

ENGLISH MONOPHTHONGS PRODUCED BY BANGLA
SPEAKERS

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FACULTY OF LANGUAGE AND LINGUISTICS

UNIVERSITY OF MALAYA

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**ENGLISH MONOPHTHONGS PRODUCED BY BANGLA
SPEAKERS**

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ABSTRACT

English was formally introduced in Bangladesh during the period of British colonization in the 16th to 19th century. The use of English in Bangladesh has developed linguistically since the British left in 1947. There are obvious differences in the English pronunciation of Bangla speakers but there is a dearth of research in the area. In an attempt to fill this gap, this study investigates the production of English vowels by the Bangla speakers through an acoustic study. Data were collected from 10 Bangla English speakers, five males and five females who speak Bangla as their first language. The questions addressed in this study are: (1) What are the qualities of English vowels produced by Bangla speakers based on acoustic analysis of the first (F1) and second formant (F2)?; (2) What is the extent to which Bangla speakers contrast typical English vowel pairs in terms of vowel length and vowel quality? The data were recorded in a word list context. A total of 550 tokens were annotated and measured and using Praat. The findings indicated a similar pattern to many other varieties of English where vowel quality was concerned, where the speakers did not display vowel quality contrast for typical vowel pairs. However, they appeared to maintained length contrast for most of the vowel pairs except the /u:/-/ʊ/ for both male and female speakers, and /e:/-/æ/ for female speakers.

ABSTRAK

Bahasa Inggeris diperkenalkan di Bangladesh pada era imperialisme British pada kurun ke-16 dan kurun ke-17. Penggunaan Bahasa Inggeris telah berkembang secara linguistik semenjak kemerdekaan pada 1947. Terdapat perbezaan ketara cara sebut vokal Bahasa Inggeris oleh penutur asli Bangladesh tetapi kajian dalam bidang pertuturan masih lagi sangat sedikit. Dalam usaha menampung kelompongan tersebut, kajian ini mengkaji penghasilan vokal Bahasa Inggeris oleh penutur asli Bangladesh menerusi kajian akustik. Data dikumpulkan dari 10 penutur asli Bangladesh; 5 lelaki dan 5 wanita yang menggunakan Bangla sebagai bahasa pertama mereka. Persoalan yang diutarakan dalam kajian ini ialah: (1) Apakah kualiti vokal Bahasa Inggeris yang dihasilkan oleh penutur asli Bangladesh berdasarkan analisa akustik formant pertama (F1) dan formant kedua (F2)?; (2) sejauh manakah perbezaan pasangan vokal diantara penutur asli Bangla dan penutur tipikal Bahasa Inggeris dari segi panjang vokal dan kualiti vokal. Data direkodkan dalam satu senarai konteks. Sebanyak 550 token dianotasi dan diukur menggunakan perisian Praat. Dapatan menunjukkan corak yang sama yang terdapat dalam variasi Bahasa Inggeris yang lain dari segi kualiti vokal, iaitu penutur asli Bangla tidak menunjukkan kualiti vokal yang berbeza bagi pasangan vokal yang tipikal. Walaubagaimanapun, perbezaan tempoh vokal untuk kebanyakan pasangan vokal dikekalkan kecuali /u:/-/ʊ/ untuk kedua penutur lelaki dan wanita, dan /e:/-/æ/ bagi penutur wanita sahaja.

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CHAPTER 1

INTRODUCTION

In the subcontinent of South Asia, English was formally introduced, during the second half of the eighteenth century. In India, the introduction of English education system was proposed through the implementation of Macaulay 'Minute' of 1835. Over time, in Indian sub-continent, the process of 'Indianisation' led to the growth of a distinctive national character of English. English was the medium of education when Bangladesh was the part of Indian sub-continent. During the British rule, formal and institutional education system started in Bangladesh. After the liberation in 1971, the government of Bangladesh tried to boycott English, and implement Bangla as the medium of education. However, due to the lack of books in Science and Technology written in Bangla language, the government could not implement a Bangla only policy (Hasan & Rahaman, 2012).

In Bangladesh, 98% of the population speak Bangla as their first language (L1). Though Bangla and 'Bengali' are interchangeable, in the Constitution of Bangladesh, the name of the language of Bangladesh is Bangla, and this is the term that will be used for this present study. English enjoyed the status of official language before the liberation of Bangladesh, and after liberation, the government offices carry out their official works in Bangla. In Bangladesh, although English is used along with Bangla in the education sector, in the Constitution, the status of English is not mentioned. Therefore, the people of Bangladesh are not always sure about the status of English of their own country. There are some studies which have been conducted on the status of English in Bangladesh (Hasan & Rahaman, 2012; Rasheed, 2012). English is said to be a second language in Bangladesh (Rasheed, 2012). As English is

considered the world's 'lingua franca', many Bangla speakers learn English for the purpose of education, employment, and international business. To the people of Bangladesh, learning English is a matter of prestige for every sector. Therefore, it is really an undeclared second language in Bangladesh, and there is no doubt about the necessity of English language among Bangla speakers.

In the Bangla medium education, there have four stages of the schooling system in Bangladesh: primary, secondary, higher secondary and higher education. Currently, in the Bangladeshi education system, English is a compulsory subject from the primary level. Students who study up to at least higher secondary level, study English for twelve years. Nevertheless, students face problems when they want to speak in English. There is a reluctance to use English language inside and outside of the classroom. It should also be pointed out that the education systems in Bangladesh comprise Bangla medium, English medium, English version and the Madrasa system. Bangla medium schools do not give that much emphasis on English language. They follow the national curriculum and they teach all subjects in Bangla except for English as a subject. On the other hand, English medium schools do not follow the national curriculum. Rather, they are under the supervision of the British Council because O and A-level exams are arranged through the British Council in Dhaka. The classes are conducted in English for all subjects except for Bangla in English medium schools. English version school which is another kind of education system is different from English medium school. Though they use the national curriculum, all books are translated into English from Bangla. The medium of instruction is in English. In the Madrasa system of education, the emphasis is on the Arabic language. Therefore, it is noticeable that education system of Bangladesh is totally dependent on the medium of education. Although many people spend a lot of money for English medium education, the

majority of the people cannot be admitted in English medium school due to the lack of money. Thus, for the majority of students, English is merely a subject taught in schools, and they do not have many opportunities to use English outside the classroom.

Language is a tool for correspondence and learning a language incorporates four essential skills: speaking, listening, reading and writing. Furthermore, the ability to speak a second or foreign language is a matter of crucial skill. Non-native English speakers can master grammar and vocabulary but pronunciation may be different. Therefore, non-native speakers must give attention on pronouncing reasonably and correctly with three characteristics, as noted by Gilakjani (2012), those are, intelligibility, comprehensibility, and interpretability. According to him, when a speaker produces sound patterns, it is important to recognise as English, so that the listener is able to understand the meaning and function of what is said. Howlader (2010) also places importance on the comprehensibility of pronunciation, while Harmer (2001) emphasises mutual intelligibility. According to Harmer, effective communication is important to a second language learner, as it will be a big issue if the second language learner unable to communicate effectively. He also points out that for language teachers, the primary goal of pronunciation teaching should be intelligible communication. However, according to Gilakjani (2012), for teachers, the least favourite areas is English pronunciation to teach in their classes.

In Bangladesh, Standard British English pronunciation prevailed as a model in the teaching of English. English spoken by Bangla speakers shows very different divergence from the standard English pattern. One possible reason for the fact that these two countries' linguistic features are different. At first glance, the sociolinguistic settings are different in both countries. In Bangladesh, most people speak Bangla. Bangladeshi people use English only

for education, job and business purposes, but in daily life conversation, they speak Bangla. Therefore, in Bangladesh, the use of English is widespread. Most children grow up with speaking Bangla as their L1 which is the only language spoken at home. Very few students study in English medium school, therefore, English has now become a language of the elite.

In the school system, the recommended accent is Received Pronunciation (RP), most of the teachers, who teach English, come from Bangla medium schools, and they produce English sounds differently from British speakers. Further, after 1957, the postcolonial period, when the British left, there was a gradual shift in the way speakers in Bangladesh produce English sounds. The English spoken by Bangladeshis has undergone several processes of language change. Bangla English becoming a new variety along with other linguistic changes. And, this might also explain Bangla English is significantly different from standard spoken British English. Many of these features have now become acceptable not only in the classroom but also in the media and other contexts. Therefore, the teachers and students speak a new variety of English. However, many parents still prefer British English pronunciation for their children.

The colonial development of the British Territory led the English linguistic development from the late sixteenth to the twentieth century (Schneider, 2003). During that time, the colonised countries used English language through missionary activities, colonial administration, trading contacts (Gut, 2007). The English used in Bangladesh has developed linguistically since the British left in 1947. The way Bangla speakers pronounce some English sounds is different from other countries. It is impossible to pronounce like the native speakers (Jenkins, 2011), and thus, it can be assumed that Bangla speakers have their own

variety of English accent. This is a usual phenomenon as evidence from studies on other varieties of English (Pillai & Salamae, 2012; Salbrina, 2006; Tsukada, 1999).

1.1 Problem statement

At present, an increasing number of Bangladeshi people work, live and study abroad in which they need to communicate in English and that's why there is a necessity for Bangladeshi to be able to communicate correctly and clearly through English. However, speaking skills tend to be neglected in the teaching of English in Bangladesh. Hence, in Bangladesh, the absence of attention to speaking skills in English is a matter of concern, especially, in pronunciation because intelligible communication in English is essential for all as well as Bangla English speakers.

For pronunciation, vowels are considered to be one of the features of distinguishing different varieties of English (e.g. Maxwell & Fletcher, 2009; Mutonya, 2008; Salbrina, 2006). From the distinctiveness, one may easily be identified as being from a particular ethnic group. Some studies have been conducted on Bangladeshi speakers' production of Bangla vowel sounds, especially on the vowel quality of Bangla (Alam, Habib & Khan, 2009). However, from a linguistic point of view, there is a dearth of published research on the English vowel production of Bangla speakers specifically (Saha & Mandal, 2011), especially, in relation to vowel quality and contrast based on acoustic analysis. Therefore, through acoustic analysis, this dissertation is an attempt to fill the research gap which will examine the production of English monophthongs by a group of Bangla speakers.

1.2 Research objectives

The objectives of this dissertation are:

- a. to examine the quality of English vowels produced by Bangla speakers based on acoustic analysis of the first and second formants of the vowels.
- b. to examine the extent to which Bangla speakers contrast typical English vowel pairs in terms of vowel length and vowel quality.

1.3 Research questions

This study aims to address two research questions.

They are:

1. What are the qualities of English vowels produced by Bangla speakers based on acoustic analysis of the first formant (F1) and second formant (F2)?
2. To what extent do Bangla speakers contrast typical English vowel pairs in terms of vowel length and vowel quality?

1.4 Significance of the study

This study will contribute to acoustically analysed data on the English vowels produced by Bangla speakers. It will serve to meet the research gap, and contribute to the rising area of research on the production of the vowels on different varieties of English.

1.5 Limitations of the study

This study has some limitations. As participants of the study, only five male and five female postgraduate Bangladeshi students were selected who were studying in different faculties at one university in Malaysia. Therefore, this study is based on the speakers who are living

outside of Bangladesh. Moreover, the analyses were focused on only one speaking context. Therefore, the findings of this study cannot be generalised to all Bangla speakers.

1.6 Organisation of the study

This study comprises five chapters. In the opening chapter, the purpose of the study is discussed. Related literature is reviewed in the second chapter. The methodology of this study is described in the following chapter. The findings are presented and discussed in the fourth chapter. The last chapter covers the summary of the findings and talks about the extent to which this current study is significant.

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CHAPTER 2

LITERATURE REVIEW

This chapter commences with a discussion on English and Bangla monophthongs, because, before understanding the current phenomenon, it is important to know what are the similarities and differences between Bangla and English vowels as this will help in the interpretation of vowels being examined in this study. The chapter then proceeds to discuss the impact of the first language (L1) on the second language (L2) or foreign language pronunciation. This chapter ends with the studies on English vowels produced by ESL or EFL speakers in different varieties of English as well as studies on Bangla vowels.

2.1 English and Bangla monophthongs

In general, English and Bangla monophthongs can be separated in terms of three areas such as vowel quality contrast, the total number of vowels, and vowel length contrast. The total number of English vowels are actually different from each other depending on the variety of English. For example, British English and American English both have variations in their pronunciation. Roach (2000), for instance, lists a total of twelve monophthongs for Standard British English pronunciation. Among twelve monophthongs, seven are short vowels and five are long vowels. In Table 2.1 and Figure 2.1, the vowels are displayed and shown, respectively.

Table 2.1: The monophthongs of British English (Roach, 2000, p. ix).

Vowels	Example words
ɪ	pit
e	pet
æ	pat
ʌ	putt
ɒ	pot
ʊ	put
i:	key
ɑ:	car
ɔ:	core
u:	coo
ɜ:	cur
ə	about

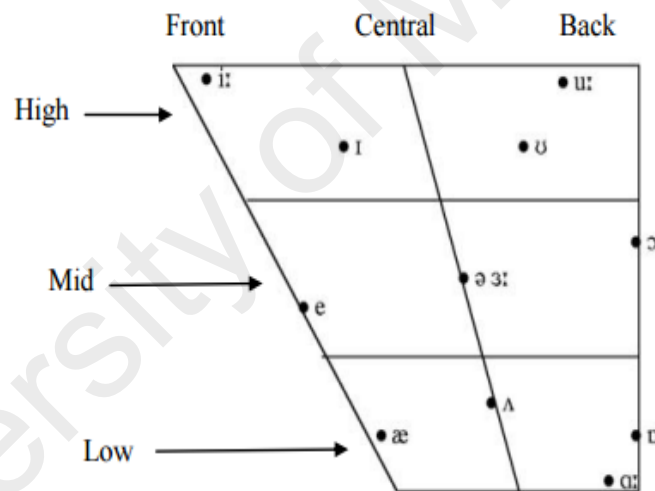


Figure 2.1: British English vowels (Roach, 2000, p. 36-38)

From Figure 2.1, it can be seen that the high vowels are /u:/, /ʊ/, /i:/, /ɪ/, mid vowels are /ɜ:/, /e/, /ə/, /ɔ:/ and low vowels are /æ/, /ʌ/, /ɒ/, /ɑ:/. Again, the front vowels are /i:/, /ɪ/, /e/, /æ/, /ɜ:/, the central vowels are /ə/, /ʌ/ and back vowels are /ɒ/, /ɑ:/, /u:/, /ʊ/, /ɔ:/.

On the other hand, there are fewer vowels in American English than British English, because there are some sounds which generally do not occur in American English. For example, /ɒ/

such as in 'hot', is pronounced by most American English speakers as /ɑ:/. Therefore, only ten distinctive monophthongs are found in American English. Ladefoged (2001) lists ten American English monophthongs: /i:/, /æ/, /ɪ/, /ɑ:/, /ɔ:/, /ʌ /, /u:/, /ɛ/, /ʊ/ and /ɜː:/. Again, Canadian English also has different types of monophthongs. They have ten English monophthongs e.g. /ɪ/, /i/, /e/, /æ/, /o/, /a/, /ʌ /, /ɛ/, /ʊ/, /u/. It should be noted that the symbol /e/ is generally used to represent the vowel in words like *bet* although the actual vowel may be closer to /ɛ/.

Studies on the second language (L2) production of vowel sound, such as, in Malaysian and Singapore English indicate that there may be even fewer monophthong vowels in these varieties (Deterding, 2003; Pillai et al, 2010). This is because there tends to be a lack of vowel contrast in these varieties (Deterding, 2003; Tan & Low, 2010; Pillai et al, 2010). For example, vowels' qualities are not contrasted between /ʊ/ and /u:/, /e/ and /æ/.

In comparison to English, Bangla has fourteen monophthongs including seven oral and seven nasal monophthongs. The seven oral monophthongs are /i /, /a/, /e/, /o/, / æ /, /u/, and /ɔ/, and the seven nasal monophthongs are /ĩ/, /ẽ/, /ã/, /ũ/, /õ/, /ã/ and /õ/ (Alam, Habib & Khan, 2009). In Kolkata Standard Bangla, the contrast between oral and nasal vowels can be observed (Masica, 1991) presumably due to the influence of the Eastern Bangla dialect but these vowels are not contrastive in Standard Bangla (Majumdar, 1997). The oral front vowels of Bangla are /i/, /e/, / æ / while /u/, /o/, /ɔ / are the back vowels and /a/ is the central vowel. Bangla monophthongs are presented in Table 2.2.

Table 2.2: Bangla vowels (Tamzida & Siddiqui, p. 288)

	Front	Central	Back
High	i		u
High-mid	e		o
Low-mid	æ		ɔ
Low		a	

Figure 2.2 is a comparison between Standard British English and Bangla monophthongs.

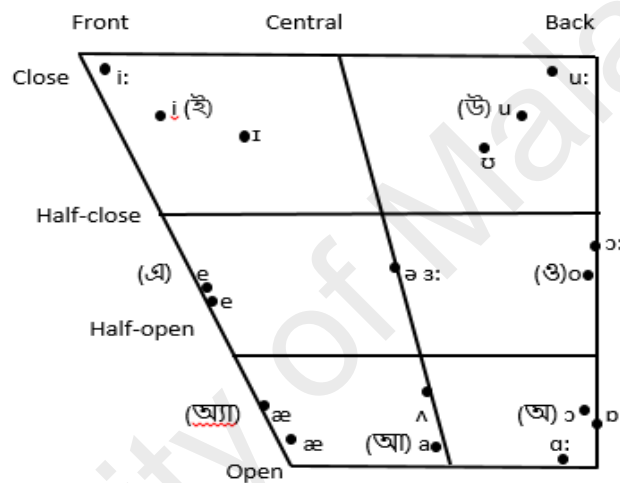


Figure 2.2: English and Bangla monophthongs (Hasan, 2013, p. 44)

As illustrated in Figure 2.2, Bangla has two equivalent vowels like English vowels e.g. /e/ and /æ/. For example, *pet* /e/ (belly) and *bang* /æ/ (frog) (Barman, 2009). The English vowel /e/ is almost similar to Bangla /e/ and Bangla monophthong /æ/ is not as much as open like English /æ/. Bangla does not have any equivalents mid central vowels such as /ɜ:/ and /ə/ so, producing these vowels might possibly create a problem for Bangla speakers of English.

2.2 Vowel contrast

Particular English vowel pairs contrast in terms of vowel length and quality. Vowel quality is a phonetic term which results from the position of the tongue, jaw, and lips during its

articulation. It makes one vowel sound different from other sounds. Specifically, a vowel can be categorized based on the shape of the lips and height and location of the tongue. A vowel can be closed, half-closed, half-opened and opened and it also can be fronted, central and back depends on the height of the tongue and location of the tongue, respectively. In pronouncing vowels, the shape of the lips is also significant. Normally, the front vowels and back vowels are related with the spreading of the lips and with the rounding of the lips, respectively. Deterding (2003) showed that in Southern British English vowel pairs /ɪ/-/i:/, /ʊ/-/u:/, /e/-/æ/, /ɒ/-/ɔ:/ and /ʌ/-/ɑ:/ are contrasted. For example, in English, the vowels /ɪ/ as in ship and /i:/ as in sheep is quite different. Thus, with reference to Figure 2.1, for instance, /i:/ is fronted and higher than /ɪ/.

The length of a vowel is also an important feature in the English language. Most English vowels can be categorised as long and short vowels. Standard British English has seven short vowels e.g. /ɪ/, /e/, /æ/, /ə/, /ɒ/, /ʊ/, /ʌ/ and five long vowels e.g. /ɑ:/, /u:/, /i:/, /ɔ:/, /ɜ:/. The duration of the vowels /ʊ/ from /u:/, /ʌ/ from /ɑ:/, /ɒ/ from /ɔ:/ and /ɪ/ from /i:/ are longer for example, /ɪ/ and /i:/ as in 'ship' and 'sheep', where the latter is meant to produce longer than the former as indicated by the diacritic ':' which has a different meaning. However, length varies according to the context (Cruttenden, 1994). Therefore, English vowel length also differs depending on the consonant following the vowel. For example, vowels before consonant /t/ tend to be shorter than /d/, such as in the words *seat* and *seed*, due to pre-fortis clipping that occurs when the vowel is followed by a voiceless consonant.

On the contrary, vowel length contrast does not apply to Bangla. Thus, long and short vowels do not exist in Bangla although in written form it has long and short symbols. There are the symbols for long ('dirgha') or short ('hrashya') vowels, but it is purely in written form

(Barman, 2009). For example, Bangla has a pair of graphemes for both /i/ (ই and ঐ) and /u/ (উ and ঊ) and these graphemes are important for Bangla writing. Though orthographically the Bangla word /no.ɽi/ (*river*) has a long grapheme at the end and /go.ɽi/ (*cushion*) has a short one at the end, phonemically they have the same short vowel at their ends. Therefore, it might be problematic for Bangla learners to perceive the length contrast of English vowels (Mostafa, 2013). The speakers might be influenced by the phonetic sounds of Bangla. For this reason, it is probable that like many other non-native varieties of English, Bangla English speakers do not maintain vowel contrast in terms of length when they produce English vowels.

2.3 Formant frequency model

Formants are the spectral peaks of the sound spectrum (Fant, 1960). These are the peaks, which are known as the Resonance Frequency. To recognise the vowels easily formants are estimated. In changing formant frequency, the shape and size of the vocal tract play a vital role. Vowel formants of male speakers tend to be located at lower frequencies than the females. The reason for this is the distance from the vocal folds to the lips. Researchers indicate that the vocal tract of the male is longer than the female, which will result in lower frequencies (Pepiot, 2012). Thus, caution must be applied when analysing and interpreting formant measurements for male and female speakers.

In acoustic analysis of the vowels, the formant frequency model is adopted by the most of the researchers. During sonorant sounds such as vowels, the formants contain most energy, and therefore, to analyse the vowels, the formant frequency model is used (Watt & Tillotson, 2001). Seven formants might be found in a speech signal. However, only first two formants

are significant. The first formant (F1) depends on the vowel height. The lower the vowel height, the higher the formant frequency of F1. On the other hand, the degree of backness/frontness of the tongue is related to the second formant (F2). The more fronted the vowel, higher the F2 value (Kent & Read, 2002). Therefore, the F1 frequency is higher for an open back vowel such as /ɑ:/ and its F2 frequency is low, while the F1 frequency is lower for a high, front vowel like /i/ and F2 frequency is higher. First two formants are considered very important for vowels, therefore, most studies analysing vowels focus on these two formants (e.g. Fleming & Johnson, 2007; Deterding, 2003). For vowels, the average values of F1 and F2 are converted into Bark scale (Zwicker & Terhardt, 1980) for almost all studies which are connected to acoustic analysis (Pillai & Hilda, 2012; Hubais & Pillai, 2010), because it can measure the accurate frequency analysis (Kent and Read, 2002).

2.4 World Englishes

In just a few decades, due to the needs of “global village”, English became a global language. One of the many consequences of this phenomenon is that non-native speakers have come to outnumber native speakers. In the non-native context, a number of varieties of English have emerged such as, Indian English, Singapore English, Malaysian English. In the 1980s, to examine the concepts of regional Englishes, the issue of World Englishes was first raised (McArthur, 2003a). The spread of English and its diversification is a relatively modern phenomenon. The development of a new variety of English is a gradual process. Schneider (2003) proposes a model in terms of five phases, namely foundation, exonormative stabilisation, nativisation, endonormative stabilisation, and differentiation which reflects the identity and linguistic changes that take place in the process. The first phase, Foundation initiates contact between the indigenous population and English colonisers. There is limited

language contact on the part of the settlers while a minority of the indigenous people may become bilingual in English at this stage. Incipient pidginisation and lexical borrowing may take place at this stage. Once a stable colonial status is established, English is also accorded official status in government and education. While English spreads among the elite group, the norms of the settlers are adopted. At this stage, lexical borrowing and pidginisation still continue. Once political independence from the colonisers has been attained, nativisation starts to take place and innovations and variations begin to appear from the level of phonology to lexicon to grammar to discourse. After that in the phase of Endonormative stabilisation, local norms start to develop and there is positive attitude accorded to it though residual conservatism might still be present. The localised English is aimed at codification, particularly through grammars and dictionaries. Differentiation begins when nation-internal, group-specific dialects are born. According to four parameters, each of the stages is examined e.g. sociolinguistic conditions, socio-political background, identity construction, and linguistic effect.

English pronunciation can be different for geographical reasons. According to Varshney (1985), for a geographical reason, pronunciation may vary from every six miles of a language. A villager pronounces a specific word differently from a person from the city. English pronunciation may also vary from one geographical entity to others. English pronunciation also varies from one English speaking country to another English speaking country, e.g. the pronunciation of U.S.A is different from U.K. Even pronunciation within U.K. has variations between Wales, Scotland, and England. So, it can be said that English native language differs from one territory to another. In each area the standards of English are different. There have always been large groups of English native speakers in ESL

territories due to colonialism. There are also large numbers of ESL speakers in English native language countries due to immigration, for example, US.

There are some influential models which discuss varieties of English around the world. There is another circle which is called MacArthur's circle of Englishes and it shows in Figure 2.1.



Figure 2.3: MacArthur's circle of English (Crystal, 1995, p. 111)

On the basis of eight zones, McArthur has divided “World English”. According to the location, the countries of the world fall into different zones. Bangla English falls under “South Asian English”. From MacArthur’s circle of English, it can be said that Australian speakers may find it hard to understand English speakers from Bangladesh, certainly. Therefore, this geographical distance influence the pronunciation of English.

The model of Kachru (1992, p. 356) is the most significant models of World Englishes which is reproduced below. In three concentric circles, Kachru distinguishes World Englishes e.g. the Expanding Circle, the Inner Circle and the Outer Circle. The English speaking countries in the Inner Circle like USA, UK, Canada are said to be ‘norm-providing’, the countries like Bangladesh, India, Ghana which are in the Outer Circle are considered to be ‘norm-developing’ and countries like China, Egypt, Indonesia which are in the Expanding Circle are to be ‘norm-dependent’.

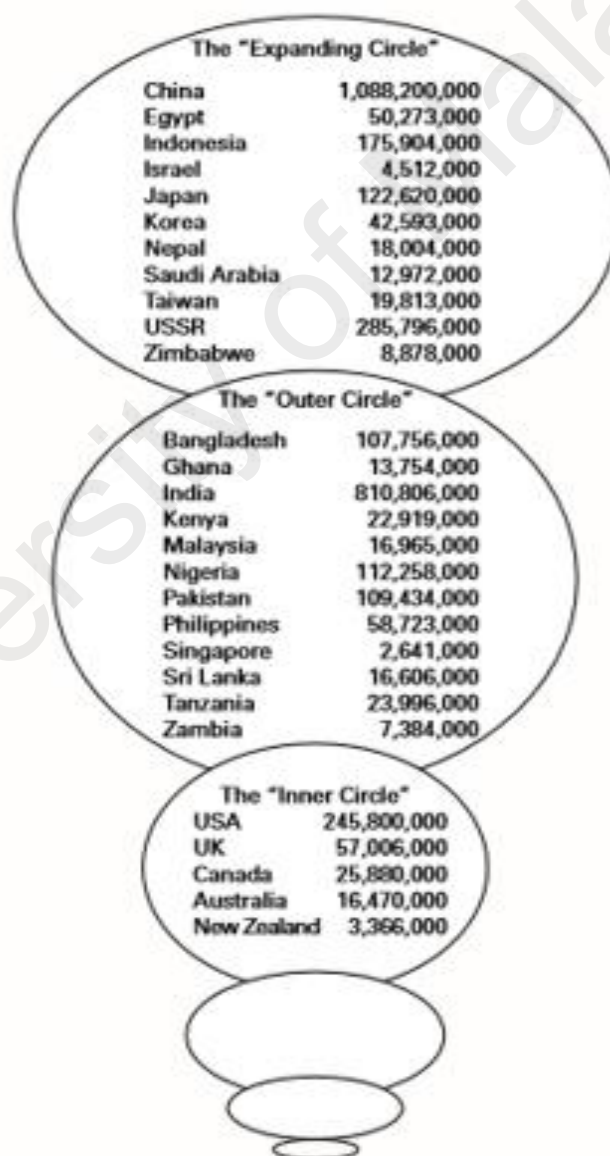


Figure 2.4: World Englishes by Kachru’s three-circle model (Kachru, 1992, p.356)

From the above discussion, it can be said that different times the different model of world Englishes have arrived but those are not out of limitations. For example, despite the major influence, Kachru's three-circle model is not without its problem. For examples, this model is not based on how the speakers use English rather on geography and genetics. In this three-circle model, Singaporean English users and Bangla English users both are in the Outer Circle though people of Singapore speak English as their first language whereas Bangla English speakers use English as their L2. Proficiency in English is another basement of this model whereas a native speaker may have the low grammatical competence and limited vocabulary than the non-native speaker. Actually, English is not everyone's first language rather somebody's second or third language and it does not mean that their competence in English is less than the native speaker of English.

2.5 The influence of L1 on L2 pronunciation

A large portion of ESL or EFL learners faces difficulty to achieve an "acceptable" and "intelligible" pronunciation of English. At the same time, many L2 learners are able to master reading, writing, vocabulary, grammar which are the distinctive components of English. It has been proven that unlike other areas of L2 learning e.g. vocabulary, the most influential transfer on pronunciation is mother tongue (Celce & Murcia, 1991) though it is disputed by Gut (2007) in his Norm Orientation Hypothesis. ESL and EFL learners may face difficulties understanding native English. Many studies have been conducted on the influence of L1 on English pronunciation (e.g. Broersma, 2005; Aoyama et al., 2004; Flege et al., 1997). There are some articulatory similarities and dissimilarities between L1 and the target L2. The articulatory organs have a direct relation on the replacement of L2 sounds with L1 sounds. There are some almost equivalent sounds between Bangla and English but

articulatory organs are different. For instance, English labiodental /f/ and /v/ are almost equivalent of Bangla bilabial stops /p^h/ and /b^h/. Thus, Bangla English speakers have the tendency to use both lips for /f/ and /v/ sound in the place of using the lower lip and upper teeth. Therefore, Bangla English speakers pronounce words like *fish*, *very*, *fine* as aspirated bilabial plosives rather than with a labiodental (Islam, 2004).

In Bangla, the length of vowels is a non-phonemic feature (Kostic & Das, 1972). On the other hand, in English, vowel length is a phonemic feature. Thus, due to L1 influences, it may be difficult to understand for Bangla speakers to distinguish the differences between the short and long vowels of English. Moreover, for Bangla English speakers, pronouncing the English vowels /ə/ and /ɜ:/ could be problematic, because, Bangla does not have any mid-central vowel such as /ə/ and /ɜ:/. Bangla has one low central vowel /a/, therefore, there is a possibility for Bangla speakers to pronounce /ə/ and /ɜ:/ as /a/.

Lado (1957), at first, proposed the Contrastive Analysis Hypothesis (CAH) which was supported the influence of L1 on L2 pronunciation, and later Suter (1976) and Hammerly (1982) supported his study. The central assumption of Contrastive Analysis Hypothesis was difficulties in producing native-like pronunciation occurred for the L1 and L2 sound system. However, according to Flege's (1987), the source of potential difficulty could be the reason of similarities in phonetic categories. The foundation of his theory is for a learner, new phonetic categories will not develop if they are perceived L2 sounds "similar" to the ones in L1. Therefore, they produce the L2 sounds in the same way as they produce in L1. Flege's Speech Learning Model (1995) also provide the idea with the higher the dissimilarities of phonemes the easier to learn it would be. Pillai and Salaemae (2012) conducted an acoustic analysis of Thai English (ThaiE) monophthongs. They found that ThaiE monophthongs were

influenced by Thai monophthongs. Their study lends some support to Speech Learning Model by Flege (1995). They found that second language (L2) sounds which are similar to the first language (L1) tend to be more complexed. However, Munro (1993) conducted a study on Arabic language and found dissimilarity with Flege's theory because Arabic speakers were not produced the vowels native-like which were dissimilar in Arabic and English. Munro's study was conducted by Arabic countries speakers where English is considered as a foreign language like Egypt, Palestine, Syria, Saudi Arabia, Sudan, Jordan, and Kuwait. Munro compared the findings with 23 native speakers of American English. He found that native speakers of Arab and native speakers of English were displayed different characteristics of the vowels, such as reduction of diphthongs and vowel length compared to American English.

2.6 Acoustic studies of vowels produced by non-native English speakers

In recent years, several studies have been done on L2 speech production and perception of speakers with different first languages. When subjects with different first languages speak English as a foreign language, their pronunciation will be different from native speakers of English. One of the major differences in pronunciation of English lies in the different realisation of vowels.

The vowel inventories in the world's languages differ considerably in size (Mary & Davies, 2011). It is common to measure and analyse vowel formants especially the first two formants (Morrison, 2002; Tsukada, 1999; Yang, 1996; Crowther and Mann, 1992) because they present the most important acoustic properties where the vowel quality can accurately be determined and classified. Tsukada (1999), for instance, conducted an acoustic work on

Japanese English speakers. Her study showed spectral differences between 12 Australian and 24 Japanese speakers. She has found a strong L1 influence on the production of English vowels in terms of duration by Japanese speakers because durational differences between preceding voiced and voiceless consonants were longer for Australian speakers than Japanese speakers. Moreover, for vowel quality, the values of F1 and F2 were higher for Japanese speakers than the Australian speakers. As a result, the comparison between Japanese English speakers and Australian native speakers show clearly separate vowels in the vowel space.

Hubais and Pillai (2010) examined English vowels produced by Omani Arabic speakers. They found that compared to British English vowels Oman English vowels occupy slightly smaller vowel space. The Omani speakers contrasted vowel length more than vowel quality in the vowel pairs, perhaps because Arabic has such a contrast. Chen and Wang (2011) conducted an acoustic study on Chinese and English vowels. They measured F1 and F2 and found that there were differences in vowel height and frontness between Chinese-English and American English. In terms of F1, the male participants produced five cardinal vowels almost in similar to American English vowel. On the other hand, in terms of F2 values, Chinese-English speakers produced more front vowel than the native speakers of English. The researchers also found the influence of mother tongue in terms of female participants on their English pronunciation of five cardinal vowels. They showed the influence of mother tongue in terms of F1 values. But, the F2 values produced by Chinese participants tended to be backward.

In another study, Ali (2013) examined English vowels produced by Sudanese whose L1 is Arabic. His study was based on to what extent Sudanese and native speakers of (RP) English produced English vowel sounds through acoustic analysis. Sudanese did not maintain the

short and long vowel whereas, native speakers maintained the differences between long and short vowels. Sudanese speakers produced further back / u:/ than the British speakers. Moreover, the researcher found the differences between British English and Sudanese English in terms of central and back vowels.

Mokari, Famian, and Ghafoori (2013) conducted a study on Azeri speakers' production and perception of English vowels. They examined 11 English monophthongs and the results were compared to Native American and British English productions. The production results revealed that the Azeri speakers produced some of the vowels closer to American English, and some other closer to British English. They have found that in terms of vowel height (F1) and backness (F2), male participants articulated /e/ vowel significantly different from British English. In terms of height, /ɪ/ vowel and in terms of backness, /æ/ and /ʊ/ vowels were articulated significantly different from British English productions. Azeri females articulated /ʌ/, /ɪ/, /ɔ:/ and /u:/ vowels significantly different in terms of height and backness. Considering height, /ɑ:/ vowel and in terms of backness /ʊ/ vowel were produced significantly different from BR norms by Azeri female participants.

Nikolic (2016) has conducted an acoustic study between two highly proficient female Serbian speakers of English and two native American speakers of English. In terms of the production of the vowels sound, he found a noteworthy difference between the Serbian speakers of English and American speakers of English. American participants tended to reduce their vowels whereas, Serbian speakers did not show the same tendency. He found that the production of the /ɑ:/ vowel which chiefly occurred in the central position quite close to the vowel /ʌ/ can be said to have been a problem for the Serbian participants. Based on the degree of openness and the degree at which the tongue was raised during articulate the vowel sounds,

the values indicate centralisation of the vowel. Instead of being open or low and back, this vowel was produced as central and open-mid. Therefore, it may be inferred that the Serbian participants have not completely acquired the vowel /a:/ in terms of its quality. There are also quite prominent variations in their production of the vowels /ɔ:/ and /ɒ/.

Phull and Kumar (2016) conducted a study on Indian English where they focused on the comparison of vowels and its influence on the accents of the Indian English. They divided the Indian English into four major groups based on the regions which include West Indian, South Indian, North Indian, and East Indian. For their study, 16 male participants were selected and they were aged between 20 to 60. The researchers found variations in these four varieties of Indian Englishes, e.g. vowel /a:/ was higher in vowel space for West Indian and North Indian whereas, for West Indian it was in low position and for South Indian, it was central and more towards the back. Billai, Mahmood, and Saleem (2011) conducted a study on Pakistani front vowels. Altogether sixty participants participated in their study who were fluent in English. They measured the F1 and F2 values of Pakistani English and compared it to Received Pronunciation and American English. They found all the four front vowels were distinguished by the RP male speakers. For example, the RP and American English speakers produced /i:/ much fronted with a raised tongue as compared to Pakistani English and for female speakers, the vowel /i:/ was much lower than RP and American English.

In a nutshell, from the previous studies on non-native speakers, it can be said that in terms of vowel quality and length, the production of English vowel sounds of non-native speakers is different from that of the native speakers of English. Based on findings from studies of the production of English vowel sounds by non-native English speakers, it is posited that

Bangladeshi speakers' will also display some of these tendencies in their production of English vowels.

2.7 Studies on Bangla sounds

Some acoustic studies have been conducted on Bangla vowels. For example, Alam, Habib, and Khan (2009) conducted an acoustic study of Bangla vowel. They examined the duration of every phoneme from male and female speakers. They also analysed the first two formants of each phoneme and identified the acoustic features of Bangla vowel phoneme inventory. They found that Bangla has fourteen monophthongs including seven oral and seven nasal vowels. They also found that the nasal vowels are less frequent than the oral vowel in Bangla and all back vowels are rounded. In another study, Barman (2009) conducted a contrastive analysis of Bangla and English sounds. He found that Bangla and English have two similar sounds, e.g. /e/ and /æ/ and long and short vowels are not distinctive in Bangla.

Saha and Mandal (2011) conducted a study on the phonetic and phonological interference of English sounds by native speakers of Bangla. They found that Bangla influences the production of American English vowel sounds. They found 4,063 examples of English vowels by forty L1 Bangla speakers which were different from American standard pronunciation. They also found that for Bangla English speakers, central vowels of English are difficult to acquire because Bangla has less central vowels than English. They found the L1 influence on L2, therefore, Bangla speakers categorised American English vowel phonemes with respect to Bangla vowel phonemes. In addition, unlike the American English, vowel quality does not change in Bangla for the absence or presence of stressed syllables. Moreover, the aim of their study was to find out phonetic and phonological interference

between Bangla and English speakers. It was not a vowel, formant-based analysis. Thus far, there is no published acoustic study on English vowel sounds produced by Bangla speakers. This is the gap that this study wishes to fill.

2.8 Summary

The literature review in this chapter discussed the number of English and Bangla monophthongs. It also discussed the vowel contrast and formant frequency model which will help to analysis the data of this study. It also provided the knowledge of world Englishes and L1 influence on L2 along with the similarities and dissimilarities among different varieties of English. The findings on Bangladeshi English vowels' studies show that there is a scarcity of acoustic studies by Bangla English speakers in terms of vowel quality and contrast. Therefore, this work is an attempt to fill research gap. For this purpose, the methodology is described in the following chapter which is used in this study.

CHAPTER 3

METHODOLOGY

This chapter comprises four sections. This chapter commences with a description of the data collection method in this study. It then describes the participants, the data collection process and how the data were analysed in this study.

3.1 Data

The data consisted of a word list containing the target vowels placed in an hVd context. In an acoustic study of vowels, the hVd context is a frequently used context (Ferragne & Pellegrino, 2010, Cox & Palethorpe, 2005). Moreover, an hVd context was selected to minimise the effects of co-articulatory features on the vowel as well as to ensure easy identification of the vowel. Others consonantal context (CVC) like pVd, bVt was avoided because it affects the vowel formant frequencies systematically. However, the hVd context does have some limitations as it contains unfamiliar words and nonsense words (e.g. *hud*, *hod*) because it is difficult to find out real hVd words in English for all target vowels. Rhyming words, for instance, *bed* for *head*, were given to the participants in case they were not confident enough how to pronounce a word. Table 3.1 is shown the word list with target vowels which were used in this study.

Table 3.1: Word list for monophthongs in hVd context

Target vowel	Target word	Supporting word
ɪ	hid	sit
i:	heed	need
ɛ	head	bed
æ	had	bad
u:	who'd	soon
ʊ	hood	book
ɔ:	horde	horse
ɒ	hod	god
ʌ	hud	mud
ɑ:	hard	card
ɜ:	heard	bird

The word with the target vowel was placed in a fixed carrier sentence to provide a more naturalistic context. The carrier sentence was *Please say hVd again*. Moreover, the rationale for the carrier sentence was for the speaker to not be too focused on the target word as this could affect the quality of the vowels. Thus, the target words were placed within the carrier sentence. In this study, the schwa /ə/ was not examined as it only appears in unstressed syllables. Moreover, no minimal pairs can be found to show a clear contrast between /ə/ and /ɜ:/ (Roach, 2000).

3.2 Participants

The participants in this study were five male and five female Bangladeshi postgraduate students. Both male and female participants were chosen for this study because their voices are considered acoustically different to each other. Some surveys (Whipple and McManamon, 2002) indicate that there are preferences for the voice of one gender over another. They found that men were significantly better than women at using small differences in the formant. Formant frequencies for female participants are higher than male participants. Therefore, to conduct this study accurately, it was important for the involvement of both genders.

All participants speak Bangla as their L1 and English as their L2. They had all completed their Bachelor's degree in Dhaka, Bangladesh, where English was the medium of instructions. During the data collection, the participants were all in the 4th to 5th semesters of their master's programme at a public university in Malaysia where English is the medium of instruction. The subject areas of their master's degree were: language studies (4), medical studies (3), Science (2), and Law (1). At the time of the data collection, the participants had been in Malaysia for an average of 2.5 years. The participants used English on a daily basis of English to communicate with their lecturers and classmates who are not from Bangladesh. All of the participants had learnt English for almost 16 years, and were taught by Bangla teachers. Therefore, in this study, the results are not affected by direct exposure to native varieties of English. In acoustic studies, the small number of participants is common and the tokens are justified. Therefore, in this study, the participants are less in number but the tokens were more (550 tokens) and justified. So, the participants are the representative of Bangla speakers due to laborious and detailed methodology.

3.3 Data collection procedures

Before recording the data, the participants were required to read and sign a consent form (Appendix D) and asked to fill up the questionnaire. The consent form described the purpose of the study, study procedure, confidentiality about their participation. The questionnaire obtained information about their age, their first language, how long they had been in Malaysia, their English proficiency level (IELTS score) and how long they have studied English. The participants were informed about the study and the nature of their participation. Their participation was purely voluntary and they could withdraw at any time. Moreover,

they were assured that their identity would be kept confidential. Therefore, the participants felt comfortable to participate.

Before the actual recording, five minutes were given to the participants to read and practice the word list in a natural manner. It helped to warm up their voice. All data were recorded in a silent room of the library at the participant's university using a Zoom H6 Handy Recorder. The participants were asked to read the word list with the carrier sentence one by one followed by three seconds break to minimise tiredness and following effects on their voice quality. They then repeated for another six times and were recorded. In total, each participant was recorded for five times and after that, the recordings were taken for analysing. It took approximately 30 minutes per participant while recording the word list. From the recordings of the 10 participants, there were five target vowels per speaker for each vowel, with a total of fifty tokens per vowel. Therefore, in total, each vowel was repeated five times yielding a total of 550 tokens for analysis (5 times repetitions \times 11 vowels \times 10 participants = 550).

3.4 Data transcription and analysis

In this study, all the measurements were based on the Formant Frequency Model (Watt & Tillotson, 2001). The formant frequency model contains most energy during sonorant sounds such as vowel which is the rationale to choose this model (see 2.3). Using Praat version 6.0.24 (Boersma & Weenink, 2017), the data were orthographically transcribed and annotated, as shown in Figure 3.1.

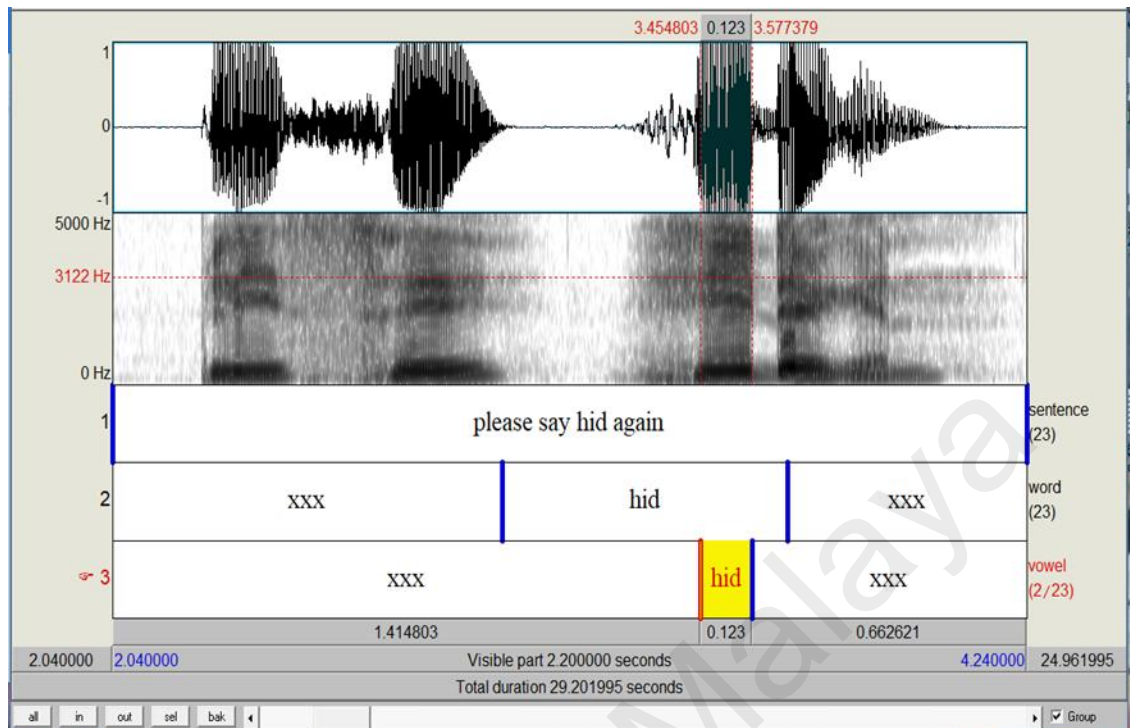


Figure 3.1: Screenshot of the word *hid*

At first, a pause detector Praat Script (<http://www.helsinki.fi/~lennes/praatscripts/public/mark pauses.praat>) was used to separate the utterances in each batch of recordings. Next, the orthographic transcription of the word containing the target vowel was inserted in the TextGrid using another Praat Script (<http://www.helsinki.fi/~lennes/praatscripts/public/label from text file.praat>). The target vowels were then marked manually from the onset of the vowel (determined from the onset of voicing for the vowel) to the vowel offset (preceding the absence of signal for the following stop consonant /d/).

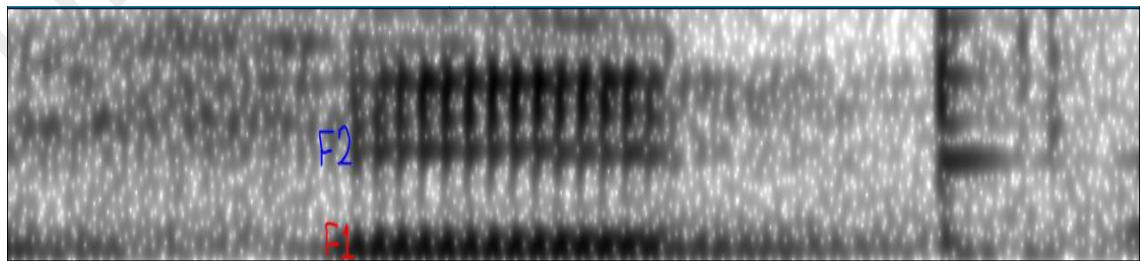


Figure 3.2: Screenshot of the formants of the vowel *hid*

A Praat script (<https://depts.washington.edu/phonlab/resources/getDurationPitchFormants.praat>) was then used to measure the midpoint of the vowels by measuring F1 and F2 where the vowel is at the steadiest state and is least influenced by the preceding and following sounds. The same script was also used to measure the duration of the vowels. For the F1 and F2, the average value of each of the vowels was measured and converted automatically from Hertz into the Bark Scale (Zwicker & Terhardt, 1980) in order to plot the vowels on a vowel chart by using an excel template (Deterding, 2006). The data were entered into an excel sheet to generate scatter plots and vowel charts as well as to enable comparisons between typical vowel pairs. After that, to find out any significant differences between F1, F2, and durations between vowel pairs, independent *t*-tests were carried out.

CHAPTER 4

FINDINGS AND DISCUSSIONS

The findings of this study are presented and discussed in this chapter. Based on the two research questions, the results of the qualities of English vowels produced by Bangla speakers are first presented. Subsequently, the results of the contrast between typical English vowel pairs produced by Bangla speakers are presented in terms of vowel length and quality. This is followed by a comparison of the F1 and F2 values between the English produced by the Bangla speakers and with British English vowels. Finally, this chapter provides an overall discussion of the findings.

4.1 Vowel quality

As mentioned in 2.3, vowel formants of males tend to be located at lower frequencies than the females. This is reflected in Table 4.1, where it can be seen that the formant frequencies of males are lower than those of the females. This is to be expected given that males have larger and longer vocal tracts, and hence produce lower pitched sounds reflected in the lower formant frequencies.

Table: 4.1: F1 and F2 values (average) of English monophthongs produced by female and male Bangla speakers

Target Vowels	Female				Male			
	F1 (Hz)	F2 (Hz)	F1 (Bark)	F2 (Bark)	F1 (Hz)	F2 (Hz)	F1 (Bark)	F2 (Bark)
hid	362	2771	3.50	15.13	306	2100	2.81	13.54
heed	374	2720	3.61	15.02	288	2139	2.98	13.42
head	540	2426	5.08	14.33	415	1997	3.98	13.09
had	707	2037	6.44	13.22	564	1611	5.28	11.68
who'd	415	830	3.98	7.40	337	930	3.27	8.05
hood	407	827	3.91	7.34	326	980	3.16	8.38
horde	662	1207	6.09	9.74	555	1178	5.21	9.58
hod	681	1168	6.24	9.52	552	1107	5.18	9.17
hud	871	1529	7.65	11.33	634	1278	5.86	10.12
hard	774	1497	6.95	11.19	615	1321	5.71	10.34
heard	715	1537	6.50	11.36	596	1281	5.55	10.14

As shown in Figure 4.1, in vowel chart (b) all vowels are placed in the higher position than those in vowel chart (a). For the female speakers, the lowest F1 value is for *hid* (362 Hz) and the highest F1 value is for *hud* (871 Hz). Thus, for females, *hid* is placed in the highest position than other words containing the target vowels, and *hud* is placed in the lowest position. For the male speakers, the lowest F1 value is for *heed* (288 Hz) and the highest F1 value is for *hud* (634 Hz). In the vowel chart for male participants, *heed* is placed high in the vowel chart, and like the female participants, *hud* is placed in the lowest position in vowel chart. The F2 values of the females are higher than the males, and thus, all words containing the target vowels of females are more fronted than the male participants.

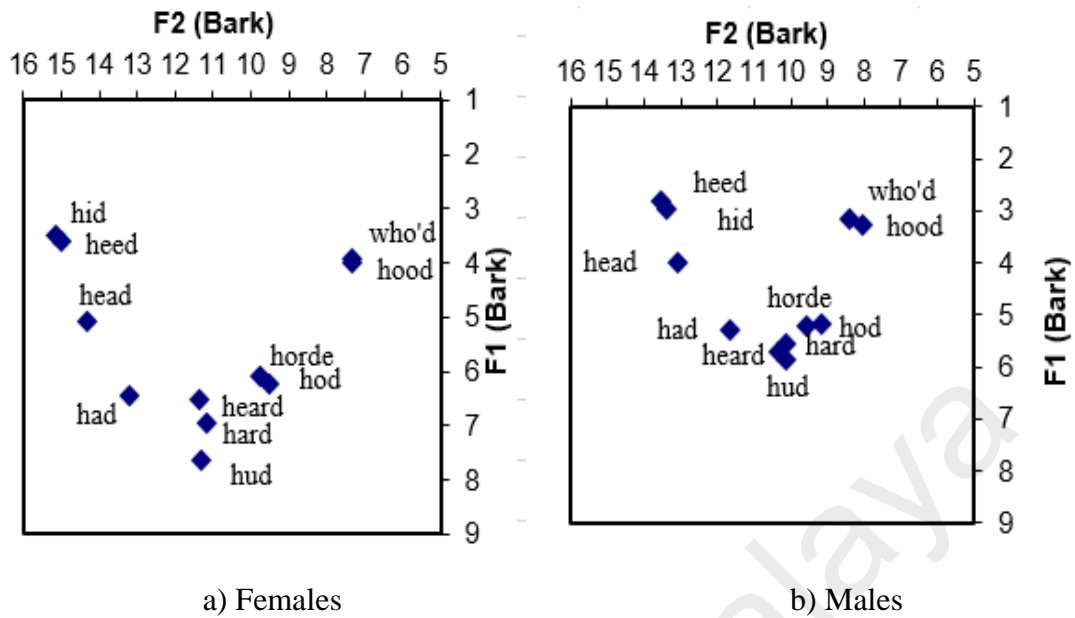


Figure 4.1: English vowel charts for female and male Bangla speakers

From the Table 4.1, it can be observed that for females, the F1 and F2 values for *hid* are higher (362 Hz and 2771 Hz) than the males (306 Hz and 2100 Hz). As shown in Figure 4.1, *hid* is in the low-mid position of the tongue and more fronted for females, whereas, for male participants, the word *hid* tends to be near central from the front and high-mid position of the tongue. The result of an independent sample *t*-test showed a significant difference for F1 between males and females ($t(24) = 5.02, p < 0.001$) but no significant difference was found for F2 ($t(24) = 7.43, p = 5.81$). Since both are front vowels, the non-significant difference in the F2 values is to be expected. For the word *heed*, the F1 and F2 values are higher (F1: 374 Hz, F2: 2720 Hz) for female participants than the male participants (F1: 288 Hz and F2: 2139 Hz). In Figure 4.1, the word *heed* was near central from the front for male participants. Moreover, the word *heed* was in a low-mid position for female participants whereas, for males, it was in a high-mid position. Similar to *hid*, an independent *t*-test for *heed*, *t* showed a significant difference for F1 ($t(24) = 5.01, p < 0.001$) between both participants whereas for F2, no significant difference was found ($t(24) = 8.88, p = 2.38$).

Similar to *hid* and *heed*, for females, for the word *head*, the F1 and F2 values were higher (F1: 540 Hz, F2: 2426 Hz) than for the male participants (F1: 415 Hz, F2: 1997 Hz). Therefore, in Figure 4.1, the word *head* was placed near the centre from the front and high-mid position of the vowel chart for the male than the female participants. Moreover, for male participants, *head* is almost in the central position of the vowel chart. Between the two groups of participants, a significant difference was found for F1 ($t(24) = 5.229, p < 0.001$) for *head* but, the result was not significant for F2 ($t(24) = 7.090, p = 1.25$). For the word *had*, the F1 and F2 values were higher for female participants (F1: 707 Hz, F2: 2037 Hz) than the male participants (F1: 564 Hz, F2: 1611 Hz), and therefore, the word *had* can be seen to be more fronted and in a low-mid position of the vowel chart for female participants compared to the males. Unlike the vowels in *hid*, *heed*, and *head*, there was no significant difference for F1 ($t(24) = 6.92, p = 1.86$) between the two groups of participants, but, there was a significant difference for F2 ($t(24) = 5.02, p < 0.001$). This indicates that there was more difference in terms of vowel fronting for the vowel in the word *head*.

For the words *who'd* and *hood*, the F1 values for females (*who'd* = 415 Hz, *hood* = 407 Hz) were higher than for the male participants (*who'd* = 337 Hz, *hood* = 326 Hz). For female participants, the F2 values for both words were lower (*who'd* = 830 Hz, *hood* = 827 Hz) than for the male participants (*who'd* = 930 Hz, *hood* = 980 Hz). In Figure 4.1, the words *who'd* and *hood* appear more central from the back and in a high-mid position of the tongue. For both words, no significant differences were found for F1: (*who'd* = ($t(24) = 6.61, p = 3.82$), *hood* = ($t(24) = 5.77, p = 2.96$), and also for F2: (*who'd* = ($t(24) = 5.18, p = 0.01$), *hood* = ($t(24) = 2.95, p = 0.003$). Similarly, for female participants, the F1 and F2 values for the word *horde* were higher (F1: 662 Hz, F2: 1207 Hz) than the male participants

(F1: 555 Hz, F2: 1178 Hz). For both participants, the word *horde* was produced in almost same position, but for females, it was placed in a low-mid position of the vowel chart compared to the male participants. An independent samples *t*-test showed a significant difference for F1 ($t(24) = 5.54, p < 0.001$), but not for F2 ($t(24) = 0.41, p = 0.34$).

For the words, *hod* and *hud*, as expected, for females, the F1 values were higher (*hod* = 681 Hz, *hud* = 871 Hz) than for the male participants (*hod* = 552 Hz, *hud* = 634 Hz), and same results were found for F2 (female: *hod* = 1168 Hz, *hud* = 1529 Hz and male: *hod* = 1107 Hz, *hud* = 1278 Hz). In Figure 4.1, for both speakers, the word *hod* can be seen to be near central in the vowel chart. However, an independent sample *t*-test produced no significant difference for F1 ($t(24) = 5.54, p < 0.001$) and F2 ($t(24) = 0.41, p = 0.34$). This indicates that this vowel was produced similarly by both male and female speakers. For *hud*, the difference of F1 was not significant ($t(24) = 9.53, p = 6.24$) but, for F2, the difference was significant ($t(24) = 2.19, p < 0.001$). This indicates that the vowel was more fronted for the females.

For the word *hard*, the F1 (774 Hz) and F2 (1497 Hz) values were higher for females (F1: 615 Hz and F2: 1321 Hz). The vowel was produced in a central position for both groups of participants, but, more so for the male participants. However for *hard*, the differences were not significant for both F1 ($t(24) = 6.58, p = 4.14$) and F2 ($t(24) = 3.16, p = 0.002$). For the word, *heard*, the F1 (715 Hz) and F2 (1537 Hz) values were higher for the female participants (F1: 596 Hz, F2: 1281 Hz), indicating that they produced the vowel lower than the males. For both participants, it was placed in a central position but was in a high-mid position for the males whereas, for females, the vowel was produced in a low-mid of the vowel chart. Significant differences were found for both formants: F1 ($t(24) = 3.58, p < 0.001$) and F2 ($t(24) = 5.06, p < 0.001$).

4.2 Length contrast

In English, the minimal pair of /ε/-/æ / does not typically contrast for length, so, in the analysis, it was not included for length contrast. The durational comparison between long to short vowel pairs displays in Table 4.2 which is produced by the female and male Bangladeshi participants.

Table 4.2: Durational comparison (average) between English long and short vowel pairs by female and male Bangla speakers (in msec)

Vowel Pairs	heed-hid		horde-hod		who'd-hood		hard-hud	
Female	heed	hid	horde	hod	who'd	hood	hard	hud
	129	124	179	137	129	128	178	150
Male	heed	hid	horde	hod	who'd	hood	hard	hud
	152	115	188	140	137	145	183	155

Figures 4.2 and 4.3 show the comparison between the female and male participants' average vowel duration of each vowel pair. The male participants showed more length contrast than the female speakers. All vowels are contrasted except the vowel pair *hood-who'd*.

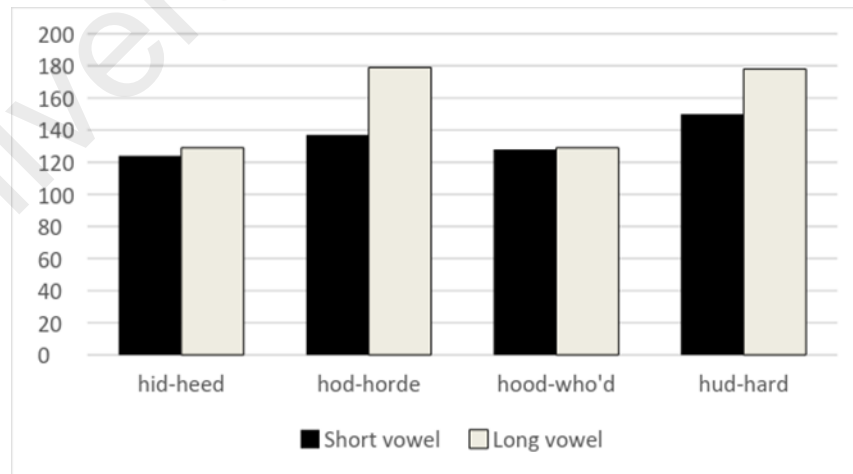


Figure 4.2: English vowel length contrast of female Bangla speakers

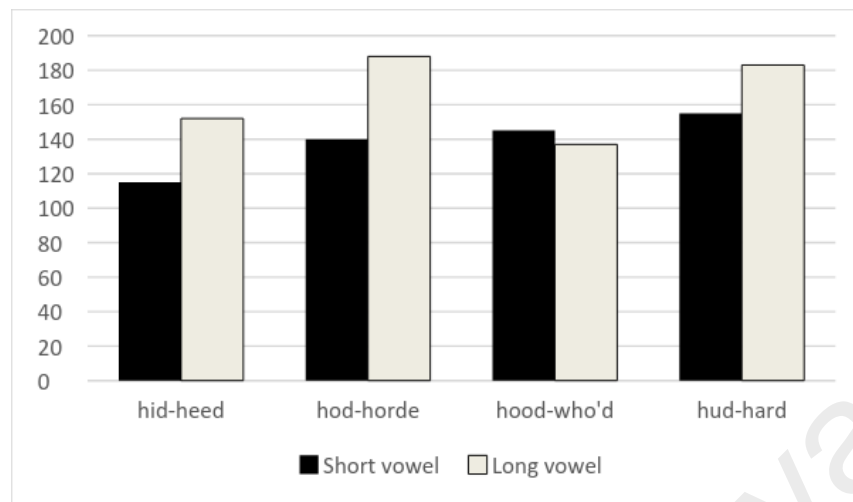


Figure 4.3: English vowel length contrast for male Bangla speakers

The average duration and the short to long ratios in milliseconds (msec) is displayed in Table 4.3 for the English vowel pairs produced by Bangla speakers.

Table 4.3: Durational differences and ratios for English vowel pairs produced by Bangla speakers

Vowel Pairs	heed-hid		horde-hod		who'd-hood		hard-hud	
	Dif	Rat	Dif	Rat	Dif	Rat	Dif	Rat
Female	5	0.96	42	0.77	1	0.99	28	0.85
Male	37	0.76	48	0.75	- 8	-1.06	28	0.85

From Table 4.3, it can be observed that the vowel ratios for female participants have a range of from .77 to .99 msec and for males, the range is from -1.06 to 85 msec. When the ratio is higher, there is less difference between the average vowel length. Therefore, for the vowel pairs with higher ratios are shown no significant differences between the vowel pairs. The ratios between vowels pairs were distinguished except for the vowel pair *who'd-hood* for the male participants. Different ratios were found for female and male participants between the vowel pair *heed-hid*. For female speakers, the ratio (.96 msec) was much higher in value than the ratio for males (.76 msec). Hence, as expected, among female speakers, the durational

differences between the vowel pair *heed-hid* is not significant ($t(24) = 1.329, p = .098$), but, for male speakers the difference between these two vowels is significant ($t(24) = 5.747, p < 0.001$). The vowel pair *horde-hod* had the highest durational differences among the vowel pairs for both sets of participants. Almost similar ratios were found for females (.77 msec) and males (.75 msec) speakers between the vowel pair *horde-hod*, and the durational differences between the vowel pair *horde-hod* is significant ($t(24) = 13.158, p < 0.001$) for female and male speakers ($t(24) = 5.664, p < 0.001$). Again, the ratios of vowel pair *who'd-hood* for the female is .99 (msec) and for male -1.06 (msec). The average length difference of the vowel pair *who'd-hood* was found to be not significant for both female ($t(24) = 1.28, p = .449$) and male speakers ($t(24) = .826, p = .208$). Another vowel pair *hard-hud* had similar ratios for both sets of participants (.85 msec). For both speakers, a significant durational difference was found for the vowel pair *hard-hud* (females: $t(24) = 4.938, p < 0.001$; males: $t(24) = 3.996, p < 0.001$). On the whole, it can be said that the length contrast was maintained for most vowel pairs by female and male speakers, except for the *who'd-hood* pair, and the *heed-hid* pair for female speakers

4.3 Quality contrast

As mentioned previously in 2.2, vowel quality is a phonetic term which results from the position of the tongue, jaw, and lips during its articulation, and it makes one vowel sound different from another vowel sound. The scatter plots visually display the distributions of the vowels in Figures 4.4 to 4.8 in the following vowel pairs: *hid-heed*, *hod-horde*, *hood-who'd*, *hud-hard* and *head-had*.

4.3.1 Vowel quality contrast between *hid-heed*

The scatter plots for vowel pair *hid-heed* are represented in Figure 4.4, where (a) is for female and (b) is for male speakers. In terms of quality, a lack of contrast is found for both scatter plots of vowel pair *hid-heed*. The female speakers' production shows considerable overlap between these two vowels and for them, vowel pair *hid-heed* is more fronted than male speakers. For male participants, the vowel pair *hid-heed* is higher and is placed in a high-central position compared to the female participants. From the Table 4.1, for female speakers, it can be seen that the average values for *hid* (F1: 362 Hz and F2: 2771 Hz) is almost similar to the average results of *heed* (F1: 374 Hz and F2: 2720 Hz). Moreover, for male participants, the average results for *hid* (F1: 306 Hz and F2: 2100 Hz) are also almost similar to the average results of *heed* (F1: 288 Hz and F2: 2139 Hz). For the average values of F1 and F2 of the vowel pair *hid-heed*, an independent samples *t*-test found no significant difference for the female speakers (F1: $t(24) = .967$, $p = .172$); F2: $t(24) = .756$, $p = .229$), and the same result was found for the male speakers (F1: $t(24) = 2.765$, $p = .006$; F2: $t(24) = .895$, $p = .189$). These results indicate that the speakers did not contrast the *hid-heed* vowel in terms of vowel quality.

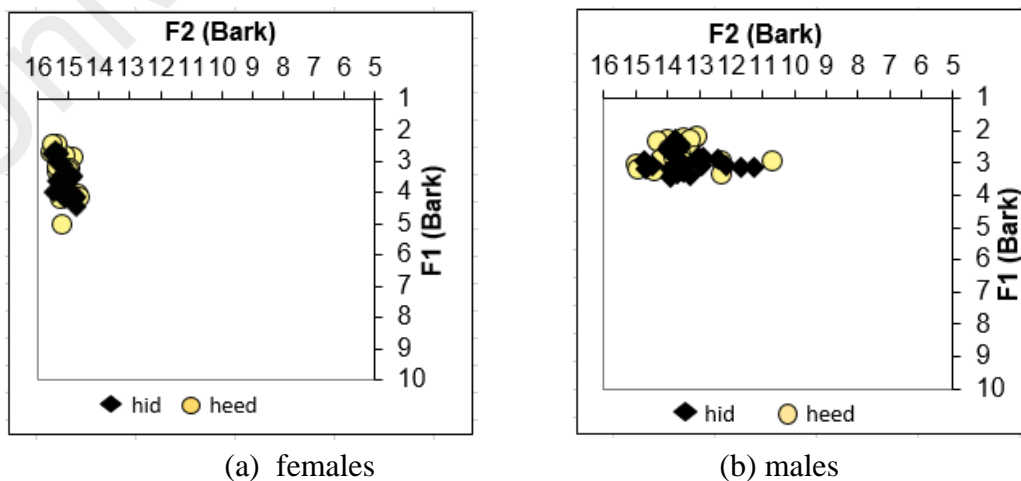


Figure 4.4: Scatter plots of *hid-heed* for female and male Bangla speakers

4.3.2 Vowel quality contrast between *hod-horde*

The scatter plots of vowel pair *hod-horde* are represented in Figure 4.5 and (a) is for female and (b) is for male speakers. It can be seen from the scatter plot that for both sets of speakers that these two vowels are very close to each other. This is also possibly because the speakers did not pronounce the ‘r’ in the spelling of the word *horde* which made this word sound the same as *hod*. In Table 4.1, for females, it can be seen that the average results for *hod* (F1= 681 Hz and F2=1168 Hz) are almost parallel to the average results for *horde* (F1=662 Hz and F2=1207 Hz). Again, for males, the average results for *hod* (F1= 552 Hz and F2= 1107 Hz) are also parallel to the average results for *horde* (F1= 555 Hz and F2= 1178 Hz). Therefore, as expected, the differences were not significant for the F1 and F2 values for female participants, (F1: $t(24) = 1.836$, $p = .040$; F2 $t(24) = 2.50$, $p = .010$), and for male participants (F1: $t(24) = .177$, $p = .430$; F2 $t(24) = 1.723$, $p = .049$), indicating that there was a lack of vowel contrast between this vowel pair.

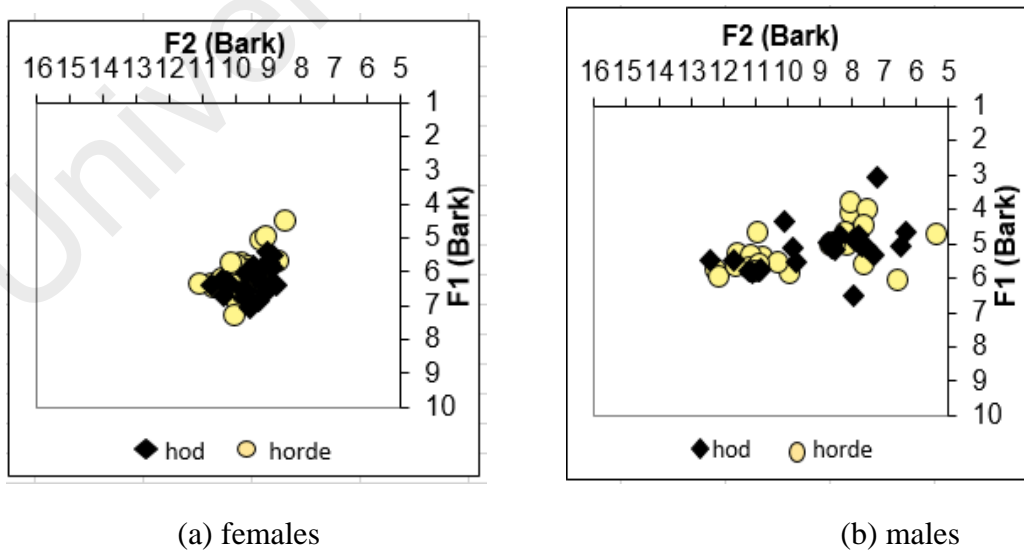


Figure 4.5: Scatter plots of *hod-horde* for female and male Bangla speakers

4.3.3 Vowel quality contrast between *hood-who'd*

The distribution of the vowel pair *hood-who'd* is shown in Figure 4.6 and (a) is for female and (b) is for male speakers. Both scatter plots show a lack of contrast between the vowel pair *hood-who'd*. These vowels also overlap with each other and for male participants. A comparison between F1 and F2 values of *hood* and *who'd* shows that the F1 for the *hood* for female (407Hz) is almost similar to the *who'd* (415Hz) and for male subjects, the F1 for *hood* is also almost similar (326Hz) to the *who'd* (337Hz). The F2 value for the *hood* (827 Hz) is almost similar to *who'd* (830 Hz) for female speakers whereas, the F2 value for the *hood* (980 Hz) is a little bit bigger than for *who'd* (930 Hz) for the male speakers. Therefore, this comparison shows that these two vowels overlap for both sets of speakers. For the male participants, the vowels tend to be placed from the back to the centre of the scatter plot. This lack of quality contrast between the vowels in *hood* and *who'd* was confirmed when no significant differences were found for the F1 and F2 values (female: F1: $t(24) = .617, p = .272$; F2: $t(24) = .117, p = .455$; and male: F1: $t(24) = 1.246, p = .112$; F2: $t(24) = 1.960, p = .031$).

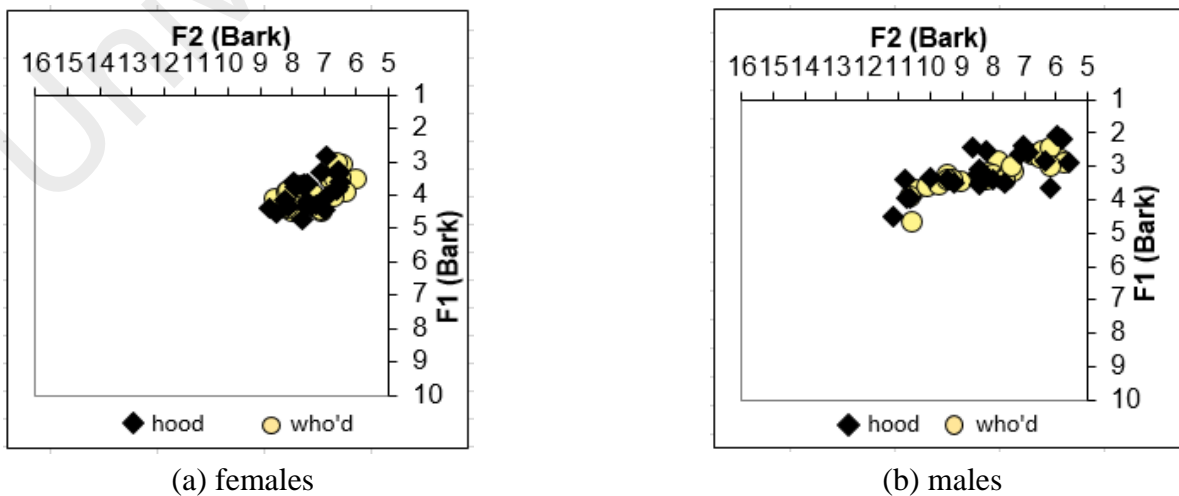


Figure 4.6: Scatter plots of *hood-who'd* for female and male Bangla speakers

4.3.4 Vowel quality contrast between *hud-hard*

Figure 4.7 shows the vowel pair *hud-hard* for both female and male participants. As can be seen, this vowel pair is more centralised for female speakers than the male speakers. For female speakers, this vowel pair tends to be placed in a low central part of the vowel chart, whereas, for male, these vowels are more in a mid-central position. From Table 4.1, it can be seen that for females, the average value for *hud* (F1 = 871 Hz and F2 = 1529 Hz) is bigger than the *hard* (F1 = 774 Hz and F2 = 1497 Hz). For male speakers, the average value for *hud* (F1 = 634 Hz and F2 = 1278 Hz) is almost similar to *hard* (F1 = 615 Hz and F2 = 1321 Hz). For female speakers, the difference was found to be significant for F1 ($t(24) = 6.25$, $p < 0.001$) but not for F2 ($t(24) = 1.20$, $p = 0.12$). However, for males, the differences between F1 and F2 were found to be not significant (F1: $t(24) = .856$, $p = 0.200$; F2: $t(24) = 1.113$, $p = .138$).

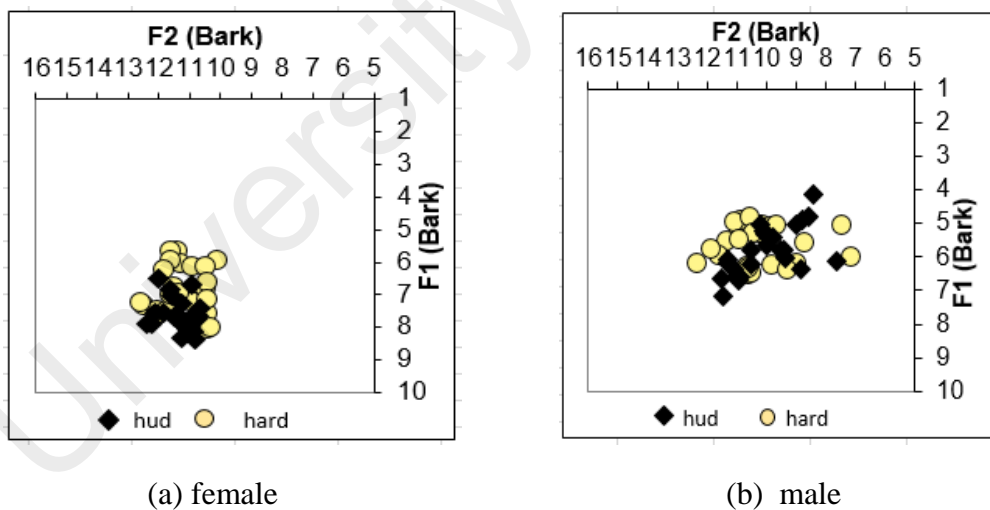


Figure 4.7: Scatter plots of *hud-hard* for female and male Bangla speakers

4.3.5 Vowel quality contrast between *head-had*

Figure 4.8 shows the scatter plots for the vowel pair *head-had*. The scatter plots show that there is a certain amount contrast between these vowels. For females, this vowel pair is more fronted than for the male participants. This vowel pair tends to be placed in the middle to the low front for female speakers whereas, for male speakers, it is more mid front to mid-central in the vowel chart. From the Table 4.1, it can be seen that for female speakers, the average value of F1 for *had* (707 Hz) is bigger than the F1 value of *head* (540 Hz), and the F2 value for *head* (2426 Hz) is bigger than the F2 value for *had* (2037 Hz). For male speakers, the average value of F1 for *had* (564 Hz) is bigger than the F1 value of *head* (415 Hz), and the F2 value for *head* (1997 Hz) is bigger than the F2 value of *had* (1611 Hz). This difference is reflected in an independent sample *t*-test of F1 and F2 which showed a significant difference for male and female participants. For the female participants, the results indicate that there was a significant difference for this vowel pair (F1: $t(24) = 8.881, p < 0.001$; F2: $t(24) = 6.410, p < 0.001$). The same results were obtained for the male participants (F1: $t(24) = 9.848, p < 0.001$; F2: $t(24) = 5.911, p < 0.001$). Thus this was the only vowel pair that displayed vowel contrast.

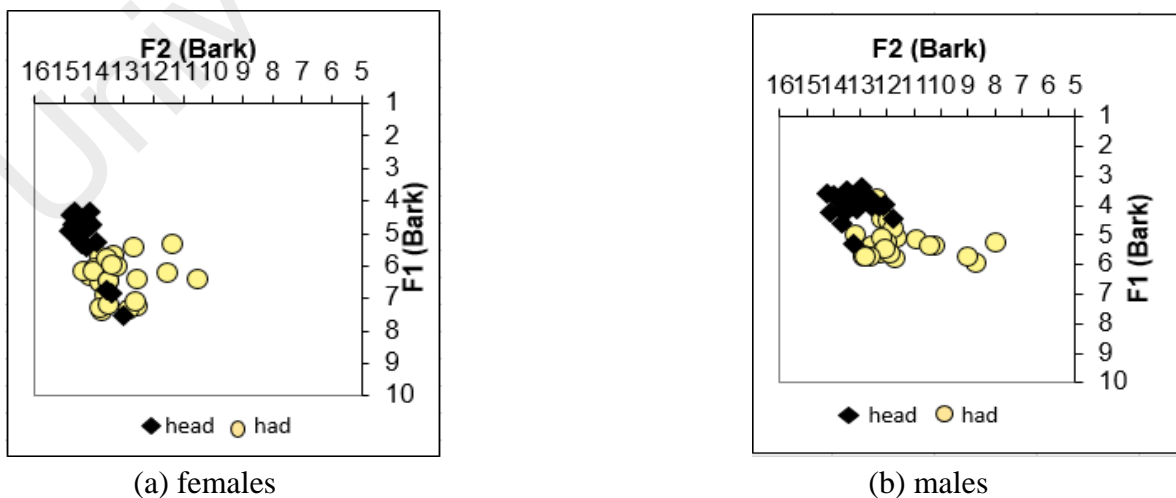
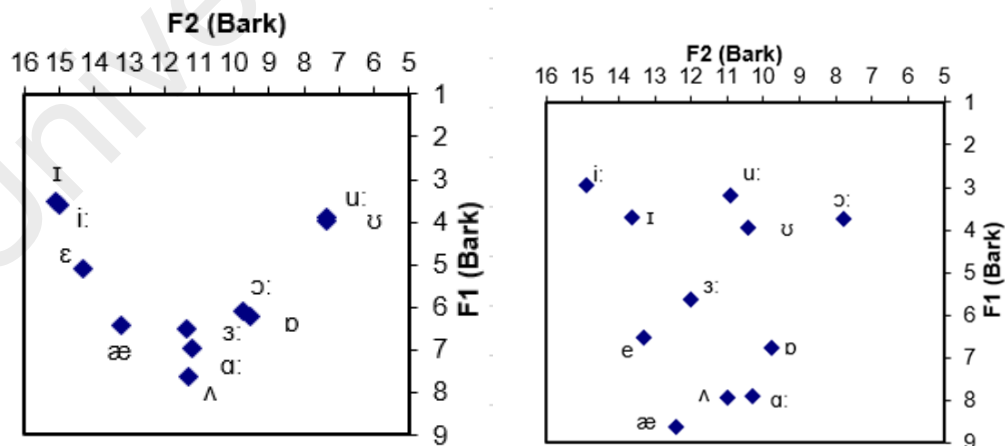


Figure 4.8: Scatter plots of *head-had* for female and male Bangla speakers

4.4 A comparison of British English vowels produced by Bangla speakers

In Bangla, the only equivalent vowel for /ɪ/ and /i:/ is /i /, for /ɒ/ and /ɔ:/ is /ɔ/, and for /ʊ/ and /u:/ is /u/ so, when the Bangla speakers produced these vowels, no significant differences found for vowel quality between /ʊ/-/u:/, /ɒ/-/ɔ:/ and /ɪ/-/i:/. Again, there is only one equivalent vowel sound for vowel pair /ʌ/-/ɑ:/, which is /a/. However, the *t*-test results of F1 for female speakers showed a significant difference. For male speakers, these two vowels were very close to each other and showed a tendency to replace both /ʌ/-/ɑ:/ with their /a/, but female speakers tried to produce these two vowels separately. This suggests that n that Bangla speakers might be influenced by their L1 (Bangla) influence when they produce L2 (English) monophthong vowels.

A comparison was carried out between the vowels in the current study and Standard British English ones from Deterding (1997). The context of both studies is hVd context. Figure 4.9 and 4.10 are shown the average values of F1 and F2 for females and males Bangladeshi English and British English.

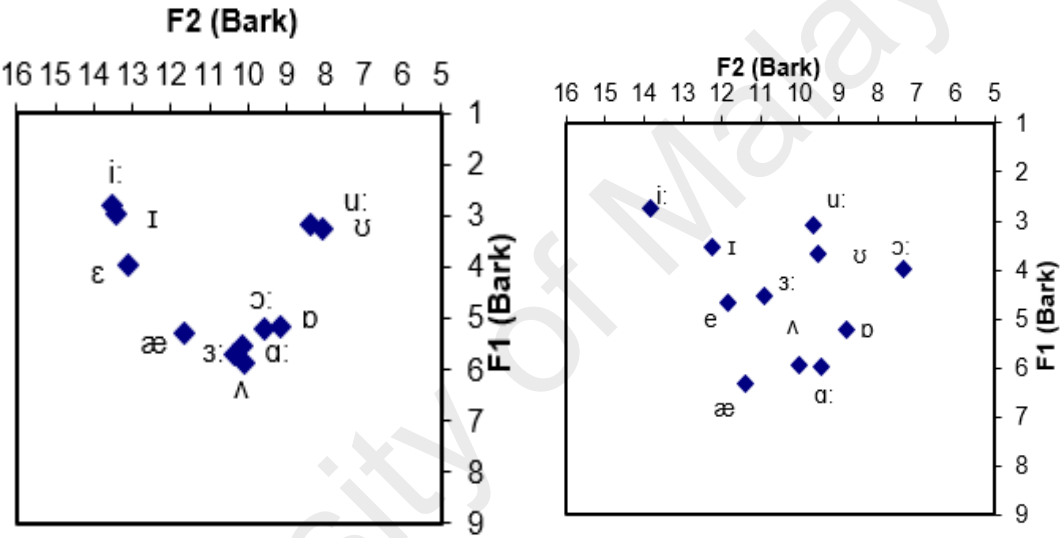


(a) Bangla speakers (females)

(b) British English (females)

Figure 4.9: Vowel charts for Bangla and British English females

Figure 4.9 shows that the vowel pairs /i:/-/ɪ/, /ɔ:/-/ɒ/ and /u:/-/ʊ/ are overlapped of females Bangladeshi English participants whereas, for British English participants they are contrasted. Moreover, the comparison between Bangla-English /ɛ/ and British English /e/ is shown that Bangladeshi English /ɛ/ is higher and fronted than British /e/. Again, the comparison between Bangla-English vowel /æ/ and British English /æ/ is shown that Bangladeshi English vowel /æ/ is higher and fronted than the British /æ/.



(a) Bangla English (males)

(b) British English (males)

Figure 4.10: Vowel chart for Bangla and British English males

From Figure 4.10, it can be seen that vowels pairs /i:/-/ɪ/, /ɔ:/-/ɒ/, /ʌ/-/ɑ:/ and /u:/-/ʊ/ are not contrasted for male Bangla speakers but for British English participants these pairs are contrasted. From this analysis, it can be said that British English and Bangladeshi English are different from each other which is similar to other new varieties of English, such as Malaysian English and Singapore English.

4.5 A comparison of equivalent Bangla and Bangla English monophthongs

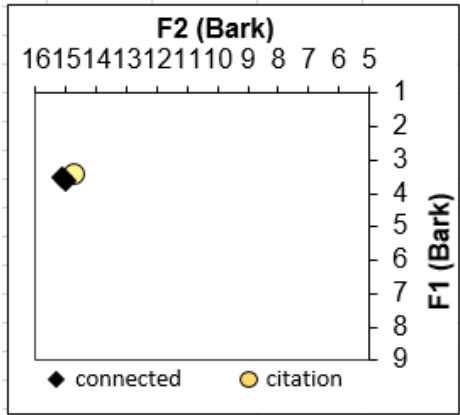
From Table 2.2, it can be seen that Bangla has only seven vowels whereas, British English has twelve vowels including /ə/. Table 4.4 presents the data of Bangla monophthongs from the previous study of Alam, Habib and Khan (2009, p. 9) for comparing Bangla vowels with English produced by the Bangladeshi English speakers (see Table 4.1).

Table 4.4: F1 and F2 values (average) of Bangla monophthongs vowels produced by Bangla speakers (Alam, Habib, and Khan, 2009, p. 9)

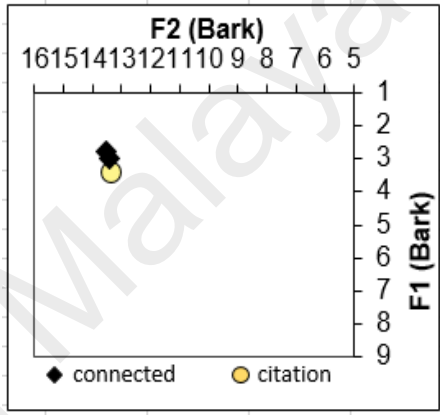
Bangla vowels	Female		Male	
	F1 (Hz)	F2 (Hz)	F1 (Hz)	F2 (Hz)
i	361	2577	357	2059
u	383	1046	347	1001
e	522	1693	481	1807
o	468	1050	423	1035
æ	789	1514	599	1619
ɔ	743	1277	586	1110
a	839	1533	694	1371

Based on the data from Alam, Habib & Khan, Figures 4.11 to 4.18 were generated. In Figure 4.11, it can be seen that Bangla English monophthongs /ɪ/ and /i:/ are very close to Bangla monophthong /i/ for both participants. In Figure 4.12, for female participants, Bangla /u/ is more central from the back than the Bangla English monophthongs /ʊ/ and /u:/ whereas, for male participants, Bangla English monophthongs /ʊ/ and /u:/ and Bangla monophthong /u/ are almost placed in the same place of the scatter plot. Again, in Figure 4.13, for female participants, Bangladeshi English monophthongs /ɒ/ and /ɔ:/ and Bangla monophthongs /ɔ/ are not placed in same place of the scatter plot and Bangla /ɔ/ is more central, however, for male participants, Bangla English monophthongs /ɒ/ and /ɔ:/ and Bangla monophthong /ɔ/ are almost placed in the same position of the scatter plot. In Figure 4.14, Bangla English monophthongs /ʌ/ and /ɑ:/ and Bangla monophthong /a/ are almost close to each other for both male and female scatter plots. Here, it can be observed that in Figure 4.14, all three

vowels are produced from the low position for female participants and for male participants, produced from the low-mid position of the scatter plots due to the L1 influences on L2. From this comparison of Bangla English monophthongs and Bangla monophthongs it can be said that for Bangla-English /ɪ/ and /i:/ the equivalent Bangla monophthong is /i/, for /ʊ/ and /u:/ is /u/, for /ɒ/ and /ɔ:/ is /ɔ/, and /ʌ/-/ɑ:/ is /a/.

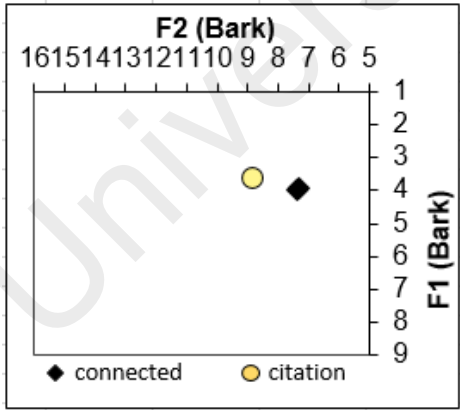


(a) Females

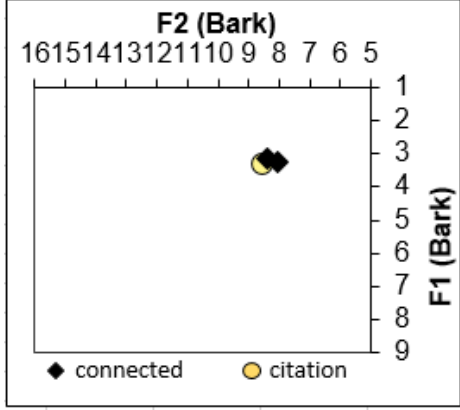


(b) Males

Figure 4.11: Comparison of Bangla English monophthongs /ɪ/-/i:/ (connected) and Bangla /i/ (citation)

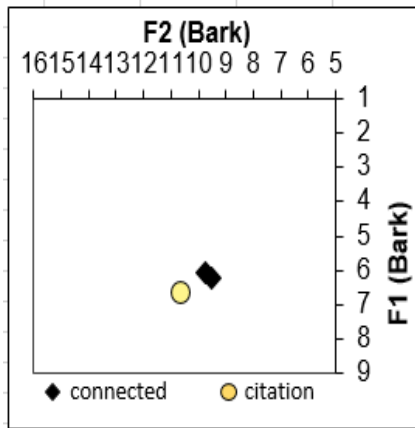


a. Females

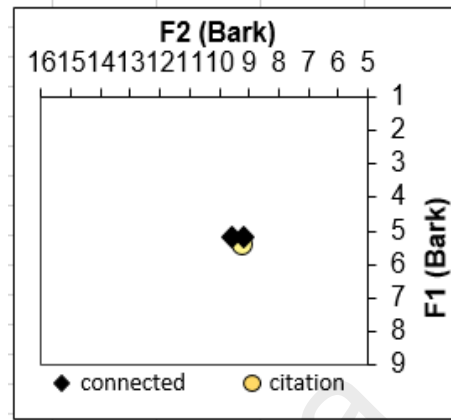


(b) Males

Figure 4.12: Comparison of Bangla English monophthongs /ʊ/-/u:/ (connected) and Bangla /u/ (citation)

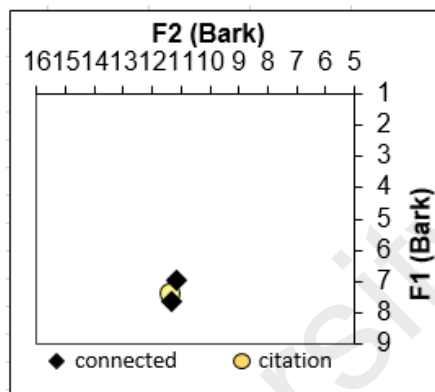


(a) Females

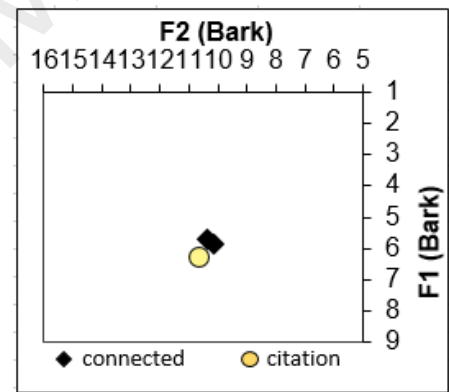


(b) Males

Figure 4.13: Comparison of Bangla English monophthongs /ɔ/-/ɔ:/ (connected) and Bangla /ɔ/ (citation)



(a) Females



(b) Males

Figure 4.14: Comparison of Bangla English monophthongs /ʌ-/ɑ:/ (connected) and Bangla /ɑ/ (citation)

To see whether Bangla English speakers are produced /ɛ/ in their English or /e/, Table 4.5 shows the comparison between the current data (Bangla English monophthongs) of Bangla English /ɛ/ and Bangla /e/ the previous data (Bangla monophthongs) from Alam, Habib, and Khan (2009, p. 8).

Table 4.5: Comparison between Bangla /e/ (previous data) and Bangla-English /ɛ/ (current data)

/e/				/ɛ/			
Female (connected)		Female (citation)		Male (connected)		Male (citation)	
F1	F2	F1	F2	F1	F2	F1	F2
540	2426	521	1692	415	1997	480	1807

A comparison between Bangla English /ɛ/ and Bangla /e/ is shown in Figures 4.15 to 4.16. From the Figure 4.15, it can be seen that for F1, for female, both data for /ɛ/ and /e/ are placed in almost same mid-high position for Bangla English and Bangla. However, for F2, there is different between Bangla-English /ɛ/ and Bangla /e/. Therefore, Bangla English /ɛ/ is more fronted and Bangla /e/ tends to be more centralised.

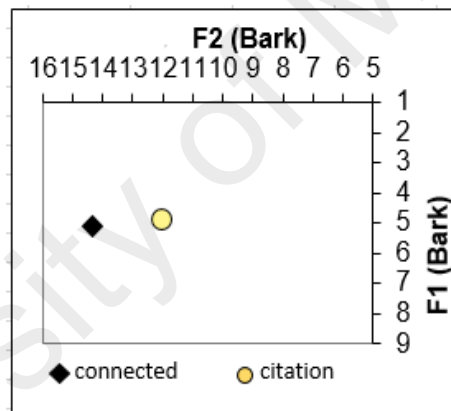


Figure 4.15: Comparison between Bangla English /ɛ/ (connected) and Bangla (citation) /e/ by female speakers

For male speakers, in Figure 4.16, it can be seen that Bangla English /ɛ/ and Bangla /e/ are produced from the almost same position. Therefore, both /ɛ/ and /e/ are very close to each other.

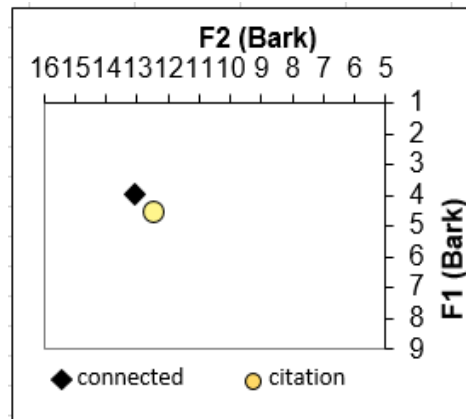


Figure 4.16: Comparison between Bangla English (connected) /ɛ/ and Bangla (citation) /e/ by male speakers

Form Figure 4.15 and 4.16, it can be observed that the quality of vowel /ɛ/ for Bangladeshi English speakers is more like /e/ than /ɛ/.

Table 4.6 is shown the comparison between Bangladeshi English /æ/ and Bangla /æ/. Here connected data is from current study and citation is from previous study of Alam, Habib, and Khan, 2009, p.8)

Table 4.6: Comparison between Bangla /æ/ (previous data) and Bangla English /æ/ (current data)

Vowel	Female				Male			
	Connected		Citation		Connected		Citation	
	F1	F2	F1	F2	F1	F2	F1	F2
/æ/	707	2037	789	1514	564	1611	598	1619

For female speakers, Figure 4.17 shows that Bangla English /æ/ is a little bit higher fronted than Bangla /æ/. On the other hand, for male speakers, both /æ/ almost overlap to each other in Figure 4.18. Overall, it can be said that male speakers show more influence of Bangla /æ/ on Bangla English /æ/ production. The findings of this study again support Deterding (1997) that female speakers have the tendency to be alert with their pronunciation.

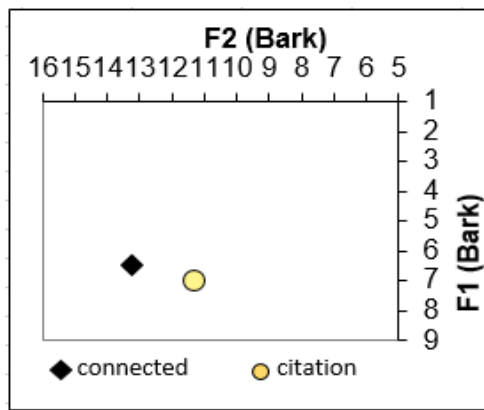


Figure 4.17: Comparison between Bangla English (connected) and Bangla (citation) /æ/ by female speakers

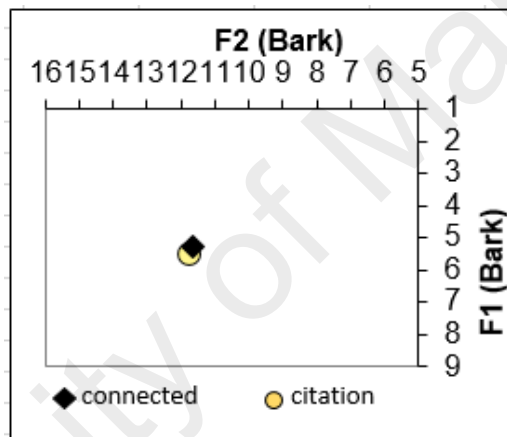


Figure 4.18: Comparison between Bangla English (connected) and Bangla (citation) /æ/ by male speakers

4.6 Discussion

The results of the comparison between Bangla English monophthongs with British English monophthongs shows that phonological process patterns are different of these two varieties of English. In this study, the targeted eleven words were contained the following eleven vowels, e.g. /i/ (*hid*), /æ/ (*had*), /i:/ (*heed*), /ɛ/ (*head*), /u:/ (*who'd*), /ʊ/ (*hood*), /ɔ:/ (*horde*), /ɒ/ (*hod*), /ʌ/ (*hud*), /ɑ:/ (*hard*), /ɜ:/ (*heard*). At first, the quality of each and every vowel in this new variety of English were measured. Unlike British English, the hVd context did not influence each and every vowel production differently in Bangla English. The observed

differences were found between the Bangla English vowels and Standard British English vowels' quality. From Figure 2.1, it can be said that in terms of vowel quality, Standard British English vowel pairs are contrasted. Bangla English speakers' L1 do not contrast in typical vowel pairs. Bangla and English have a different phonological system, especially in terms of vowels. From Figure 4.1, scatter plots 4.3.1 to 4.3.5 and the t-test results of these vowel pairs, it can be said that except /ɛ/-/æ/, in terms of quality, Bangla English vowel pairs are not contrasted though for vowel pair /ʌ/-/ɑ:/ the difference of F1 value was significant but it was not contrasted with F2. It might be a possible reason that vowel pairs of words are sounding alike for Bangla English speakers so, they tend to produce these vowels similarly. Based on vowel quality, this study support Fledge's Speech Learning Model (1995), because the participants were perceived English sounds "similar" to the ones in Bangla sounds so the participants were not developed new phonetic sounds for them. Therefore, they produce the L2 sounds in the same way as they produce in L1. As mentioned in 4.4, the equivalent vowels for /ɪ/ and /i:/ is /i /, for /ɒ/ and /ɔ:/ is /ɔ/, and for /ʊ/ and /u:/ is /u/ and for /ʌ/-/ɑ:/ is /a/, therefore, the vowel pairs were not contrasted by the Bangla English speakers.

Vowel length is also an important feature of the English language but, in Bangla, there is no difference in short and long vowels. However, the findings of the length contrast suggested that Bangla English speakers, who are fluent, were maintained the length differences among the vowel pairs except for vowel pair /u:-/ʊ/ (*who'd-hood*) for males and females and /e/-/æ/ (*head-had*) for females. The results of the vowel pair /ʊ/-/u:/ for male speakers show that short vowel /ʊ/ longer than long vowel /u:/. This is because vowel length for Bangla is not a distinctive or phonemic feature in pronunciation (Hasan, 2013) and Bangla has only one /u/ vowel so that the participants were not made differences between short vowel /ʊ/ and long

vowel /u:/. Here, a small number of phonological divergences from native varieties may occur, but it cannot be said that this is the direct L1 transfer, because if so, others data were also expected to show the same behaviour. From the point of view of Kachru's model of conceptualises (1986), this study also can be interpreted. According to Kachru (1986), Bangla English is under Outer circle which is in the process of developing their own standards. From the findings, it can be observed that Bangla English participants were distinguished the short and long vowels. The changes in the features found in this study have probably taken place over the years.

This study can interpret the data from a World Englishes perspective. A world English perspective is more likely to see variation in pronunciation as a feature of a particular variety of English rather than "wrong" pronunciation. Through acoustic analysis, this study provides a description of the way a 'new' variety of English speakers produce English monophthong vowels. This study shows the similarity to new varieties of English, especially, which were all the under British colonization. In terms of quality, typical vowel pairs are not contrasted like other New varieties of Englishes, e.g. Malaysian, Singaporean, Brunei English, for Bangla English.

4.7 Summary

From the analysis, the findings show the particular characteristics of Bangla English vowels produced by Bangla speakers. From the findings, between the vowel pairs, one of the most distinguishable features found in pronunciation of Bangla English is the lack of vowel contrast. These include maintenance of vowel length contrast in typical vowel pairs. Though Bangla is not phonemically contrasted, both of the speakers maintained phonemic length

contrast for all vowel pairs, except the /u:/-/ʊ/ for both participants and /ɛ/-/æ/ for female participants.

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CHAPTER 5

CONCLUSION

5.1 Summary

In this current study, the influence of Bangla monophthongs found when Bangladeshi speakers produced English monophthongs. Although the speakers maintained length contrast between the minimal pairs of the vowels but could not maintain the difference in terms of quality. Moreover, this study only limited to a specific group of speakers, so, further research is required with a larger sample and a broader scope of participants. The findings which address the two research questions are presented in as follow in a concise manner.

1. Research question 1: What are the qualities of English vowels produced by Bangla speakers based on acoustic analysis of the first formant (F1) and second formant (F2)?

The average result of Bangla English speakers' shows that compared to British English vowels, Bangladeshi speakers occupy a smaller vowel. Most of the vowels overlapped with each other which is similar to other varieties of English. For female participants, /ɪ/ is placed in the highest position whereas, for male participants, /i:/ is placed in the highest position of the vowel charts, but for both participants, /ʌ/ is placed in the lowest position.

2. Research question 2: To what extent do Bangla speakers contrast typical English vowel pairs in terms of vowel length and vowel quality?

In terms of vowel quality and length contrast, some differences were found. In general, both participants were able to maintain length contrast though the differences between short and

long monophthongs were not significant. In terms of quality contrast, the differences for most of the vowels were not significant because of the L1 influences on L2 according to Fledge's Speech Learning Model (1995). From the findings, it has also found that the vowel pairs /ʌ/-/ɑ:/, /ɒ/-/ɔ:/, /ɪ/-/i:/, and /ʊ/-/u:/ are very close to each other for male participants. For the female participants, vowel pairs of /ɪ/-/i:/, /ʊ/-/u:/ and /ɒ/-/ɔ:/ are closer than for the male participants whereas, although the *t*-test result is not significant, the vowel pair /ʌ/-/ɑ:/ is more contrasted than male participants.

5.2. Limitations and directions for future research

The results of the acoustic analysis of Bangladeshi English were closer to the Bangla sounds, however, further research needs to be carried out to determine whether these results are for lack of similar phonetic categories or the existence of similar categories. This study is being confined to a specific group of speakers and also conducted on only vowels and only one speaking context, therefore, further research is required to include other aspects of English pronunciation by Bangladeshi English learners.

5.3 Contributions

Based on an instrumental analysis, the present study provides a description of Bangladeshi English vowels. Though it is not included in research questions, this study also provides a description of how close is Bangladeshi English vowels to Standard British English which is the required teaching model in Bangladesh. The findings also add a milestone to provide information on the way Bangladeshi speakers pronounce English sounds. This study does contribute empirical evidence and complement existing research on Bangladeshi English pronunciation.

5.4 Concluding remarks

Based on an instrumental study, this work does contribute empirical evidence and complement existing research on Bangladeshi English pronunciation, especially on vowels. For future research, the findings from this study also create the spaces on other aspects of English pronunciation among Bangladeshi speakers, e.g. Bangla-English consonant quality, diphthongs quality.

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