

Distinctiveness of Aspiration in Bangla

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Abstract: Aspiration plays an important role in the pronunciation of Bangla words. It not only brings variety in pronunciation, but also distinguishes meanings in words. Some pairs of similar-sounding words are differently recognized in Bangla only because of the aspiration trait. Hence it is claimed that aspiration is a distinctive feature in Bangla. In this paper the distinctiveness of Bangla has been tested with minimal pairs, in order to establish the distinct linguistic fact in question. Examples have been drawn widely from contemporary Bangla language in sufficient number with utmost care and contemplation. Phonemic and phonetic transcriptions, as necessary, have been provided beside the words along with meanings for a better grasp of the contrast in minimal pairs. The relevant aspects of phonetics and phonology of Bangla have also been compared with those of English to bring into focus the aspirational characteristics. The elaboration of the concept 'intonation' at the beginning of thesis will be helpful for a clear understanding of technicalities involved in the Bangla-specific analysis of the subject.

1. Introduction

All prominent traditional Bengali grammarians have pointed to the fact that aspiration has a distinct place in the pronunciation of Bangla. Dr. Sunitikumar Chatterji in his famous 'Bhasha-Prakash Bangala Vyakaran' noted that every second and fourth consonants in the five-strong Bangla 'barga' (a group of five serial sounds in alphabetic list) are aspirated while others remain unaspirated (Chatterji 1996, p. 42). He classified Bangla consonants on the basis of manner and place of articulation as well as aspiration and voicing. Dr. Muhammad Shahidullah also took aspiration into account in classifying the consonants of Bangla, as it plays a significant role in the subtleties of pronunciation (Shahidullah 2003, p. 30-31). Dr. Rafiqul Islam classified Bangla consonants in terms of aspiration along with other factors like manner and place of articulation, voicing, nasalization and muscular tension (Islam 2002, p. 44). In Bangla classificatory matrix, aspiration has an equal status to voicing. In practice, aspiration and voicing are two important aspects of articulation in human languages. These two factors are **distinctive features**[†] in some languages and non-distinctive in others.

We consider aspiration to be a distinctive feature in Bangla as its presence or absence creates a meaning difference in otherwise similar-sounding words. Dr. Rameswar Shaw (1996, p. 299) maintains that aspiration is a distinctive feature in Bangla as it distinguishes sounds which have

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[†] In linguistics, a distinctive feature is the most basic unit of phonological structure that may be analyzed in phonological theory. Distinctive features are grouped into categories according to the natural classes of segments they describe: major class features, laryngeal features, manner features, and place features. These feature categories in turn are further specified on the basis of the phonetic properties of the segments in question. Since the inception of the phonological analysis of distinctive features in the 1950's, features traditionally have been specified by assigning them binary values to signify that the segment being described by the feature either possesses that phonetic property or it does not. Therefore, a positive value, [+], denotes the presence of a feature, while a negative value, [-], indicates its absence.

similarity in other respects, so /b/ and /b^h/ will be considered as two different phonemes in Bangla. The distinctiveness of aspiration can be measured with minimal pairs, in which two words have identical sequence of phonemes differing only in aspiration. As aspiration is essentially a consonantal feature, we will look at the syllable initial and final positions, technically called *onset* and *coda* respectively, as well as word medial position surrounded by vowels and/or consonants for its existence and operation. In Bangla, only plosives or stops are aspirated. Fricatives are not aspirated, nor are nasals, laterals, trills and approximants.

Before we embark on the main body of thesis, we should like to present a brief analysis of the phonetic phenomenon called ‘aspiration’.

2. Aspiration defined

Aspiration is the pronunciation of sounds with a little puff of air from the lungs. It is the burst of air that accompanies the release or closure of some **obstruents**^{*}. David Crystal defines aspiration in the following way: “A term in phonetics for the audible breath which may accompany a sound’s articulation, as when certain types of plosive consonant are released.” (Crystal 2003, p. 37) According to R. L. Trask, aspiration is “The phonetic phenomenon in which a segment (normally an obstruent) is followed by a voiceless breathing.” (Trask 1996, p. 36) The sounds that have got the special phonetic characteristics as such are traditionally called ‘aspirates’.

The diacritic for aspiration in the International Phonetic Alphabet is a superscript ‘h’, [h̥]. In normal case the superscript follows the main phoneme. This is, in stricter sense, post-aspiration. Pronunciation may be characterized by what might be called pre-aspiration, when the symbol [h̥] precedes the main phoneme.

In phonological analysis, aspiration may be abbreviated as ‘asp’ to which a positive or negative value is added. It counts as a distinctive feature which makes a contrast between aspirated sounds [+asp] and unaspirated sounds [–asp]. In the **SPE**[†] Feature System, aspiration is treated as heightened sub-glottal pressure, which comes as a measurement of air pressure in the pulmonic air stream just below the vocal folds or cords.

In **Ladefoged Feature System**[‡], aspiration is a distinctive feature invoked to handle distinctions in **voice onset time (VOT)**[§]. It can assume any of the three values – aspirated, unaspirated or voiced. Katamba (1989, p. 70) observes, “An aspirated stop is released with greater force than an

* Obstruent is any sound segment whose articulation involves an obstruction of pulmonary airflow in the vocal tract often to produce a friction noise. Plosives, fricatives and affricatives are called obstruents. Obstruents are contrasted with sonorants, which are pronounced without any obstruction in the vocal tract so that spontaneous vocal cord vibration is possible. Liquids, nasals and approximants are sonorants.

† SPE refers to *The Sound Pattern of English*, a major work by Noam Chomsky and Morris Halle published in 1968. The work introduced a distinct feature system known as ‘SPE Feature System’ and elaborated all the principal ideas of generative phonology. It is regarded as the most influential publication in phonology in modern times.

‡ It is a distinctive feature system proposed by Peter Ladefoged in a series of publications during 60s to 80s of the twentieth century. The system employs predominantly articulatory features and allows them to be multivalued. There are twenty features in the system.

§ Voice onset time (VOT) is the length of time that elapses between when a consonant is released and when voicing, the vibration of the vocal folds, begins. VOT is important in many languages in determining whether a segment is perceived as voiced or voiceless.

unaspirated one.” For example, in the word ‘attend’ [at^hend] the force is felt in the pronunciation of the stop [t], perceived with aspiration [ʰ]. This is because there is a slight delay between the release of the stop and the onset of voicing in the vowel [e].

According to Roger Lass, it is not true that aspiration, whether allophonic or distinctive, is in some way related to ‘tenseness’, ‘force of articulation’ or some probable correlate like ‘heightened subglottal pressure’ (the SPE solution). He thinks aspiration is primarily a matter of timing, an aspirated consonant having its stricture released before the onset of voice on a following voiced segment, giving a period of voicelessness. So aspiration may be analyzed with the frame [±premature release]. Under this framework, an aspirated segment has its closure released earlier than a corresponding unaspirated one, without change in voicing value. (Lass 1984, p. 91)

3. Aspiration in English plosives

The pronunciation of plosives is accomplished in three phases: *phase 1*: approach, *phase 2*: closure or compression or occlusion, and *phase 3*: release. In the first phase two articulators come close to each other to form a stricture; in the second phase the articulators touch each other to block the air passage, and in the third phase the articulators get apart to let the compressed air behind the block escape with a plosion. Each phase of the vocal tract is accompanied with certain position of glottis in larynx; the glottis may remain closed, open, or partially closed/open. When the glottis is partially closed/open, the vocal folds vibrate, which we identify as voicing. When air from the lungs rushes through the glottis with a burst, we call it aspiration.

English has six plosives: /p, t, k, b, d, g/. The first three are voiceless and last three are voiced. Apart from voicing, the two groups are also distinguished by aspiration. In the initial position, the members of the former group are aspirated while the members of the latter group are unaspirated. Roach (2000, p. 34) states the difference in the following terms:

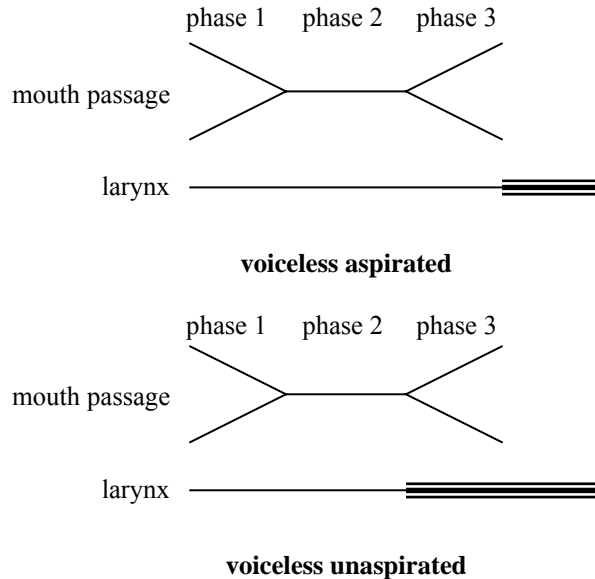
The release of p, t, k is followed by audible plosion, that is, a burst of noise. There is then, in the post-release phase, a period during which air escapes through the vocal folds, making a sound like h. This is called aspiration. Then the vocal folds come together and voicing begins. The release of b, d, g is followed by weak plosion, and this happens at about the same time as, or shortly after, the beginning of voicing. The most noticeable and important difference, then, between initial p, t, k and b, d, g is the aspiration of the voiceless plosives p, t, k. If the English speakers hear a fully voiced initial plosive they will hear it as one of b, d, g but will notice that it does not sound quite natural. If they hear a voiceless unaspirated plosive they will also hear that as one of b, d, g, because it is aspiration, not voicing, which distinguishes initial p, t, k from b, d, g. Only when they hear a voiceless aspirated plosive, will they hear it as one of p, t, k. Experiments have shown that we perceive aspiration when there is a delay between the sound of plosion and the beginning (or onset) of voicing.

Daniel Jones says, during the pronunciation of initial voiceless plosives in English, breath is heard immediately after the plosion, and the sounds are then said to be aspirated. Thus ‘part’ and ‘pair’ would be written narrowly as [p^hAt] and [p^he≡]. (Jones 1972, p. 153)

David Abercrombie shows the difference between voiceless aspirated and voiceless unaspirated plosives with the illustrations as seen in figure 2. If voicing starts after phase 3 (release) is completed, the plosion will be voiceless and the stop is said voiceless aspirated. If voicing starts

simultaneously with the beginning of phase 3, the plosion is voiced, and the stop is termed voiceless unaspirated. So aspiration is a period of voicelessness that follows the voiceless closure phase of a stop (Abercrombie 1967, p. 148). The relationship of stops with glottal states has been clarified in the figure 2, where the lower line represents state of the glottis, thicker part indicating vibration in the glottis.

Figure 2: Voiceless aspirated and voiceless unaspirated plosives



Aspirated and unaspirated sounds differ in terms of energy they consume. Aspiration corresponds acoustically to aperiodic energy in at least part of the formant transition between the consonant burst and the following vowel. In unaspirated consonants these transitions have periodic energy since vocal cords vibrate immediately on explosion. (O'Connor 1973, p. 132)

In English, /p t k/ are aspirated in the word initial position, so that 'pill' /pɪl/, 'till' /tɪl/ and 'kill' /kɪl/ will be pronounced as [p^hɪl], [t^hɪl] and [k^hɪl] respectively. But this aspiration will be lost when /p t k/ will be followed by /s/. So 'spill' 'still' 'skill' will be pronounced as [spɪl], [stɪl] and [skɪl], and not [sp^hɪl], [st^hɪl] and [sk^hɪl]. In English when the plosives are followed by /l, r, w, j/ as in 'please', 'praise' 'twice' and 'queue', the aspiration devoices these consonants.

4. Aspiration in Bangla

In Bangla, aspiration is found in voiceless as well as voiced plosives. Bangla has five kinds of plosives: bilabial, dental, alveolar, palatal and velar. In each kind there are four phonemes labeled as: 1. voiceless unaspirated, 2. voiceless aspirated, 3. voiced unaspirated, and 4. voiced aspirated. Bangla plosives exploit voicing and aspiration systemically for the extension of phonemic inventory. It makes a four-way contrast of the plosives, putting aspiration to interact with voicing. The full list of Bangla aspirated plosives has been presented in table 1.

Table 1: Aspirational matrix in Bangla

Consonant type according to	Voiceless Aspirated	Voiced Aspirated
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<i>manner and place of articulation</i>		
Bilabial plosives	/p ^h /	/b [□] /
Dental plosives	/t ^{□h} /	/d ^{□□} /
Alveolar plosives	/t ^h /	/d [□] /
Palatal plosives	/c ^h /	/□ [□] /
Velar plosives	/k ^h /	/g [□] /

We shall examine the plosives in minimal pairs in its whole range found in Bangla to ascertain how aspiration acts as a meaning-differentiating factor. We shall take the relevant consonants in group for examination according to manner and place of articulation, with extended reference to aspiration and voicing. We shall consider them in three positions—initial, medial and final.

Aspiration is not shown with any diacritic mark in Bangla but these are integrated with the letter signs. Separate sets of letters are used for the aspirated and unaspirated along with voiced and voiceless plosives. The contrast is very sharp in pronunciation as well as in orthography.

4.1. Aspiration in bilabial plosives

The bilabial plosives are produced with the two lips pressing against each other and then with sudden release of air with a plosion. In Bangla there are four bilabial plosives: /p/, /p^h/, /b/ and /b[□]/. The first two are voiceless and the last two are voiced. The members of the voiceless and voiced pairs are perceived as distinct due to aspiration, which makes a semantic difference between the same sequences of segments. We can look at the following pairs of words and their meanings:

Initial position:

[pul]	‘bridge’
[p ^h ul]	‘flower’
[ban]	‘flood’
[b [□] an]	‘pretension’

Medial position:

[ripu]	‘enemy’
[rip ^h u]	‘cloth hole repair’
[nObO]	‘new’
[nOb [□] O]	‘sky’

Final position:

[mɔp]	‘measure’
[mɔp ^h]	‘apology’

Minimal pair is not available for voiced bilabial plosive in the final position in Bangla, although aspirated and unaspirated sounds may appear in the final position of syllable and word. We find the aspirated one in the word [beɔd[□]Ob] (insolent) and the unaspirated one in the word [gOrd[□]Ob[□]] (donkey).

4.2. Aspiration in dental plosives

Dental plosives are produced with the front of tongue touching the back of upper teeth and suddenly releasing the air with a plosion. There are four dental plosives in Bangla: /t_ɫ/, /t_ɫ^h/, /d_ɫ/ and /d_ɫ^h/. The first two are voiceless and the last two are voiced. The members of voiceless and voiced pairs remain distinct from each other by virtue of aspiration. We can notice how aspiration creates meaning difference in the following words:

Initial position:

[t _ɫ AɪA]	‘lock’
[t _ɫ ^h AɪA]	‘plate’
[d _ɫ An]	‘donation’
[d _ɫ ^h An]	‘paddy’

Medial position:

[mAt _ɫ A]	‘mother’
[mAt _ɫ ^h A]	‘head’
[Ad _ɫ A]	‘ginger’
[Ad _ɫ ^h A]	‘half’

Final position:

[ΣAt _ɫ]	‘seven’
[ΣAt _ɫ ^h]	‘together with’
[bOd _ɫ]	‘bad’
[bOd _ɫ ^h]	‘killing’

4.3. Aspiration in alveolar plosives

Alveolar plosives* are produced with the tip of tongue touching the alveolar ridge and then suddenly releasing air with a plosion. In Bangla there are four alveolar plosives: /t/, /t^h/, /d/ and /d^h/. The first two are voiceless and the last two are voiced. The first two differ from each other in terms of aspiration, as the last two. We can observe how aspiration creates meaning difference when they are used in words:

Initial position:

[tOk]	‘sour’
[t ^h Ok]	‘cheat’
[dAk]	‘call/post’
[d ^h Ak]	‘drum’

* In strict sense, as many linguists claim, Bangla alveolar plosives are retroflex, since the pronunciation of these sounds involves curling back of the tongue unlike the English ones. But we avoid the issue here for the sake of simplicity in analysis and notational convention.

Medial position:

[pit _α]	‘hit’ (Imperative)
[pit ^h A]	‘cake’

Final position:

[pAt]	‘jute’
[pAt ^h]	‘reading’

The voiced alveolar plosives in the medial and final positions are rare in Bangla, although the unaspirated one may appear in some words, for example: [ludu] (a kind of game), [hud] (bonnet). The latter is a loan word from English. We can find other loan words which are widely used and understood by most Bengali speakers: [rOd] (rod), [mud] (mood), [spi:d] ‘speed’ etc. This sound does not appear in any original Bangla word in the specified position. However, in some dialects of Bangla, [t] or [t^h] may be transformed into [d] in the medial and final positions. For example, [bætA] (son) is typically pronounced as [bæd_α] and [mat^h] (field) as [mød] in the dialects of Barisal and many other districts of Bangladesh. In these dialects the village boys would say: [møde □Ai] rather than [mat^he □Ai], meaning ‘We go to field’.

4.4. Aspiration in velar plosives

Velar plosives are produced with the back of the tongue touching velum or soft palate and sudden release of air with a plosion. Bangla has four velar plosives: /k/, /k^h/, /g/ and /g^h/. The first two are voiceless and differentiated by aspiration; and the last two are voiced, also differentiated by aspiration. We can notice how aspiration causes semantic difference when the sounds are used in words:

Initial position:

[kOr]	‘tax’
[k ^h Or]	‘straw’
[gOnO]	‘people’
[g ^h OnO]	‘thick’

Medial position:

[pAkA]	‘brick-built’
[pAk ^h A]	‘fan’
[ΣOngO]	‘companion’
[ΣOng ^h O]	‘association’

Final position:

[muk]	‘dumb’
[muk ^h]	‘mouth’
[bAg]	‘control’
[bAg ^h]	‘tiger’

4.5. Aspiration in palatal plosives

Palatal plosives are produced with the mid of tongue touching the hard palate and sudden release of air with a plosion. Bangla has four **palatal plosives***: /c/, /c^h/, /ɟ/ and /ɟ^h/. As usual, the first two are voiceless and differentiated by aspiration. And the last two are voiced, also differentiated by aspiration. We may see how the aspirated and unaspirated counterparts carry different meanings when used in words:

Initial position:

[cAi]	‘I/we want’
[c ^h Ai]	‘ash’
[ɟAI]	‘net/forged’
[ɟ ^h AI]	‘hot tasting’

Medial position:

[muci]	‘shoe-maker’
[muc ^h i]	‘I/we rub’
[boɟa]	‘closed’
[boɟ ^h a]	‘load’

Final position:

[moc]	‘moustache’
[moc ^h]	‘rub’ (Imperative)
[mAɟ]	‘brush’ (Imperative)
[mAɟ ^h]	‘middle’

4.6. Pre-aspiration in Bangla

Bangla makes use of pre-aspiration for distinguishing meaning in words. Pre-aspiration arises when the voiceless glottal fricative [h] is followed by a trill [r]. In such case, the length of glottal fricative is drastically reduced by the clustering effect of the following consonant. In Bangla, we get pre-aspiration in the word ‘hrad’ /hrOdɟ/ (meaning ‘lake’) which is contrasted with the word ‘rad’ /rOdɟ/ (meaning ‘stop’). So pre-aspiration is clearly a distinctive feature in Bangla. However, the use of pre-aspiration is very limited in the language. Only a small number of words have pre-aspirated sounds, although it has a fairly wide range of distribution. It is found to appear in word initial and medial positions. In the words ‘randhra’ [rOndɟ^hrO] (meaning ‘small hole’) and ‘shubhra’ [ʃub^hrO] (meaning ‘white’). But it may be debated whether such cases should be treated as pre-aspiration or post-aspiration. In the above examples it seems really difficult to say whether [ɟ^h] belongs to preceding [dɟ]/[b] or the following [r]. It essentially entails the tricky problem of determining syllable boundary.

* Here I do not enter into the debate whether these are palatal plosives or affricates. Some linguists claim that these are affricates while some claim them to be plosives. To the extent we are concerned with aspiration, their labelling in terms of manner and place of articulation is irrelevant for our purpose.

Pre-aspiration may be found in other words in Bangla. In the words like ‘hridoy’ [ʰridɔi] (meaning ‘heart’), ‘hrashya’ [ʰrɔʃɔ] (meaning ‘short’) and ‘hresha’ [ʰreʃa] (meaning ‘cry of horse’), the ‘h’ sound before ‘r’ is very short and almost inaudible. In contemporary parlance, the difference between unaspirated and pre-aspirated consonants is neutralized in most of the cases. Therefore, if ‘hrad’ is pronounced like ‘rad’, without any aspiration, it will be quite acceptable and the meaning will be clarified with the contextual cues. In Bangla, post-aspiration is obviously stronger than pre-aspiration.

In Bangla, pre-aspiration is not found with any consonants other than trill, as it may be found in other languages (Icelandic, for example), where plosives are pronounced pre-aspirated: [ʰp], [ʰt] and [ʰk].

5. Claims based on evidence

All the above examples testify to the fact that aspiration is a distinctive feature in Bangla. The variety of language we have considered here is principally Standard Colloquial Bangla (SCB). In some regional varieties, however, the difference between aspirated and unaspirated sounds may be neutralized. For example, in Narayanganj and Comilla dialects, the word for ‘rheumatism’ [bat] and the word for ‘cooked rice’ [bʰat] both may be pronounced as [bat], without aspiration. The meaning is recovered from the context. It must be noticed that in all cases of neutralization, the aspiration is lost; neutralization is never directed towards gaining aspiration for the unaspirated sound.

In English there is aspiration but it is not a distinctive feature. Aspiration in English is a phonetic characteristic, which is determined by sound context. For example, in the syllable initial position a voiceless plosive followed by a strong vowel will be pronounced with aspiration. So the word ‘tea’ will be pronounced as [tʰi:] rather than [ti:]. But [t] will be just [t] and not [tʰ] in the syllable final position as in the word ‘eat’ [i:t]. This is what is called complementary distribution, and in such case different realizations of the same phoneme will be treated as allophones (Roach 2000, p. 41). Unlike Bangla, English aspiration is well predictable. We can predict, ‘car’ will be pronounced as [kʰA:(r)] instead of [kA:(r)] and ‘pull’ may be pronounced as [pʰYl] instead of [pYl] from the fact that these are voiceless plosives and followed by strong vowels.

In English, aspiration has no influence on meaning. If we somehow pronounce ‘tea’, ‘car’ and ‘pull’ as [ti:], [kA:(r)] and [pYl] instead of [tʰi:], [kʰA:(r)] and [pʰYl], they will not be understood as different words and their meaning will not be changed. They will only be considered as non-native or non-standard pronunciation. But the case is totally different for Bangla. The change in aspiration will immediately change the meaning of the words concerned. For example, if we take the pair [kɔr] and [kʰɔr] (interestingly, we have these similar sounding words in Bangla), the former will mean ‘whose’ (an interrogative pronoun) and the latter will mean ‘alkali’ (a chemical substance). [k] and [kʰ] are different phonemes altogether and not just allophones in Bangla.

6. Pedagogical implications

The presence of aspiration in Bangla poses special problems for the Bengali people who venture into learning English as a second/foreign language. It also creates problems for the English speakers who attempt to learn Bangla as a second/foreign language. Whenever a Bengali learner finds an ‘h’ after any plosive in English spelling, they tend to pronounce with an aspiration. For example, they tend to pronounce the word ‘ghost’ as /gʰəst/ instead of /gəst/. They often fail to realize that English voiced plosives are not aspirated, and they are influenced by the phonetic sense of their mother tongue. The presence of a supposed aspiration mark (‘h’) in print confuses

them. They also tend to pronounce syllable initial plosives in English without any aspiration whereas aspirated pronunciation is a norm. They pronounce 'tea', 'car' and 'pull' as [ti:], [kA:(r)] and [pYl] instead of [t^hi:], [k^hA:(r)] and [p^hYl]. They do so in these cases as no aspiration sign like 'h' is visible there to guide them.

Similarly, an English speaker may find it difficult to pronounce voiced aspirated sounds when he/she is learning Bangla. They will pronounce 'ghanta' [g^hOntA] (meaning 'bell') as [gOntA] as English does not allow aspiration with voiced plosives. For the same reason, they will pronounce 'Dhaka' [d^hAkA] (the capital of Bangladesh) as /dAkA/ instead of [d^hAkA] and 'bhan' (pretence) as [bAn] instead of [b^hAn]. They are likely to face more problem in pronouncing dental and palatal plosives /d^h/ and /t^h/, as English lacks these plosives.

Therefore the learners and teachers as a second/foreign language have to take special care about aspiration when English and Bangla are concerned. They must know the relevant phonetic and phonological rules of the concerned language(s) and follow them when they are engaged in learning or teaching. Their primary effort will be to prevent mother tongue interference.

7. Conclusion

It is evident that aspiration is not as important in English as it is in Bangla. It is semantically relevant in Bangla but it is devoid of meaning in English. Aspiration plays a very important role in Bangla phonetics and semantics. It is not simply dependent on context nor is a matter of style in pronunciation. It is a distinctive feature in Bangla and influences meaning in a definite way. In English, the pairs of aspirated and unaspirated consonants are same phonemes but in Bangla they are different phonemes. Aspiration is a great phonetic asset for Bangla. It enriches the inventory of sounds, ensuring wider use of the fundamentally basic consonants. In fact, very few living languages of the world possess such enormous strength of aspirational property. However, as a note of apprehension, the use of aspiration in Bangla is on the wane. The users of the language tend to neutralize the difference between the aspirated and unaspirated pairs, knowingly or unknowingly. For pre-aspiration, the tendency of neutralization is much more acute. What we can say now, the potency of aspiration would be tested through the time. It will take probably millennium for aspiration to be obsolete or unnecessary, if it will be at all.

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