Contrastive Analysis of Bangla and English Monophthongs

Eshita Awal
Lecturer, Southeast University, Dhaka, Bangladesh

Abstract: *Linguistics is the scientific study of a language, more precisely human language because it is the mankind who only uses language meaningfully. Linguistics has different fields. Phonetics is one of the fields where speech sound is analysed generally along with the sound production, transmission and reception. Again, phonology is the field where different sound systems of a language are analysed through scientific method. This paper deals with the phonology field where two languages, English and Bangla, are discussed. Every language has its own phonemes where each of them carries unique characteristics and these make them different from one another. Contrastive phonology is the field where different phonemes of a language are put side by side and studies different features of each phoneme. These are again analysed with phonemes of other language. Moreover, this is done to compare and contrast the sound systems, especially the pure vowels of two or more languages. Also, it has detailed scientific explanations of the reasons that people find it easier to learn Bangla Pure Vowel than that of English Pure Vowel. Finally, this paper is written to explore the fact that English phonemics is easier than Bangla phonemics (concerned with pure vowels).*

Keywords*- Articulators, Bangla Pure Vowel, Cranial Nerves, English Pure Vowel, Speech Sound*

I. Introduction

Vowel is a sound segment for which active and passive articulators collectively produce an open configuration in such a way that egressive pulmonic airstream passes through the oral cavity more or less freely without the facing of any solid obstruction.

Vowel is a sound which is found in every languages of the world. Generally, vowel can be divided into two categories- simple and complex vowel. Again, they are called plain or pure and compound vowel respectively. Pure vowel is the vowel which consists of one vowel sound and that cannot be divided or analyzed in terms of other vowels. On the other hand, complex vowel is the one which consists of two or more vowel sounds.

In English, there are three types of vowel sounds. They are monophthong-consists of one vowel sound, diphthong-consists of two vowel sounds and tripthong-consists of three vowel sounds. Again, in Bangla, there are two types of vowel sounds and they are pure and compound.

II. English Monophthong

A monophthong (pronounced "Mono-F-thong") is simply a vowel. The word monophthong comes from the old Greek language. *Mono* means *one* or *single*, and the *-phthong* means *sound* or *tone*, from the basic word *phthalein*, which means *to speak*, *create sound with the voice*. The word monophthong shows that a vowel is spoken with exactly one tone and one mouth position. For example, when we say "teeth", then while we are creating the sound of the "ee", nothing changes for that sound. (Monophthong, 2011).

In English, there are 20 vowels and among them 12 of them are monophthongs. These are also called simple or pure vowels. Based on the length of the vowel, they are again divided into two groups-lax and tense. Lax vowels are those for which less amount of time, energy and air are required. On the other hand, tense vowels are those for which relatively more time, energy and air are required. For example, /i: / is long and /i/ is short. If someone says the long /i: / vowel as a short sound, as in /i/, it actually sounds like the wrong word. For instance, the word 'deep.' Deep is with the long vowel. Dip, another word with the short vowel. If one says the long vowel, /i: / in its short form, then deep will actually sound like the word 'dip'. It will ultimately lead to the mispronunciation. So the length of the vowel is very important. There are some words like feet, fit ... sleep, slip ... jeep, jip ... heat, hit ... neat, knit ... sheep, which can be mispronounced if they are not used according to their vowel length.

There are 7 lax and 5 tense vowels. The lax vowels are as following:

/ɪ/	**pit**
/e/	**pet**
/æ/	**pat**
/□/	**pot**
/□/	**luck**
/u/	**good**
/□/	**ago**

The features of closed, mid close, mid open and open are the different position of the tongue. When the tongue is maximally raised towards the alveolar ridge but it does not touch the alveolar ridge then that position is called closed position. In that position eggressive pulmonic airstream will face a great obstruction. When the tongue is raised and because of that air will face an obstruction, it is called mid close position. Similarly, when the tongue is little bit raised and maximally lowered we call it mid open and open position respectively.
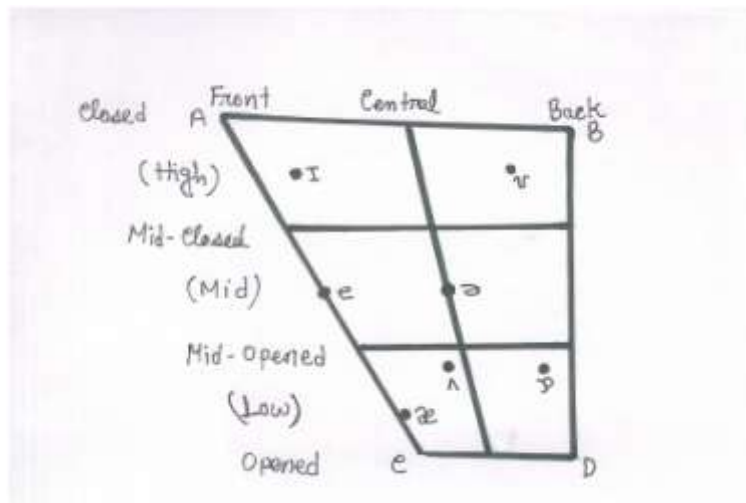

Figure: 1- Lax Monophthongs in diagram

This is the diagram of the insight of the oral cavity. A represents the area of the upper teeth and alveolar ridge meeting point. B represents the area of the velum. C and D represent the area of the lower teeth and oropharynx respectively.

The tense vowels are as follow:

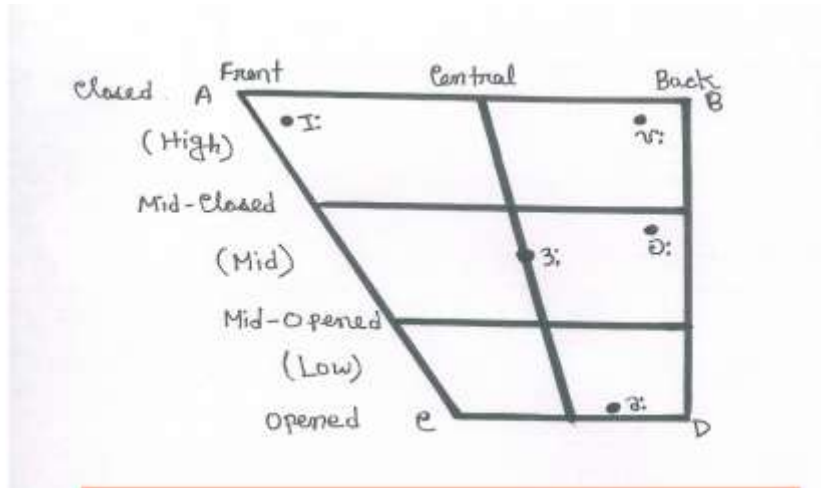| /i□ /	**meat**
/a□ /	**car**
/□: /	**door**
/3: /	**girl**
/u□ /	**too**

Figure: 2- Tense Monophthongs in diagram

From the above diagram the features of the pure vowels in English are described below:

/I: /- during the articulation of /I: / the front of the tongue is raised towards the hard palate; almost in the close position. The lips are spread. This is why it is called front close vowel.

/a: /- during the articulation of /a: /, the back of the tongue is in the complete open position and the lips are neutral. Thus this is called back open vowel.

/□: /- back of the tongue is raised towards the soft palate during its articulation. The position is between the mid-open and mid-close and lips are rounded. Thus it is called back vowel between mid open and mid close.

/u: /- this sound is articulated back of the tongue towards soft palate and almost in the close position. The lips are closely rounded. It is called back close vowel.

/3: / -during of its articulation the centre of the tongue is raised towards the roof of the mouth and lips are spread. This is called central vowel between mid-close and mid-open.

/I/-the front of the tongue is raised in the direction of the hard palate during its articulation and it is towards the position between the close and mid- close. The lips are loosely spread. Thus, this is called front vowel.

/e/-the front part of the tongue is raised towards the hard palate in the position between mid-close and mid-open during its articulation. The lips are neutral in this case. That is why, it is called front vowel.

/æ/-during its articulation the front part of the tongue is raised towards the hard palate. Its position is in between open and mid-open. Thus, this is called front mid- open and open vowel.

/u/-during it articulation the back part of the tongue is raised towards the velum. The lips are rounded. Its position is between close and mid-close. That is why, it is called back close and mid-close vowel.

/□/-it is articulated by the centre part of the tongue which is raised towards the roof of the mouth and its position is in between open and mid-open. Thus, this is called central vowel.

/□/-the back of the tongue is in the complete open position and lips are rounded. It is called back open vowel.

/□/-during its articulation the centre of the tongue is raised towards the roof of the mouth. Its position is in between mid- open and mid- close. It is called the centre vowel.

III.   Bangla Monophthong

Bangla monophthong is divided into two groups-short and mid long monophthong. When less time, energy and air are needed to produce a simple vowel is called short whereas in case of mid long simple vowel moderate time, energy and air are required. Mid long vowel is written by using one dot whereas two dots are used to show English long simple vowel. Bangla pure short vowels are divided into 4 types-/□/-অ(অলস), /a/-আ(আয়া), /e/-এ(এবং), /æ/-অ্যা (এক).Again, mid long vowel is divided into three types-/I./- ই(ইট),/u./-উ(উট) and /□. /-ও(ওল).

Bangla Pure Vowel

Short Vowel
/□/-অ, /a/-আ, /e/-এ, /æ/-অ্যা

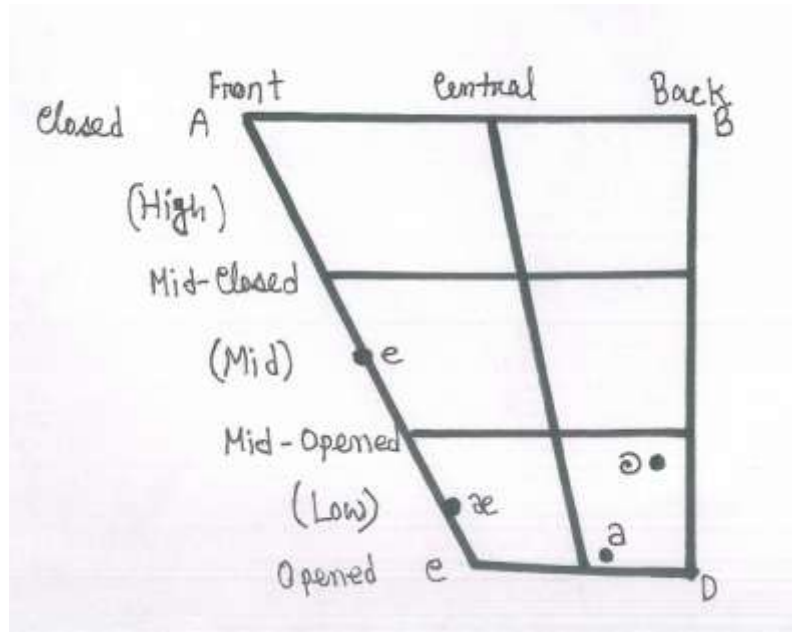Mid- Long Vowel
/I./- ই,/u./-উ, /□. /-ও.
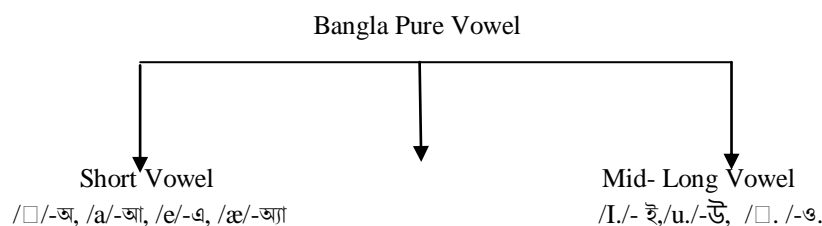
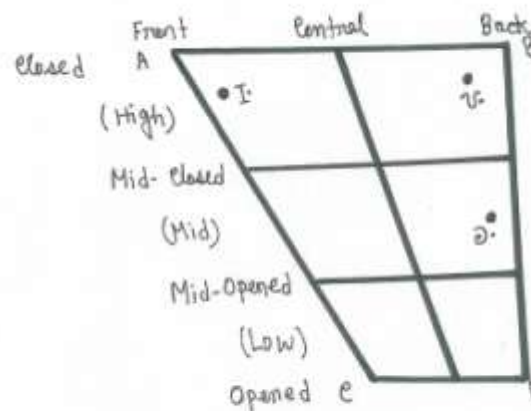**Figure: 3- Short Monophthongs in diagram**

Figure: 4- Mid-Long Monophthongs in diagram

From the above diagrams, we can describe the positions, as well as, articulation processes of the Bangla pure vowels.

/I. /- during the articulation of /I. / the front of the tongue is raised towards the hard palate; almost in between the mid-close and close position. The lips are slightly spread. This is why it is called front mid-close and close vowel.

/u./-during it articulation the back part of the tongue is raised towards the velum. The lips are slightly rounded. Its position is in between close and mid-close. That is why, it is called back close and mid-close vowel.

/□ /- back of the tongue is raised towards the soft palate during its articulation. The position is more close to the mid-open and lips are slightly rounded. Thus it is called back mid open vowel.

/□. /- /- back of the tongue is raised towards the soft palate during its articulation. The position is more close to the mid-close and lips are slightly rounded. Thus it is called back mid close vowel.

/a/- during the articulation of /a /, the back of the tongue is in the complete open position and the lips are close to neutral. Thus this is called back open vowel.

/e/- the front part of the tongue is raised towards the hard palate in the position between mid-close and mid-open during its articulation. The lips are neutral in this case. That is why, it is called front vowel.

/æ/- during its articulation the front part of the tongue is raised towards the hard palate. Its position is in between open and mid-open. Thus, this is called front mid- open and open vowel.

IV.   Production of Speech Sound

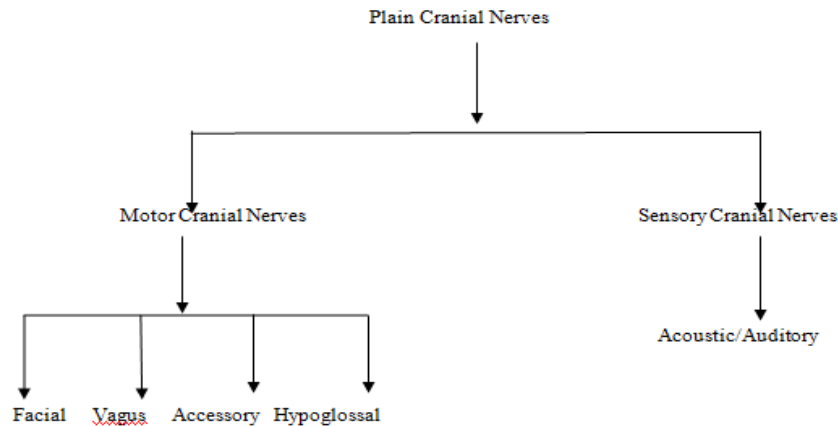The vocal organs are responsible for processing of a speech sound .After that, that sound is produced through the interactions of different articulators. These interactions are depending on some processes through which the speech sounds are produced. This is called neurophonemic process. When we about to produce a speech sound we plan firstly what we will say and then how we will say it. This planning involves some psychological and physical sets where brain decides how the different articulators will act with another to produce that sound.
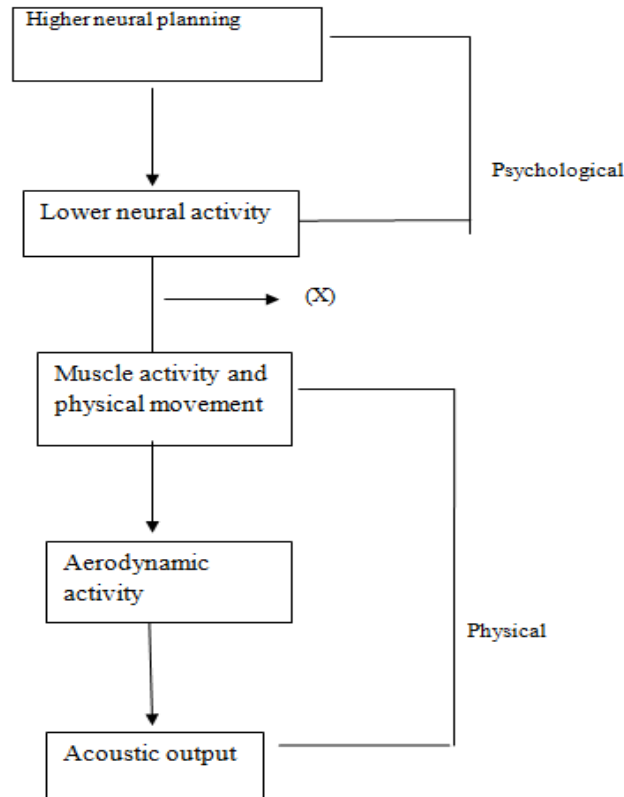

The first two stages are in the mind means psychological. In these stages we think of a sound (phoneme). Then, X is the grey area where brain and mind come together. In this area at first brain activates the cranial nerves (between brain and neck).Basically, the nervous system is divided into two ways –anatomically and functionally. Anatomically it is subdivided into groups-central nervous system, which includes the brain and spinal cord. All the motor activities including perception and integration of the sensory information are done by this system. Second part is the peripheral nervous system, which conveys neural impulses.

Likewise, functionally nervous system is divided into two parts- somatic, which deals with the changes of the external environmental changes and expressed by the movement of the muscles whereas autonomic nervous system deals with the internal environmental changes and expressed by the body temperature, blood pressure etc. (Datta, 2000). Cranial nerves play a significant role for the production of the speech sound. It comes under peripheral nervous system (PNS).These nerves are extended directly from the brain. There is 12 pair of cranial nerves. Only the first and the second pair emerge from the cerebrum (region of the vertebrate nervous system) and the remaining 10 pairs emerge from the brainstem (Datta, 2000). However, for the production of speech sound only 7 pairs work. These 7 pairs are divided into 2 groups-plain and complex. Plain cranial nerves realize one function whereas complex cranial nerves realize multiple functions. Again, plain cranial nerves are divided into two groups-motor C.N and sensory C.N. Moreover, each group is divided into four and one group respectively

Plain Cranial Nerves

Motor Cranial Nerves   Sensory Cranial Nerves

                                     Acoustic/Auditory

Facial   Vagus   Accessory   Hypoglossal

Motor C.N inspires the movement of the organs, more precisely active articulators. Even though facial C.N is a mixed nerve which has both the functions of the motor and sensory, it plays an important role in movement of the articulators. Lips are moved by the facial C.N. and it is the 7th C.N. Next, 10th C.N.is the vagus nerve and the vertical and horizontal movement of the pharynx and horizontal movement of the larynx are done by the Vagus C.N. Again, accessory nerve is the 11th cranial nerve which is entirely motor in function. Movement of the velum is done by the accessory C.N. Finally, the hypoglossal nerve, which is the 12th C.N., has an entirely motor function. Datta (2000) noted that hypoglossal nerve innervates the muscles of the tongue. It originates from the columns of motor neurons located near the midline in the dorsal aspect of the medulla (lower half of the brainstem). The nerve exits the ventral side of the medulla as a row of small nerve rootlets adjacent to the pyramid. After a short course through the subarachnoid space, the rootlets come together as a single nerve that passes through the hypoglossal foramen in the base of the skull. Hypoglossal nerve conveys entirely somato motor fibers and supplies all muscles (extrinsic and intrinsic) of the tongue. Velum moves vertically whereas tongue moves horizontally, vertically and laterally. However, sensory C.N gives the sense of touching something. It has only one the category, acoustic/auditory. This nerve is found in ears. Datta (2006) stated "Human ears are very sensitive to sound frequency ranging between 1500 and 3000 cycles per second or hertz." It is divided into three parts-external, middle and internal. Through the sensory nerve and from the external part of the ear, the brain collects the information about the appearance of the sound waves from the air to the tympanic membrane (also called ear drum), which vibrates to all audible frequencies. The middle ear is the bony cavity that is filled with the air. It is derived from the naso pharynx through the auditory tube .This middle ear intensifies the force of the sound vibration without altering the amplitude. Lastly, the internal ear is concerned with the conversion of the sound energy into nerve energy. It conveys the sense of hearing and tells the brain what kind of a sound it is (Datta, 2006).

Furthermore, complex C.N is divided into two groups-trigeminal and glossopharyngeal.

Complex Cranial Nerves

Trigeminal Cranial Nerves   Glossopharyngeal Cranial Nerves
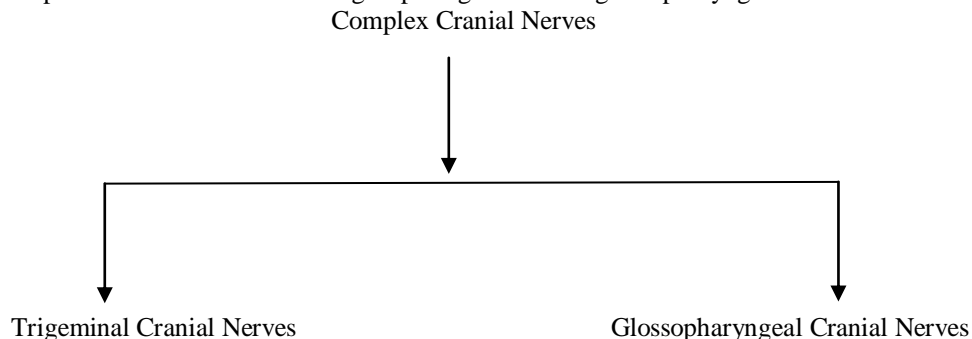
Trigeminal C.N.is the 5th and largest nerve among all the other cranial nerves. It is a mixed nerve which means it has the characteristics of both motor and sensory. It influences three active articulators-lower teeth, velum and tongue in two different ways. One way is the motor and other one is the sensory. For example, when we move the tongue towards the alveolar ridge we can feel the tongue and this is because of the trigeminal C.N. On the other hand, glossopharyngeal influences two active articulators- pharynx and the tongue. It helps pharynx to move and tongue to sense something.

After crossing the grey area the sound comes visible. Last three stages are physical stages where speech sound is appeared. When we produce the sound it takes the form of the phone.

These 7 pairs of cranial nerves play a significant role in the production of the speech sound. If any of the nerves does not work properly then speech disorder may occur.

4.1 Oral sound and Nasal sound: The pharynx, one of the vocal organs, is the part of the throat situated immediately posterior (behind) the mouth and nasal cavity, and superior to the larynx. The human pharynx is conventionally divided into three sections: the nasopharynx-part of the pharynx connected to nasal cavity, the oropharynx-part of the pharynx connected to oral cavity, and the laryngopharynx-part of the pharynx connected to larynx. Sounds which are produced from the oropharynx area and sounds that are produced from the nasopharynx area are called oral and nasal sounds respectively.

4.2 Voiced and Voiceless Sounds: When vocal cords vibrate sounds that are produced during that time are called voiced sounds. On the other hand, voiceless sounds are produced when vocal cords are in adduction stage means vocal cords are fully closed.

V.   Contrastive Analysis of English and Bangla pure vowel

Every language has its own unique characteristics which makes them different from one another. Likewise, the sound system and pronunciation of every individual language play a significant role for learning that target language. While learning a foreign language learner faces some difficulties which might hinder the learning process. The level of difficulties depends on the level of differences that the two languages have.

If we consider the sound pattern (pure vowel) of Bangla and English language, we can see that English has tense and lax pure vowel whereas Bangla has mid long and lax vowel. This   difference puts a strain to the learners. Let's just make it elaborate.

The individual features of Bangla mid-long vowel:

Mid-long vowel	Types of Sound	Neurological Features	Voiced/ Voiceless
/i./	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Vegul	Voiced
/u./	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Facial Vegul	Voiced
/□. /	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Facial Vegul	Voiced

The individual features of Bangla short vowel:

Short Vowel	Types of Sound	Neurological Features	Voiced/ Voiceless
/□ /	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Facial Vegul	Voiced
/a/	Oral	Accesorial Trigeminal Vegul	Voiced
/e/	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Vegul	Voiced
/æ/	Oral	Accessorial Trigeminal Vegul	Voiced

The individual features of English short vowel:

Short Vowel	Types of Sound	Neurological Features	Voiced/ Voiceless
/i/	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Vegul	Voiced
/u/	Oral	Facial Accesorial Trigeminal Hypoglossal Glossopharyngeal Vegul	Voiced
/e/	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Vegul	Voiced
/æ/	Oral	Accessorial Trigeminal Vegul	Voiced
/□ /	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Facial Vegul	Voiced
/□/	Oral	Accesorial Trigeminal Vegul	Voiced
/□/	Oral	Accesorial Trigeminal Vegul	Voiced

The individual features of English long vowel:

Long vowel	Types of Sound	Neurological Features	Voiced/ Voiceless
/i:/	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Vegul	Voiced
/u:/	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Facial Vegul	Voiced
/□: /	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Facial Vegul	Voiced
/a: /	Oral	Accesorial Trigeminal Vegul	Voiced
/ɜ: /	Oral	Accesorial Trigeminal Hypoglossal Glossopharyngeal Vegul	Voiced

From the above charts we can see that English /e/ and Bangla /e/ share same features. Moreover, English /æ/ and Bangla /æ/, as well as, English / □ / and Bangla /□ / share same features.When two sounds from two different

langauges share same characteristics then they are called cognates.   This term is derived from the Latin "Cognatus" which means blood relative (Cognate, 2011).

Cognates are identified as the process to find out the relatedness of the languages. They are used to figure out the genetic relationship of different languages. Cognates have three characteristics- recurrent sound correspondences, phonetic similarity, and semantic affinity (Kondrak, 2009).For this paper we are concerned with the phonetic similarity only.For example, English and Bangla /æ/, /e/ and /□ / have same place, manner and voicing features. That is why they are called cognates.

Again, if we examine the schematic diagram of the oral cavity where Bangla and English vowels are positioned then we can see that-

	High pure Vowel	Mid Pure Vowel	Low Pure Vowel
English	4(/i/, /i: /, /u/, /u :/)	4 (/e/,/□/, /ɜ/ ,/□: /)	4 (/æ/,/□/,/a:/, /□/)
Bangla	2(/i./,/u./)	2(/e/, □./)	3(/æ/,/a/, /□/)

	Front pure Vowel	Central Pure Vowel	Back Pure Vowel
English	5(/i:/,/i/,/e/,/æ/,/□/)	2(/ɜ/ ,/□/)	5(/u:/,/u/,/□:/,/a:/, /□/)
Bangla	3(/i./,/e/,/æ/)	0	4(/u./,/□./,/a/, /□/)

Now we will see the level of difference between these two languages. We will be doing the mathematical calculation of the cognition and in-cognition.

	English	Bangla	Cognition	In-cognition
High Pure Vowel	4	2	0	100%
Mid Pure Vowel	4	2	33.3% (2×100\6) cognates=2	66.7%(100-33.3)
Low Pure Vowel	4	3	57.8%(4×100\7) cognates=4	42.9%(100-57.8)
Front Pure Vowel	5	3	50% (4×100\8) cogntes=4	50%(100-50)
Back Pure Vowel	5	4	22.2% (2×100\9) cognates=2	77.8%(100-22.2)
Central Pure Vowel	2	0	0	100%
All Pure Vowel	*12*	*7*	*31.6%(6×100\19) cognates=6*	*68.4%(100-31.6)*

From the above table we can say that Bangla and English have the similarities of 31.6% (considering the pure vowel only).However, the dissimilarities are much more prominent and greater than the similarities. The above mathematical calculation is clearly showing that Bangla and English pure vowel are staying apart from each other to a greater extent.

VI.   Which One is Easy-Bangla or English

Since this paper is concerned only with the Bangla and English languages (pure vowel), it would consider two learners- English learner of Bangla (EloB) and Bangla learner of English (BloE) and analyze mathematically which learner can learn the target language easily and the reason behind it.

High Pure Vowel

	Learn	Retain	Unlearn
EloB	2	0	4
BloE	4	0	2

Mid Pure Vowel

	Learn	Retain	Unlearn
EloB	1	1	3
BloE	3	1	1

Front Pure Vowel

	Learn	Retain	Unlearn
EloB	1	2	3
BloE	3	2	1

Central Pure Vowel

	Learn	Retain	Unlearn
EloB	0	0	2
BloE	2	0	0

Back Pure Vowel

	Learn	Retain	Unlearn
EloB	3	1	4
BloE	4	1	3

Pure Vowel

	Learn	Retain	Unlearn
EloB	4	3	9
BloE	9	3	4

In case of Bengali learner of English (BLoE),he/she has to learn 9 pure vowels whereas has to unlearn 4.On the other hand, English learner of Bangla (EloB), he/she has to learn 4 pure vowels whereas has to unlearn 9. In both cases, they can retain 3 pure vowels.

Unlearn becomes very difficult for the learner than learn something. What we already know gets in the way of what we want to learn. When we unlearn, we generate anew rather than reformulate the same old stuff.Again, Learning is easy. Our brain works like a computer with a really powerful word processor, so anything that you type in and "Save" will be stored in a file that can be accessed at a later date. It becomes a challenge when we need to edit the files stored in our brain. It has been said that it takes three days to build a habit and three weeks to break one, which has a lot to do with the speed at which we are able to learn and unlearn things ("*A Simple Yet Creative*", 2008). Learning is a creative process whereas unlearning is a destructive process which is done only through the hard work and deliberate efforts. Furthermore, it is required a strong intention to begin with and then we have to let go of the intention itself.

Since, EloB has to give 9 vowels sounds from his brain; it puts a great strain on him/her. However, BloE has to give up 4 vowel sounds from his/her own mother tongue. From the above charts, we can say that learning Bangla is much more difficult than learning English (concerned with the pure vowel).

VII. Conclusion

Every language has its own distinctive characteristics which differs them from one to another. Likewise, Bangla and English language is different from one another. For example, the articulatory features of Bangla are absolutely different from the articulatory features of English, such as English /I: / is articulated in the area which is more closer to upper teeth and alveolar ridge than the Bangla /I./.Therefore, one is called long vowel and the other one is called mid-long vowel respectively. Moreover, words, consist of these two different pure vowels, are pronounced differently. Again, the acoustics features are different as well. When a person speaks in any particular language it is very important that he/she speaks it properly. In phonetics, pronunciation takes the major part. Mispronunciation can create miscommunication. Since this entire paper is based on the pure vowel sound of Bangla and English languages, it is written to distinguish the both sound systems. When a learner wants to learn a new language lots of factors are involved in this learning process. The neurological process, articulatory process and receptive process play a significant role in learning a language. Neurological process is concerned with the function of the brain, more specifically, function of the different nerves which is done inside the human body and entirely psychological. After processing the brain functions question of sound articulation comes. Human has different organs and articulators which are entirely assigned for generating the speech sounds. Finally, the reception of the speech sound comes which is concerned in the field of acoustic process. These processes are inseparable and if any of it does not work properly then the entire method can be disturbed and as a result of it communication can be failed. Again, while contrasting the two languages according to their pure vowel sounds, we have found that even though these two languages have several similar features, dissimilarities are more prominent. By analyzing the similar, as well as, dissimilar features it is proved that pure vowel of both languages differ of 68.4% whereas they match with the percentage of only 31.6. Scientifically and mathematically it has also been proved that while learning Bangla Pure Vowel, a learner would face much difficulties compare to the learner who would learn English Pure Vowel. One of the main reasons is the unlearning process which becomes a major hinder along with the age factor. As time passes on people become more reluctant towards learning and adopting a new thing as their attitude and aptitude come over the path. However, exploring new things is always challenging and if it is the learning a new language then it is always seemed to be a bravery task. Children can learn a new language with ease because of having the great advantage of their age. However, adults do face lots of challenges which become a promising task when

they learn a new language. Self motivation, determination, willingness and full effort can make the hard path easy. It can be universally believed that languages will differ from one another but learners will cross the boundary of that difference and learn the target language.

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