NASAL ASPIRATES IN URDU

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ABSTRACT

Aspirated nasals are fairly common especially in the languages of the subcontinent. Their possibility in Urdu however is very ambiguous. Different authors present conflicting views on this. Lack of any previous acoustic analysis of this phenomenon in Urdu only makes this subject more ambiguous.

This study is based on acoustic analysis of recordings made by native Urdu speakers. The results show that the possibility of aspirated nasals is very bleak except for the word medial /m^{h}/.

1. INTRODUCTION

This primary objective of this study was to ascertain the possibility of aspirated nasal consonants in the Urdu Language. Most of the study presented is based on experiments conducted on native Urdu speakers. This is mainly due to the lack of research on Urdu Language. Only a handful of researchers have contributed to the phonetic and phonological aspects of Urdu language.

There have been no formal studies done on this subject. Any reference material that is available treats this subject very lightly and presents an overall picture of the Urdu language. Furthermore, the research done on Urdu language draws a very ambiguous picture of the subject under investigation.

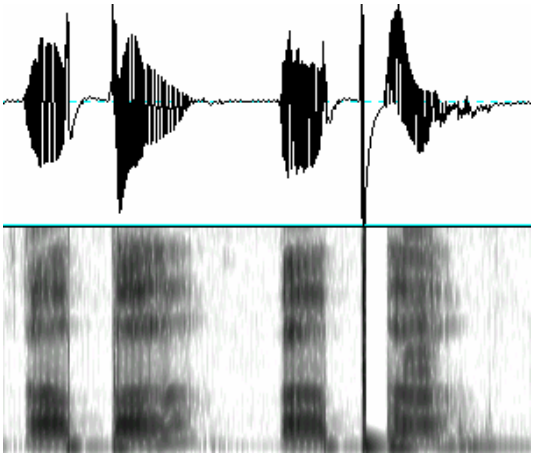
2. LITERATURE REVIEW

2.1 Aspiration and Nasalization

Aspirated segments are indicated by [+spread glottis] because the spreading of the vocal cords at the release of a complete closure is called aspiration (Napoli, 1996, p.12)

Aspirated consonants have their stricture released before the onset of voice on a following voiced segment, thereby giving a period of voiceless ness (Lass, 1984, p.91); this being the primary queue for the identification of aspirated stops. Aspiration of consonants is symbolized by a superscripted [^{h}] on the aspirated segment.

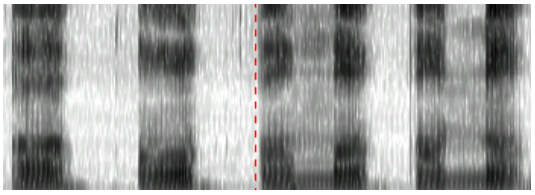
Another secondary acoustic queue as suggested by Napoli (1996, p.12), may be a relatively stronger release burst for aspirated stops as compared to un-aspirated stops.



∂ p ɑ ∂ p^{h} ɑ

FIGURE 1 unaspirated /p/ vs. aspirated /p/

The effect of nasalization is to slightly lower format frequencies while at the same time increasing the bandwidth of formants (Pickett, 1999, p. 115-118). During the murmur of a nasal consonant the spectrum has a low frequency prominence at about 250Hz, and there is also a weaker prominence in the vicinity of 1000Hz (Stevens, 2000, p.512).



ə nas (ə) ə m ə ə n ə

FIGURE 2 Spectrogram of ə vs. ə^{n} and murmur of /m/ and /n/

2.2 Nasal Aspirates

Nasal phonemes comprise of /m/, /n/, / ŋ /, and / ɲ /. Of these nasal consonants, /m/ and /n/ are the only ones that are normally aspirated.

Nasal aspirates are a fairly common phenomenon among various languages and are somewhat more common amongst the East Asian Languages.

Word initial /m^{h}/ and /n^{h}/ occur in Marathi, Kohani, most dialects of Rajastani, Kumrani, Braj, and the Saurashtra language.
Non-initial /m^{h}/ is found also in Gujrati, Sindhi, some dialects of Bihari language, Kalasha, and most West Bihari Languages. A non-initial /n^{h}/ occurs in Marathi, Bhojpuri, and Chhittisgashi. (Masica, 1991, p.103).
However, the idea of nasal aspirates in Urdu has been very controversial. There is no generally accepted opinion about the existence of nasal aspirates in Urdu. Moreover, different authors of the subject do not on agree the nasals that are aspirated, even when they do agree on the idea of nasal aspirates in Urdu.

One view about this lack of agreement is as suggested by Khan (1997, p.31). In Pakistan, Pashto, Punjabi, and Sindhi continue to be the regional languages. Since these languages do not contain any nasal aspirates, their dialectical influence on Urdu has successively eliminated nasal aspirates, if there were any to start with. However, this claim seems to be false, since there is strong support in favor of nasal aspirates in Sindhi (Masica, 1991, p.103), and somewhat less strong in favor of Punjabi.

In his book Moizuddin, (1989 *p.16-17*) altogether disagrees with the idea of nasal aspirates in Urdu. Along with him Kachru (1987, p.55) gives no indication of any nasal aspirates in Urdu. Masica (1991, p.103), also goes along the same lines and does not point out the possibility of nasal aspirates in Urdu or Hindi. This work seems to be the strongest indicator of the lack of nasal aspirates in Urdu. He contrasts all the Indo Aryan languages and although agrees on the existence of nasal aspirates in many other languages, yet presents no evidence of nasal aspirates in Urdu or Hindi.

In contrast to this point of view, many researchers feel that there is a strong possibility of nasal aspirates in Urdu. However the agreement on their word positioning is not so clear.

Bokhari (1985, p.8, 36), suggests the possibility of nasal aspirates in word initial, word medial, and word final positions. Khan (1997, p.106-110) on the other hand dismisses /m^{h}/ in word initial and word final positions and only entertains /m^{h}/ in word medial position.

However, all the researchers agree on one thing: aspiration in Urdu is denoted by ‘ھ‘ and not by ‘ح‘. Thus, if there are any nasal aspirates the nasal consonant must be represented as کھا and not as کہا or کحا

Furthermore, all the standard dictionaries also support this view. However, the dictionaries too do not agree on the choices of nasal aspirates.

In fact, to illustrate the point, many of the words that were chosen (see below) as representative of the required problem were written by Moizuddin (1989, p.75) as examples of words that are not nasal aspirates.

3. METHODOLOGY

3.1 Collection of Samples

As has already been pointed out, due to a general lack of agreement on the choice of nasal aspirates on the part of dictionaries as well as different researchers, collecting words that were less controversial was a difficult task. The words that created the least controversy were chosen for the analysis. The words chosen were selected from three dictionaries and one book.

Following is a list of the words that were collected from various sources as representative of the required data.

TABLE 1 Words taken from Khan, M. (1997)

	Word	Transcription	Page
Word Initial	نھا	nʰa	107
	نھاو	nʰao	107
	نھلا	nʰəla	107
Word Medial	ننھا	nənʰa	107
	کمھار	kʊmʰar	109
	جمھوریت	dʒəmʰuriət	109
	تمھارے	tumʰare	109
	کمھلانا	kəmʰlana	109
	اِنھیں	ʔɪnʰæ̃	107
	اُنھیں	ʔʊnʰæ̃	107
	کنھیا	kənʰəɪa	107
Word Final	منھ	mʊnʰ	107
	مینھ	mɪnʰ	107

TABLE 2 Words taken from Qureshi, B

	Word	Transcription	Page
Word Initial	none	none	--
Word Medial	ننھا	nənʰa	650
	ننھی	nənʰi	650
	ننھیال	nənʰəal	650
	کنھیا	kənʰəɪa	500
Word Final	مونھ	munʰ	615

TABLE 3 Words taken from Feroz-ud-Din, M.

	Word	Transcription	Page
Word Initial	نھانا	nʰana	1274
Word Medial	انھوریاں	ʔnʰoriă	134
	پنھانا	pɪnʰana	109
	بانھیں	banʰĕ	109
	اِنھیں	ʔɪnʰæ̆	107
	اُنھیں	ʔʊnʰæ̆	107
Word Final	بانھ	banʰ	107

TABLE 4 Words taken from Haqqi, S (1995)

	Word	Transcription	Page
Word Initial	مھا	mʰa	920
	مھارا	mʰara	920
Word Medial	ننھا	nənʰa	952
	کمھار	kʊmʰar	920
	جنھوں	dʒɪnʰŏ	952
	نھانا	nʰana	952
	تمھارے	tʊmʰare	920
	کمھار	kʊmʰar	920
	اِنھیں	ʔɪnʰæ̆	952
	اُنھیں	ʔʊnʰæ̆	952
	کنھیا	kənʰəɪa	952
	کمھاری	kʊmʰari	920
	ننھی	nənʰi	952
	ننھیال	nənʰəal	920
	کانھا	kanʰa	920

Of the above words collected, the following were chosen as being representative of the total set of nasal aspirates.

TABLE 5 Final set of words selected for analysis

	Word	Transcription
Word Initial	نھا	n^ha
	نھاو	n^hao
	نھلا	n^hla
	مھا	m^ha
Word Medial	ننھا	$n\partial n^ha$
	کمھار	$k\upsilon m^har$
	تمھارے	$t\upsilon m^hare$
	کمھلانا	$k\upsilon m^hlana$
	ننھیال	$n\partial n^h\partial al$
	کنھیا	$kn^h\partial \imath a$
Word Final	منھ	$m\upsilon n^h$
	مینھ	$m\imath n^h$
	بانھ	ban^h

3.2 Recording and Analysis

For the acoustic analysis of the data thus collected, the words were embedded in the carrier phrase:

میں نے _____ کہا

kəha _____ ne mæ̃

These phrases were written on thirteen flash cards and placed randomly on a table. The samples collected were of native Urdu speakers. The speaker selected one card at random and spoke the phrase into the microphone. The distance between the speaker and microphone was more or less kept the same (between two to three inches). In one go, the speaker made four recordings of the phrase.

Thus there were a total of fifty-two recordings made for all the speakers, with four recordings per speaker per phrase. The data was collected from five such speakers.

All the recordings were made and analyzed on Ensig-Xwaves version 5.3 and the software was running on Linux version 6.2 on a Pentium 3 machine with 128 MB RAM. Some additional recordings were also made on Praat version 4.0.4 running on Windows NT for verification of some results.

The apparatus consisted of a Shure microphone, which was connected to the input of the computer system. The speaker output of the system was inserted into the input of a Teac power amplifier (195 Watts per Channel). The power amplifier provided the connection to two Technique speakers

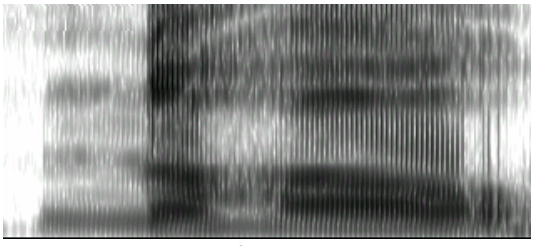
All recordings were done with a sampling frequency of 8Khz.

4. RESULTS

4.1 Word initial /m^h/ and /n^h/

Due to the lack of availability of words that contained /m^h/ in the word initial position, only one word that was thought to contain /mh/ was selected for analysis (m^ha).

The analysis revealed that without exception none of the speakers showed any aspiration. All of the speakers inserted a /ə/ between the /m/ and /h/ segments. Thus, the word مھا was transcribed as məha.



n ə h a o

FIGURE 3 the spectrogram of /nəhao/

The spectrograms of the words containing /n^h/ in the word initial position revealed that like /m^h/, all the speakers inserted a /ə/ between the /n/ and /h/ segments.

The words along with their transcriptions for all the speakers are shown below:

TABLE 6 Results for the word initial n^h

نھا	nəha
نھاو	nəhao
نھلا	nehla

4.2 Word medial /m^h/

The results for aspirated /m/ in word medial position were fairly consistent across the speakers The first and the third word were pronounced as un-aspirated. The second word however, varied largely across the five speakers.

TABLE 7 Results for the word medial m^h

	تمھارے	کمھلانا	کمھار
Sp. A	tʊmhare	kʊm^{h}lana kumlana	kʊmhar
Sp. B	tʊmhare	kumhɪlana	kʊmhar
Sp. C	tʊmhare	kumhɪlana	kʊmhar
Sp. D	tʊmhare	kumhlana kum^{h}lana	kʊmhar
Sp. E	tʊmare	kʊmlana	kʊmhar

Of the five speakers, only two showed aspiration. The aspiration was seen in three samples for speaker A and two samples for speaker D, out of a total of four samples. It was evident that when aspiration of /m/ occurred the following vowel was deleted and the glide /l/ came in the onset of the following syllable. However, the vowel deletion and the glide /l/ still occurred in the onset for the following syllable even when /m/ was not aspirated for the two speakers.

Thus when aspiration occurred for the second word, the word was syllabified as kʊm^h.lana. When aspiration was not present a ə was inserted between the /h/ and the /l/ segments with the word was syllabified as kum.hɪlana.

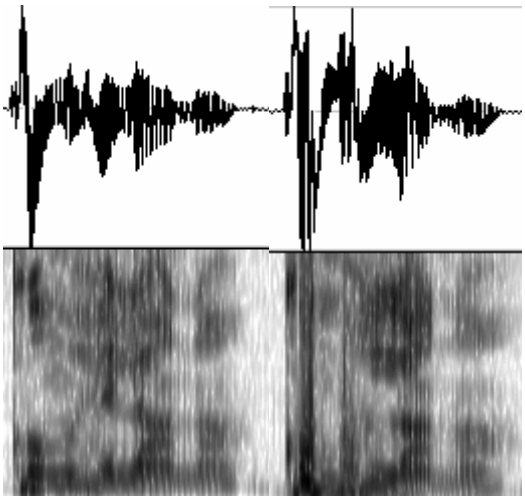


FIGURE 4 Two spectrograms representing the two transcriptions for Speaker A who showed aspiration. Speaker D showed similar spectrograms

4.3 Word medial /n^h/

The recordings analyzed presented a little ambiguous picture of word medial aspirated /n/. The results were variable between the speakers for all the three words. The table below summarizes the results of the recordings.

TABLE 8 Results for the word medial n^h

	ننھا	ننھیال	کنھیا
Sp. A	nəna	nəneal	kənhəia kən^{h}əia
Sp. B	nəna	nənheal	kənhia kən^{h}ia
Sp. C	nənha	nənheal	kənhəia
Sp. D	nənha	nənheal	kənəija
Sp. E	nəna	nənehal	kənəija

The results from the table show that at least the first two words do not have nasal aspirates. This is most likely because of the syllabification of the two words that was syllabified as either nən.na or nən.ha. In either case, aspiration did not occur.

For the second word, the pronunciations were too variable across the speakers. However, none of the speakers showed any

possibility of aspirated nasals the syllabification of the three transcriptions was: n∂n.ne.al, n∂n.he.al, n∂n.ne.hal.

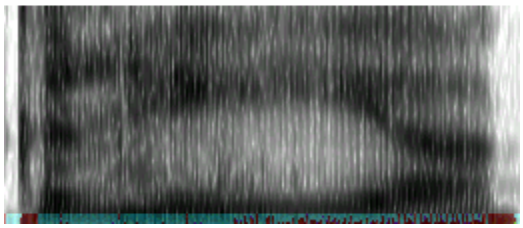


FIGURE 5 Spectrogram of speaker A for the third word. The strong higher formants may indicate aspiration

For the third word, the results were a little complicated. Speaker A and B produced very slight aspirations of nasals. Other speaker did not produce any aspiration. However, this aspiration was doubtful and it is likely the segment only contains a /n/ followed by a /h/. The stronger higher formants may be due to stress on the /n/ segment rather than aspiration.

4.4 Word final /mʰ/

No words could be found that contained /mʰ/ in word final position.

4.5 Word final /nʰ/

The analysis of /nʰ/ in word final position revealed variable results for the different speakers, though none of the speakers ended up with an aspirated nasal.

The following table summarizes the results that were arrived at after the analysis.

TABLE 9 Results for the word final nʰ

	Sp. A	Sp. B	Sp. C	Sp. D	Sp. E
منہ	muⁿ	mʊⁿ	muⁿ	mʊⁿ	muⁿ
مینہ	mi	miⁿ	miⁿh	miⁿ	mih
باہنہ	baⁿh	baⁿh	baⁿh	baⁿh	baⁿ

The table above shows that the pronunciation for the five speakers A,B,C,D, and E is fairly similar for منہ and باہنہ.

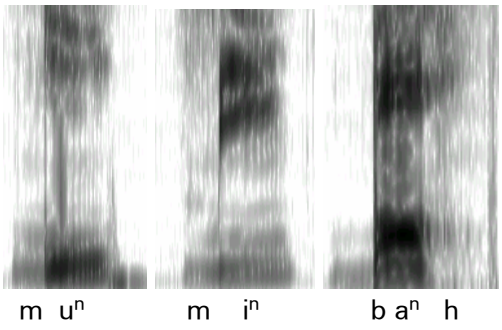


FIGURE 6 Spectrogram of the three word final /nʰ/ words

However, for مینہ the results for the five speakers varied considerably. To arrive at a final conclusion, another sample of a speaker F was taken. The analysis finally showed that the transcription of the majority is miⁿ.

5. DISCUSSION

Aspiration of oral consonants differs from that of nasal consonants. The primary acoustic queue for the identification of oral aspirates is a period of voiceless ness following the release of the stop (Lass, 1984, p.91). The following voiced segment also has some frication as a result of this aspiration. A secondary acoustic queue for the identification of oral stops is a relatively stronger release burst than that of un-aspirated stop consonants (Napoli, 1996, p.12). See figure 1 above.

Identification of aspirated nasals is quite difficult through acoustic analysis. This is because it becomes difficult to differentiate between the two when there is a strong resonance due to the nasalization in higher frequency bands

Especially if nasals are aspirated, it gets very confusing to find out how to identify aspiration. This is because nasals do not have any release burst. Thus it becomes very difficult to find out if the nasal is aspirated when we come out of the nasal.

Therefore if we are to identify nasal aspirates, than we can only look at two things: the Voice Onset Time (VOT) and the length of aspiration.

However, the VOT found for the following segment in the samples taken, was either too small to serve as a queue for aspiration or was non-existent (which may indicate the lack of aspirates altogether). Thus the VOT too, was not considered to be a decisive factor for aspiration of nasals.

What was therefore given relatively more weight for the determination was the length of aspiration. Aspirated stop consonants have the property that the frication of /h/ occurs for a very small time after the release of the stop. If however, /h/ occurs as a fricative, the timing interval is comparable to that of a short vowel.

From the analysis of the recordings that were made, at least one thing is clear: there are no nasal aspirates in word initial and word final positions.

In the word initial position, all the speakers inserted a ∂ between the nasal and the following /h/ segment.

In the word final position, all the speakers ended up deleting the nasal and nasalizing the preceding vowel. Especially when the preceding vowel was a back vowel, this nasalization was very dominant. It also seems probable that when the first segment is a non-nasal stop, a /h/ is inserted or pronounced in the word final position, though this possibility was not explored.

Aspiration at least in the word medial position seems to be a phenomenon that is not uniform over all speakers. A word medial /n^h/ seems very improbable to occur. Three out of five speakers did not aspirate the /n/. And the remaining two speakers also most likely did not aspirate the /n/ segment. The only indication for aspiration for speaker A and B were strong higher formants, which could well have been caused by stress on the nasal.

A word medial aspirated /m/ is seen to occur when the following segment is a non-vowel, although this may be completely arbitrary due to lack of data. One thing is certain: a /m^h/ occurs word medially, however no other words could be found to confirm this hypothesis.

Furthermore, the reference material suggests that the possibility of nasal aspirates in Urdu is very bleak. Most of the authors simply do not agree on the choice of nasal aspirates even when they do agree on the idea of aspirated nasals in Urdu.

This discrepancy is brought forward when one author gives examples of words as having aspirated nasals while another author gives the same words as examples of un-aspirated nasals.

One reason why aspiration was seen in some of the samples may have been because all of the speakers belonged to a Punjabi speaking background. Since Punjabi is thought to contain nasal aspirates, it is a possibility that due to this reason some sample showed aspiration.

The results seem to show that the pronunciation for the words selected varies considerably from user to user. Another reason why aspiration was seen in some samples may be due this variation between the users. It may be that aspiration is a user dependant phenomenon in Urdu, specially for the word medial /n/.

6. REFERENCES

Bokhari, S. 1985. *Phonolgy of Urdu Language*. Royal Book Company, Karachi, PK

Feroz-ud-Din A. *Feroz-ul-Lughaat*, New Edition.

Haqqi, S. 1995. *Farhang-e-Talafuz*, Muqtadara Qaumi Zaban, PK

Kachru, Y. 1987. “Hindi-Urdu, in The Major Languages of South Asia, The Middle East and Africa, ” Comrie, B (eds.). Routledge, London, UK.

Khan, M. 1997. *Urdu Ka Sauti Nizam*. Muqtadara Qaumi Zaban, Islamabad, PK

Lass, R. 1984. Phonolgy - *An introduction to Basic Concepts*, Cambridge Uniuversity Press, Cambridge, UK

Laver, J. 1994. *Princilpes of Phonetics*, Cambridge University Press, Cambridge, UK

Masica, C. 1991. *The Indo-Aryan Languages*. Cambridge University Press, Cambridge, UK

Moizuddin, M. 1989, *Urdu Forms in Urdu*, Muqtadara Qaumi Zaban, Islamabad, PK

Napoli, D. 1996. *Linguistics - An Introduction*, Oxford University Press, Oxford, UK

Pickett, J. 1999, *The Acoustics Of Speech Communication*, Allyn and Bacon, US

Qureshi, B. *Standard Twentieth Century Dictionary - New Edition*, Educational Publishing House, New Delhi, IN

Stevens, K. 2000, *Acoustic Phonetics*, The MIT Press, Cambridge Massachusetts, London, UK