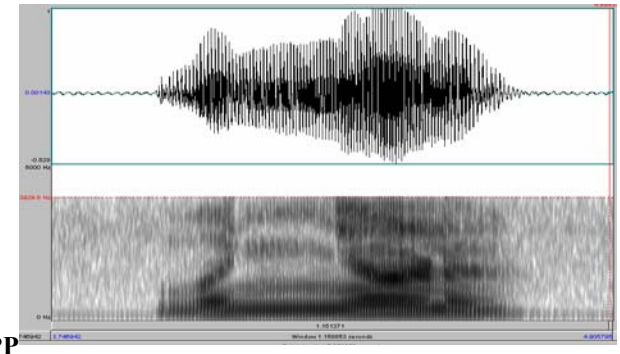
b) /ΣI}φφα/

APPENDIX H

Spectrograms for palatal nasal /ɲ/



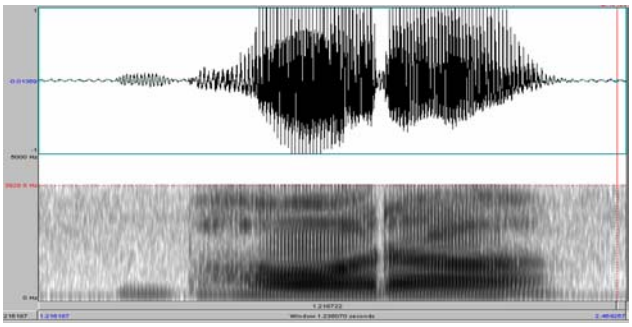
a) /δZ□ɲδZ/



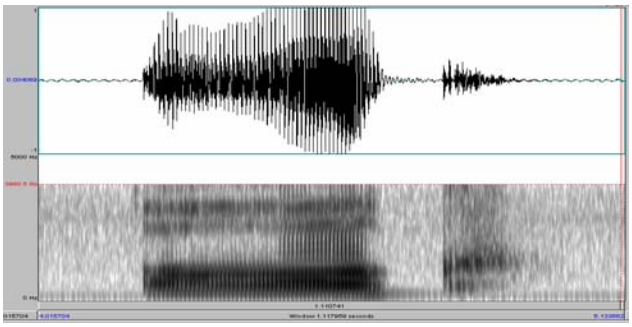
b) /ϖ□ɲ·□ /

APPENDIX I

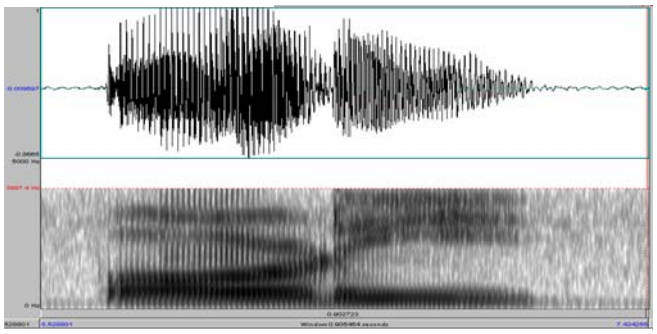
Spectrograms to show the existence of vowel /□/



a) /βH□ρα/



b) /□κH/



c) /π□}ι/