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Are non-native speakers' English pronunciation similar?: Evidence through PRAAT recording software

Rakiba Sultana¹

¹ Kean College

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Abstract

This article investigates how two non-native speakers from different countries' pronunciations of the same words and phrases work differently in the phonological structures. The researcher shows the differences in allophones and phonemes between two pronunciations of a single word and a single sentence for both speakers. Also, the article exposes how these two speakers' voices work for a group of the same terms and sounds. The research uses mixed methods, including the interview of the participants for qualitative research and PRAAT recording to analyze the phonological aspiration for quantitative data. This research suggests that there are differences in their Speaking experience between the two groups, with *Speaker A* exhibiting a higher mean length run in the speech than *Speaker B*. The same word has been pronounced using different sounds, creating several phonemes in their speech. The speakers' voices and voiceless sounds are also highlighted in the research. Although they used the exact words to speak, the researcher found several differences in pronunciation and phonological aspiration. This research contributes to the non-native speakers to distinguish and make new plans, and steps to improve their English pronunciation which can be a new milestone for their English education.

Keywords PRAAT recording, Phonological aspiration, voiced aspiration, phonemes.

1. Introduction

This article investigates how two non-native speakers from different countries' pronunciations of the same words and phrases work differently in the phonological structures. In this study, two young female non-native speakers were gathered, one from China, and another from Bangladesh, equally produced two separate recordings, one for a specific word, "think," and another recording for a particular sentence, "I thought that thing." PRAAT recording software is used to analyze the phonological aspiration for quantitative data.

I conduct this research for a number of reasons. Firstly, Teachers in Bangladesh are not well trained to teach students about English in communicative methods, and they prefer a translation way and teaching grammatical rules (Kabir, 2015),

but they don't focus on the pronunciation of students, therefore, Bangladeshi people are away from native speaking. On the other hand, Chinese Schools are also less likely to focus on English very much, therefore, students are away from English learning in typical Chinese schools. However, as Chinese and Bengali both are non-native and both are given chance very little to learn English, and their speaking, sound, and tone are entirely different, the researcher got interested to investigate their English accent through the PRAAT recording software, whether which country's English pronunciation is closer to the original phonological aspiration.

Two major phonological distinctions have been found between the two speakers, Speaker A and Speaker B. One is 'allophones,' and another is "Connected speech patterns." According to Bachu et al. (2008), different speakers' voices can be separated by voiced and unvoiced regions. The types of the speech signal unvoiced and voiced produce an exploratory auditory segmentation for the speech processing suppletion. An allophone is a phonetic variant of a phoneme in a particular language. Allophone works like a distinct variant of a phoneme (Britannica, 2018).

Prior research explained that Speech production is the psycholinguistic conceptualization used by Levelt's (1989). The speech Production Model makes a comparison of knowledge about three elements: the Conceptualizer, the Formulator, and the Articulator (Poulisse 1997). According to De Bot 1996, in the Conceptualizer, the message is initiated by the speaker's drawing on her or his knowledge, and here, it is transformed into a linguistically relevant form. For this reason, the essential lemmas are retrieved in the speaker's mental wordbook. Another prior research examined that the process of the phonetic plan is crossed on the Articulator, where it is perceived as overt speech (Malloy et. al., 2022). All the operations of the speech construction are presumed to happen with the consequence of overlapping while one statement is being articulated and another following statement is enciphered phonologically and grammatically (Lotman et. al., 1990). Additionally, the whole process of speech production is tracked by the speaker. According to Nordquist et al. (2020), Connected speech is a continuous sequence of spoken language, as in a usual way of conversation, with a significant distinction between the way of pronunciations and word isolation. As well as the system of articulation is in the situation of connected speech. In the connected speech, words diphthongs are attached, phrases are rushed together, and those words are stressed separately from the writing (HNILOVÁ, 2014).

To find the answer to the research objectives, this study combines the elements of qualitative research and quantitative research. This study used a mixed method to increase the generalizability of the findings. The data were collected through the PRAAT recording program, a version of 6.2.14 used to analyze the stress and phonological aspiration of two non-native speakers. The research uses mixed methods, including the interview of the participants for qualitative research and PRAAT recording to analyze the phonological aspiration for quantitative data. This research suggests that there might be differences in their Speaking experience between the two groups, with Speaker A exhibiting a higher mean length run in the speech than Speaker B. The same word has been pronounced using different sounds, creating several phonemes in their speech. The speakers' voices and voiceless sounds are also highlighted in the research. Although they used the exact words to speak, the researcher found several differences in pronunciation and phonological aspiration. This study contributes to the literature in several ways: as non-native speakers' pronunciations are not similar, and if their pronunciations are not good, then this research will contribute to non-native speaking countries distinguishing and making

plans in English education. This can be a new milestone for these both countries in their English education sectors.

The rest of the paper is organized as follows: Section 2 describes the literature review and hypothesis development. Section 3 describes the research methodology. Section 4 describes the result, section 5 shows the discussion, and Section 6 analyzes the conclusion.

2. Literature review and hypothesis development

2.1. Literature Review

In the modern era, forensic science or digital computer analysis is definitely a good way to identify the exact result (Binyamin Widi Prasetya, dkk, 2008). PRAAT recording software is such a thing that is helpful to identify the sound spectrum of a specific speaker's voice measurement (Styler, 2013). There are two ways in the production of sound systems that are classified into control of sounds producing phonemes and the production of audible sounds (Alighieri et. al., 2023). Phoneme is the tiniest sound capacity that has an efficient function in the language (Alhazaymeh, & Al-Sadat 2022). Through pumping the lungs, the air inhales and exhales. This air is exhaled by the lungs and departs through the glottal area. As well as the vocal cords produce different types of sound waves by creating vibration. Then the air passes through the throat. From the throat, air passes through the nose and the oral cavity. Then the lips, teeth, tongue, and nose work as indicators to generate a variety of different sounds.

In the study, the principal software is PRAAT. PRAAT is a software which is developed by David Weenink and Paul Boersma of the University of Amsterdam's Phonetic Sciences Department (Maryn et. al., 2017). It is a programming monitoring software that is used to do tutorials on the reconstruction and analysis of aural speech waves (Styler, 2013). The PRAAT recording software can be gotten through the internet, the official website of PRAAT software is <http://www.fon.hum.uva.nl/praat/>.

Septiyansyah (2015) indicated that PRAAT software is capable to record sound from audio devices or microphones. She also mentioned this app can be used to read the sound from the disk or input file. Through the PRAAT recording application, operators are able to identify and see the audio. Precisely, this program is the most flexible program to analyze human sound and speech. Moreover, PRAAT recording software has a vast range of unique techniques such as neural networks, articulatory synthesis, and spectrographic analysis. The development of technology gives a great contribution to the emergence of technological media in the process of forensic linguistics (Surahman, 2021). Voice recording is one of the common language materials to analyze (Surahman, 2021, Shadiev et al., 2020) the voice of the speaker.

2.1. English language in Bangladesh

Bangladesh was an undividable country before 1947, which was included in the Indian subcontinent. As well as undivided India was ruled by British colonies for two hundred years with Pakistan and India. India got independence from British

colonial rule in 1947, and Bangladesh becomes a part of Pakistan until the independence war of Bangladesh in 1971. English has disappeared due to the independent war of 1971 in Bangladesh (Banu & Sussex, 2001a; Moniruzzaman, 2009; Rahman, 2005). After the Liberation war, the English language is generally used in Bangladesh to possess a position as the second language and Bangla took the position as a mother tongue (Ara, 2020). Later, the Bangla language got the status to be the only official language here after 1952's language movement and English lost its position, even though it lost its glory. As well as till now the official status of English in Bangladesh is not decided yet.

Hence Bangladesh was ruled by a British colony for two hundred years till 1947, (when Bangladesh was a part of the Indian subcontinent) there is an importance in studying English.

Several sectors in Bangladesh such as the education sector, judiciary, administration, etc. are used to communicate in English (Moniruzzaman, 1979). English is remained the official and second language of India and Pakistan, due to the varieties of dialects of different areas. On the contrary, its position has been changed in Bangladesh just because of its only one native language "Bangla Vasha" (Bengali language). As, the only reason for the liberation war between Bangladesh and Pakistan is the deepest root (Skutnabb-Kangas and Philipson, 1989) in history is its native language. Moreover, because of the ongoing national feelings, the policies of Bangladesh have been changed, and it has started to declare Bengali should be the only official language. As it's also not clearly mentioned about the English language is somewhat of a second language or official language at all, therefore, Bangladesh has been starting to away from English after the liberation war in 1971.

However, time is changed, as well as People's emotions also be faded but are not removed. World has been globalized widely, To do so, to keep balance the world, English has become a significant role in international communication. Nowadays, the education sectors have been enriched in Bangladesh (Erling et al, 2012). At the Public and Private University levels, all courses and books are in English version in Bangladesh. Therefore, teachers generally used English in their teaching. Therefore, the English language is worked as an omnipresent spectacle in all spheres of Bangladeshi people (Ara, 2020).

2.2. English language in China

The emphasis on the English language in China arose in 1979 just after the Cultural revolution. Before 1979, China was not worried about other English. Then Open Door Policy has been established in China by tying a diplomatic relationship between China and USA. However, around 2007, the number of English speakers has been raised to over 200 million including 50 million secondary school students who are learning English now. According to Ran et al. (2020), Pure Chinese Universities use textbooks that are published in China, and if it's published in China definitely they are written in the Chinese language, not English, so Chinese Universities hardly ever provide international textbooks. If the question comes Bangladesh use the English version of a textbook at the university level, then the very fast question comes, what's wrong with China why they don't use English version textbooks? Firstly, English versions of international textbooks are expensive. As the cost of textbooks is subsidized by the Chinese government (Ran et al., 2020), the price of the English version of textbooks is much higher than the Chinese version of textbooks (Fuzong, 2003). Secondly, the language

barrier is another important reason, as China is not an English-speaking country, the Chinese Education Ministry has not only encouraged to learn only English but both Chinese and English since 2003 (Chinese Ministry of Education, 2003; Li & Wang, 2010), the undergraduate level of English education is still very basic and doesn't have any specific goal in English (Cai, 2010).

Tong et al (2020) also noted there is no strong evidence to support the effectiveness of bilingual education in Chinese universities. Consequently, using English textbooks in class is inconsistent with the English proficiency of students in pure Chinese universities. Finally, the political factor. Specifically, in 2016, Xi Jinping, the president of China, openly instruct that textbooks must represent the state's power and convey the will of the state (Xu, 2021). Following President Xi's instruction, the communist party of China Central Committee & State Council (2016) issued the first instruction on the textbooks for schools and universities as follows: "*Establishing a National Textbook Committee to direct and coordinate the national textbook work...following the instruction from the state and China Central Committee & State Council*". Hence, English textbooks from international publishers are rarely used in traditional Chinese universities because of the price of the English textbooks, Chinese Students' English proficiency, and the political factor.

So, after investigating the huge history of Bangladesh and China, it can be formulated that there is a huge gap between learning English and teaching English in China and Bangladesh, therefore, the researcher choose these two countries as her sample whose' English learning backgrounds are different. To do so fill up this gap to investigate these two questions:

1. Do non-native speakers from different countries' pronunciations of the same words and phrases work similarly or differently?
2. Do the allophones and phonemes work differently or similarly for non-native speakers from different countries?

So, it seems that the English language has ups and downs position in Bangladesh as well as in China Therefore, it might be a reason to identify Bangladeshi and the Chinese modern generation's pronunciation; the same words and phrases work similarly or differently. In China, Chinese Universities do not provide an English version of textbooks and materials for all major students (China Central Committee & State Council, 2016) however, in Bangladesh, textbooks and teaching materials are provided in English version (Hamid & Jahan, 2020) except the Bengali language course in all Public and Private Universities for all majors students. So, the researcher finds there is a difference in enhancing English knowledge between these two non-native-speaking countries. Therefore, it is crucial to investigate whether the allophones and phonemes work differently or similarly for these two non-native countries 'speakers. Based on the above argument, this study develops following hypothesis

- H1a: *there are differences in their Speaking experience between the Chinese and Bangladeshi speaker*
- H1b: *there are no differences in their Speaking experience between the Chinese and Bangladeshi speaker*

3. Research Methodology

3.1. Research design

A research design is a plan or framework for conducting research. It is used for a smooth guideline and analyzing the data. According to Yin (2003) and Sultana (2022), there are several conditions for choosing a research design and what the researchers intended to find out is one of the conditions among them. So, selecting an appropriate research design would help researchers address the research questions well.

This study uses mixed methods both quantitative and qualitative data. Qualitative data is analyzed by the in-depth interviews of the participants and PRAAT recording to analyze the phonological aspiration for quantitative data.

3.2. Ethical consideration

Ethical principles are followed based on the guidelines of the Sino-Foreign University's Ethics Committee. Following Bryman (2016), I confirmed the basic ethical principles such as voluntary participation of the respondents, there will be no physical or emotional harm to the participants, and the participant's identity (identity as name and ethnicity) being protected. Besides, following Wilson & MacLean (2011), confidentiality and privacy are ensured. All participants ensure confidentiality by indicating them "Speaker A" and "Speaker B". Participants have not bounded to comment on topics that they will consider personal.

3.3. Data sampling

The data for this study were taken using PRAAT software, which has been entirely completed on a laptop. The researcher chose two students who studied at an American university and came from two non-native countries.

3.4. Participants and procedures

Two young female students produced equally two separate recordings, one for specific a word, "think," and another recording for a particular sentence, "I thought that thing." For the first recording, the researcher used it to identify the allophones. And for the second recording, the researcher has identified "the connected speech patterns" between two speakers. In this study, the first speaker is mentioned as 'Speaker A', and the second speaker is mentioned as 'Speaker B.' Speaker A is a female. She was born in Bangladesh, English is her second language, and her mother tongue is Bengali. She belonged to a Banglish environment in the Capital of Bangladesh, Dhaka, and she is fluent in English. She is 22 years old. From the beginning of her life, around four years old, she had learned English terms. But not fluent in English speaking.

On the Contrary, Speaker B is of Chinese nationality born in Chongqing, China. Her mother tongue is Mandarin Chinese. English is also her second language. She is 19 years old. She is a student in Honors, majoring in Economics. Both speakers are studying at a Sino-American University.

3.5. Setting

This study is conducted with students at a Sino-American University in China. This University is authorized by jointly American and Chinese. Although it is a Sino-American University, it is situated in the Chinese Environment, a traditional Chinese rural zone where people are less likely to speak English. Most of the students are Chinese. There are very few students who are non-Chinese and international students. So, Chinese Students are used to using Chinses rather than English in their daily life. As Even international students also need to learn Chinese to communicate with shopkeepers, cleaner or security guards daily communicating, as those people are not able to speak in English. Therefore, although the overall environment is a Sino-American University, the location is in an underdeveloped culture, which can be a common problem for fewer students (both Chinese and international) on the campus and in their daily life except for talking with teachers.

3.6. *Research Instruments*

Several instruments were used in this research to collect data. Qualitative data was collected through interview, and quantitative data were collected by using the PRAAT recording software program, which is a version of 6.2.14 were focused on analyzing the phonological aspiration and finding how differences in allophones and phonemes between two pronunciations of a single word and a single sentence for both speakers.

3.7. *Data analysis*

To analyze the qualitative data, firstly, the researcher transcribed the recorded sound. Next, the transcription data which is contained the phonetic form of English spelling through the processing into the graphic PRAAT recording software. PRAAT is software that is used for the purpose of recording and flexible sound analysis as well as reconstruction. PRAAT could be used for several sound and recording purposes, such as spectrogram analysis and sound reconstruction, and for creating diagrams and drawings, which can be used in scientific research (Rahmatunisa et al., 2021). The PRAAT software program is strongly demanding software that is highly needed by researchers who use acoustic data (Jadoul et al., 2018). Generally, the information is completely and accurately generated through empowering the PRAAT program (Rahmatunisa et al., 2021).

4. Results

Figures 1 and 2 show the voicing and voiceless aspirations of Speaker A and Speaker B. Comparing two speakers' single word recording to identify the allophones and phonemes proves how different those speakers' phonological aspiration and pronunciations. In this study, during Speaker A's pronunciation, the word 'think' had been started from the sound level 0.02 in 'figure 1:a', where Speaker B started from 0.14 in the 'figure 2:a'. During that time, it was voiced aspiration, and then the voice had been made nothing between burst and vowel that means it was mute during the Speaker A's aspiration reached in 0.16 in the 'figure1:b' on the contrary, Speaker B's sound level was in the same level like before 0.14 in the 'figure 2:b'. That means Speaker B's voice didn't move yet, and it belonged at the same level. Again, 'Speaker A' had created Voiceless aspiration between burst and vowel during 0.23 level in the 'figure 1:a' and 'Speaker B' had been reached in

0.09 level of aspiration in the 'figure 2:b'.

Speaker A:

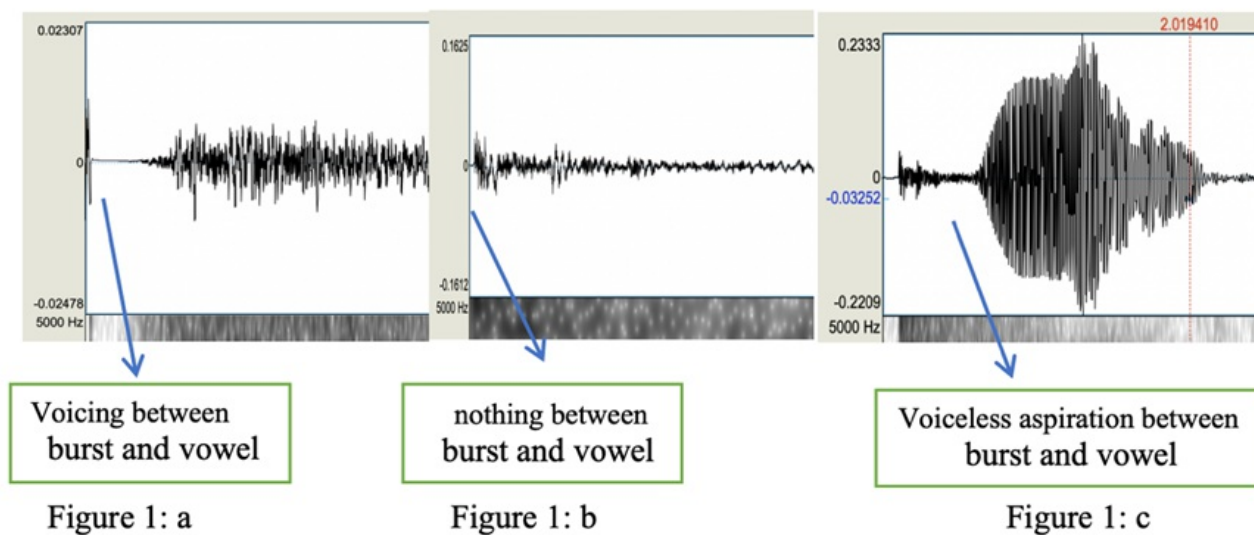


Figure 1:a, 1:b, 1:c.

Speaker B:

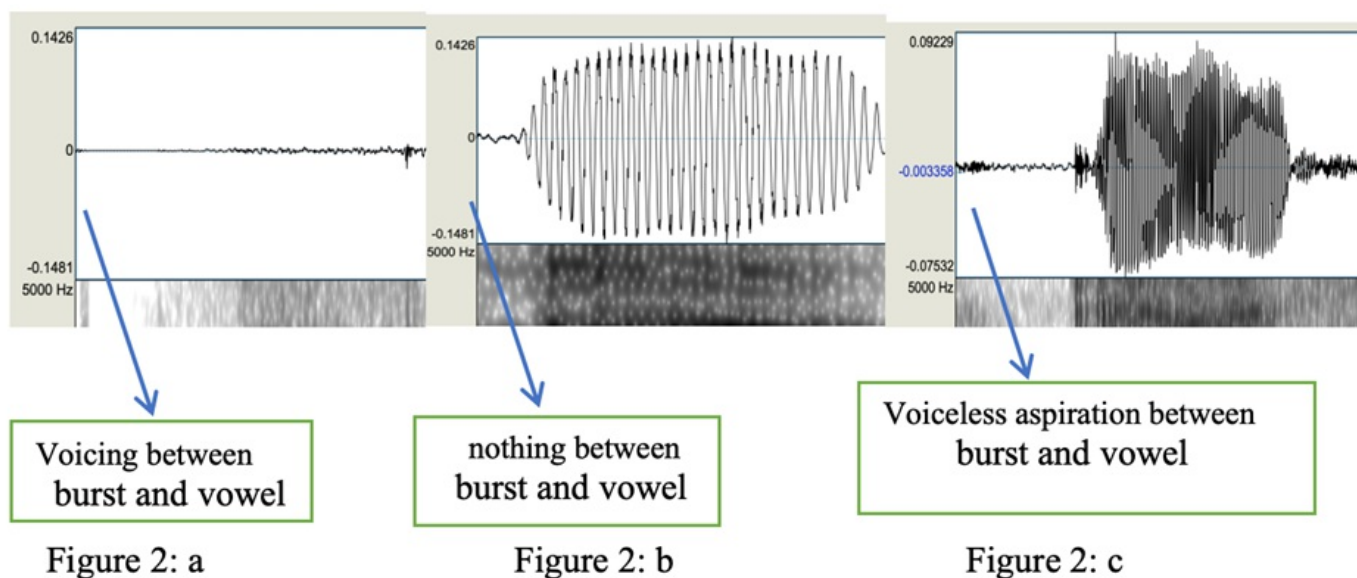


Figure 2:a, 2:b, 2:c.

Figure 3: a and Figure 3: b represent Speaker A. Figure 4: a and Figure 4: b represent Speaker B. Figure 3: a and Figure 4: a expose the waveform, the spectrogram, the annotation tier for the orthographic transcription of a word "Think".

Similarly, Figure 3: b and Figure 4: b generate the phonemic transcription of both words recorded individually. Figure 3:a and Figure 3:b explore the stress level of pronunciation of Speaker A. From the beginning of the level, It creates a deeper tone from top to bottom. Likewise, Figure 4: a and Figure 4:b show the stress level of pronunciation of Speaker B, which had been very light in the beginning, and is different from Speaker A. As Speaker B makes the sound /θ/. speaker A creates /th/ sound. However, the two speakers distinguished their pronunciation, which created two different phonemes in their sound. The second feature is the connected patterns of the two speakers, making significant differences between the two speakers.

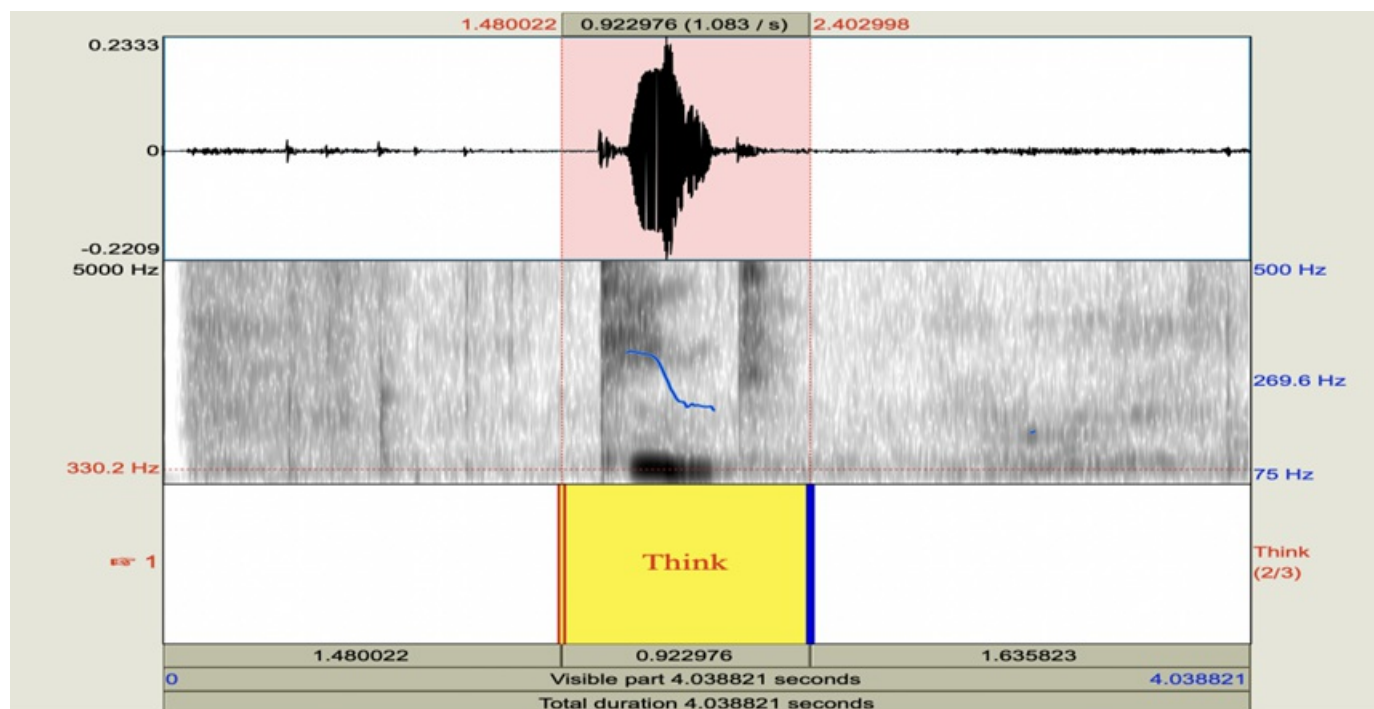


Figure 3:a. (Speaker: A)

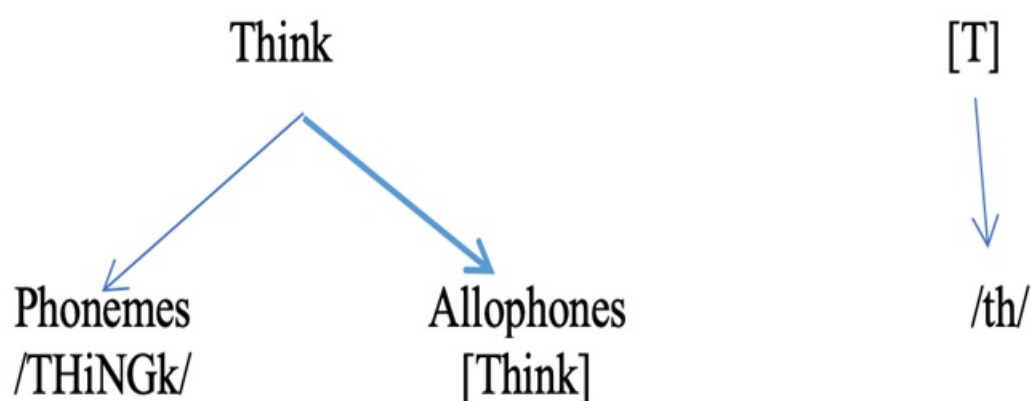


Figure 3:b. (Speaker: A)

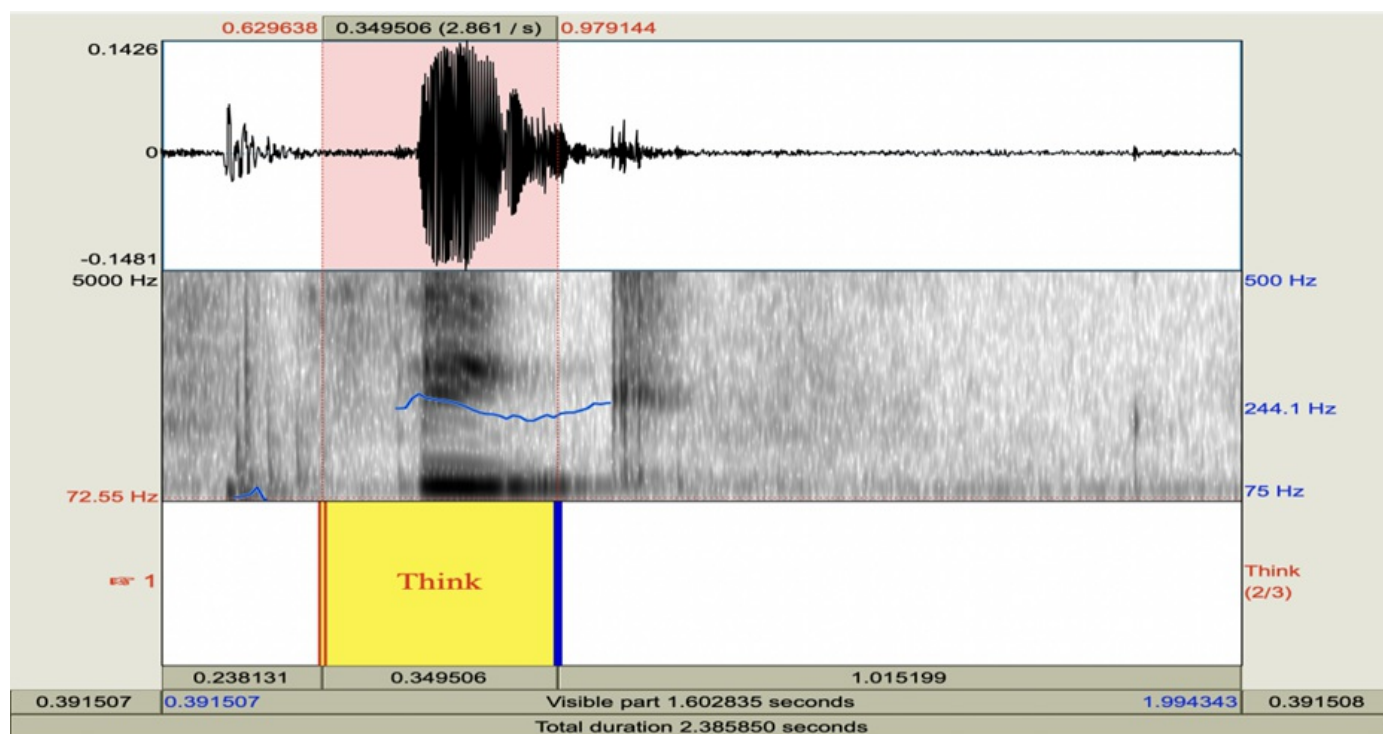


Figure 4:a. (Speaker: B)

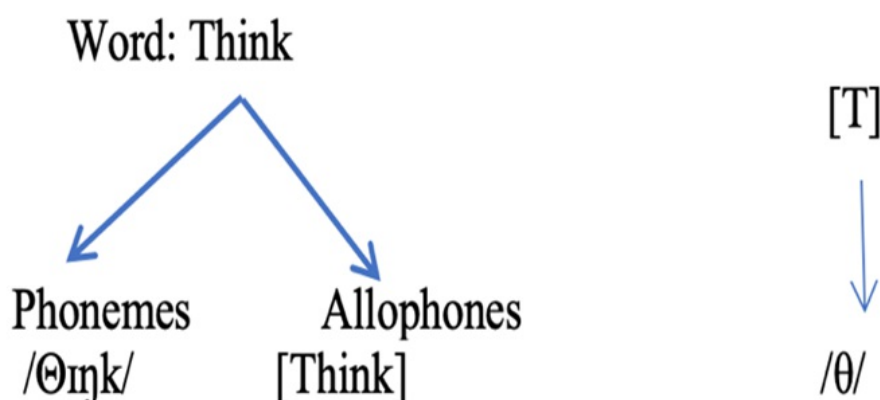


Figure 4:b. (Speaker: B)

Figure 5 shows Speaker A and figure 6 shows speaker B which explores an extract from a broadcast talk from 'Speaker A' and 'Speaker B' that was phonemically aligned and eventually manually corrected in PRAAT. From the beginning to the end, it exposes the waveform, the spectrogram, and the annotation tier for the orthographic transcription of the phrase. It is generated the phonemic transcription of both words recorded individually. Figure 5 and figure 6 show that 'Speaker A' has been significantly higher in the scripted broadcast talks, the starting level is 200.7 Hz than 'Speaker B', the starting level is 97.63 Hz. And for the ending level, both of the speakers have also dissimilarities. For 'Speaker A', it is shown at the level of 235.1 Hz, whereas for 'Speaker B', it is 234.6 Hz, which is not a little different but significant differences.

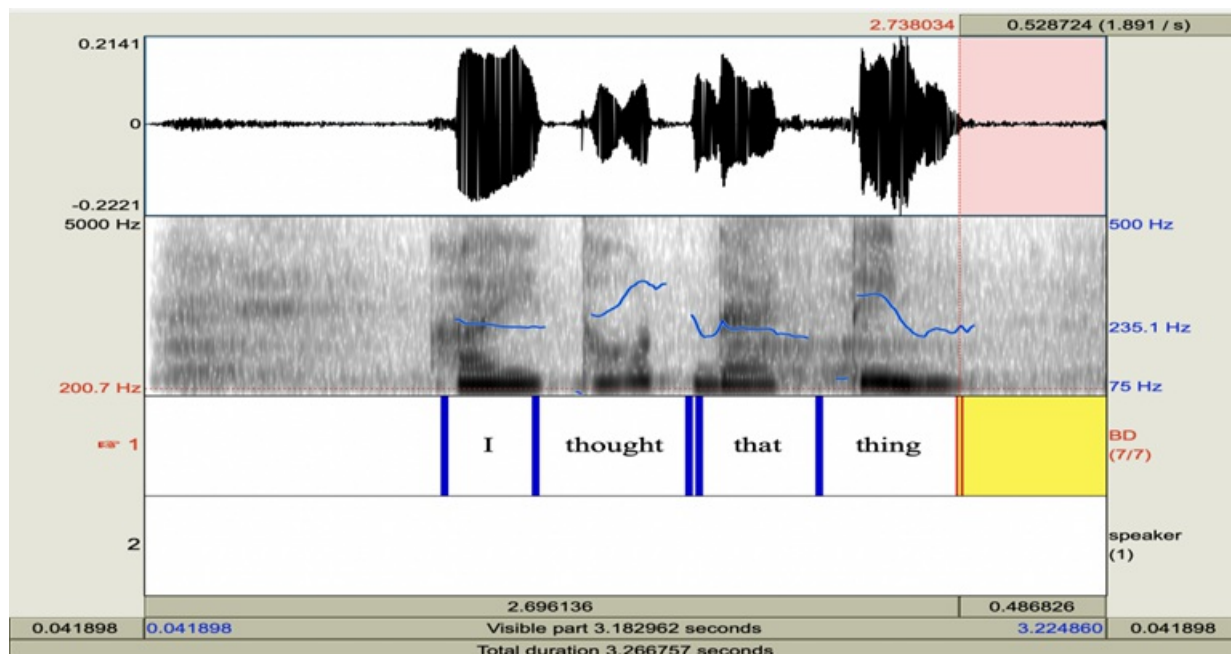


Figure 5. (Speaker A)

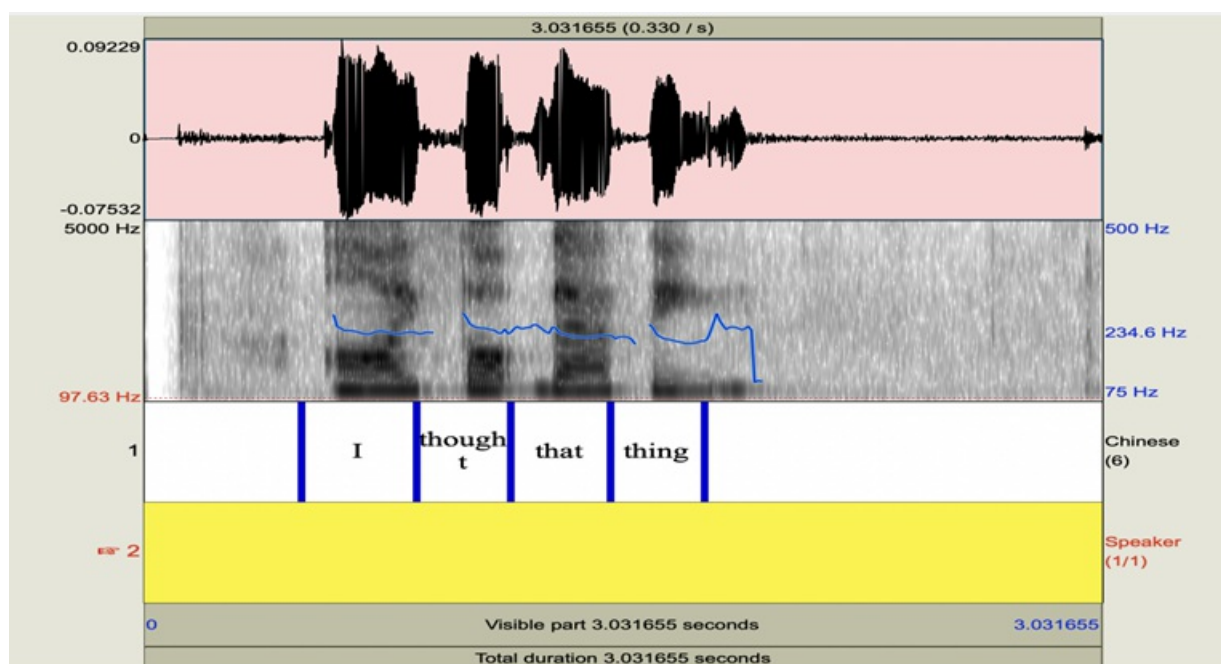


Figure 6. (Speaker B)

5. Discussion

The study found the differences between two nonnative speakers pronunciation and phonological aspiration. Although they speak same words and phrases, the result suggests that two speakers' phonological aspiration are not similar. The stress level of pronunciation for Speaker A is stronger than the stress level of the pronunciation of Speaker B. 'Speaker A' explores the phonemes "/THiNGK/" of the allophone's 'Think'. Because the result found she has the "/th/" sounds for allophone '/T/' Where, for the 'Speaker B' the result shows the phonemes "/Θiŋk/" of the allophone's 'Think', as she

creates “/θ/” sound for allophone ‘/T/’.

Similarly, this research also found in their speaking experience between the two groups, with Speaker A exhibiting a higher mean length run in the speech than Speaker B which refers that there are pretty differences for the pronunciation of same sentence, ‘I thought that’. Furthermore, the study also proves the allophonic distinction in their speech. The same word has been pronounced using different sounds, creating several phonemes in their speech.

6. Conclusion

This research suggests that there are differences in their Speaking experience between the two groups, with Speaker A exhibiting a higher mean length run in the speech than Speaker B. Furthermore, the study also proves the allophonic distinction in their speech. The same word has been pronounced using different sounds, creating several phonemes in their speech.

The research exposes the distinction between the two non-native English speakers’ allophones and phonemes in their speaking through the PRAAT recording. The speakers’ voices and voiceless sounds are also highlighted in the research. Although they used the exact words to speak, the researcher found several differences in pronunciation and phonological aspiration which proves that there is not any relationship between the two speakers’ pronunciations although they study at the same University. Because there is discrimination in both countries’ English language learning. So, both Bangladeshi and Chinese modern generation’s pronunciation; of the same words and phrases work differently as well as the allophones and phonemes also work differently for these two non-native countries ‘speakers. This study contributes to the non-native speaking countries who don’t provide good English background or pronunciation to make new plans, and steps to improve their English education.

The researcher used several words to examine the non-native speakers’ phonological aspirations. The participants are also few in this paper which doesn’t bring a possible result. However, in the future, the researcher will add more participants with more words for the Praat recordings and get the possible answers.

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