English Pronunciation of Punjabi Speaking Youth: A Phonemic Analysis of Diphthongs

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ABSTRACT

This study investigates the influence of the Punjabi language on the articulation of selected English diphthongs. Although Punjabi is the dominant vernacular across the province of Punjab, proficiency in English constitutes a critical prerequisite for both educational attainment and professional advancement. Accordingly, scholarly inquiry into the extent to which Punjabi shapes English pronunciation is of considerable significance. The empirical data for this study were collected through audio recordings of twenty male and twenty female participants. These recordings were systematically analyzed using Praat 6.4.15 software and subsequently compared with corresponding productions by native English speakers in order to evaluate pronunciation discrepancies. The findings are presented through tables, column charts, bar charts, and spectrographic sound waves. The investigation specifically focused on the effect of Punjabi on English [eɪ] and [əʊ] diphthongs. The results demonstrate that the differential between the first and second formant frequencies remains largely invariant in the participants' productions. This occurs because speakers exhibit a marked tendency to prolong the initial vowel element of the diphthongs. Consequently, the expected glide from the first to the second vowel target is either attenuated or absent which leads to a phonetic articulation that diverges from native English norms. This study highlights the pedagogical importance of equipping Punjabi youth with more accurate English pronunciation skills. Future research should extend this line of inquiry by examining additional phonological and prosodic features of Punjabi that exert an influence on English pronunciation.

Key Words: Phonemes, consonants, praat, fricative, plosives, voice onset time

1. INTRODUCTION

The first language invariably exerts an influence on second language acquisition. In some cases, it facilitates the learning of the second language but sometimes it impedes the mastery of particular features of the target language. Consequently, the effect of the first language on the acquisition of a second language has been the subject of extensive scholarly investigation. The Punjabi language also exerts a strong influence on the English pronunciation of learners from Punjab. Youth from this region frequently encounter difficulties with English sounds due to the phonological interference of Punjabi. It affects not just their English pronunciation, but also their Urdu pronunciation which makes this study even more significant. Authar (2018) observed that the first language invariably exerts some degree of influence on second language acquisition. The present research reinforces this view by demonstrating that the Pakistani dialect of English incorporates features that can be directly attributed to the influence of the Punjabi language.

However, a reasonable amount of research has been done on the influence of Punjabi on the English pronunciation of the learners from Punjab but some areas need some more research work to be done. 'English has been studied phonemically in various researches, and Punjabi is no exception. However, the work on Punjabi phonology is far less than that of English' (Chohan, and Garcia, 2019, p. 3). The influence of certain phonemes of Punjabi need to be explored to understand how they influence the English pronunciation of Punjabi youth. There are some phonemes which are present in the phonemic system of English but are not present in Punjabi language. The Punjabi learners of English tend to replace these English phonemes with some Punjabi phonemes which ultimately affects their overall pronunciation. This influence of Punjabi makes it a bit challenging for the young learners of English to avail opportunities on international platforms when they want to teach English online or if they wish to join multinational companies to work abroad. The study lets us know how Punjabi language, as the mother tongue, influences the English pronunciation of youth from Punjab. By figuring this out, the teachers can create new ways to teach English to the young learners of English from Punjab. The students, on the other hand, can learn the tricks to improve their pronunciation to avail online opportunities. So the aim of the present research is to explore the influence of Punjabi on the articulation of certain diphthongs. This research is limited to these sounds to see how they are affected by the Punjabi language when the young people from Punjab learn English.

2. LITERATURE REVIEW

The languages spoken in different provinces of Pakistan make up a rich linguistic tapestry. Among all the other languages spoken in Pakistan, Punjabi stands out as a major language spoken by most of the 112 million people living in Punjab. Punjabi language is not only the native language of the people living in Pakistani Punjab, but it is also the native language of most of the 32 million people living in Indian Punjab as well. A diphthong actually combines two vowels sounds in which one sound glides to another sound smoothly. The learners of English who learn it as their second language struggle with diphthongs especially if they do not have these sounds in their native languages. For instance, Indonesian learners of English have tough time understanding and pronouncing diphthongs. Palupi (2021) explored that the Indonesian learners of English as a second language replace [aʊ] diphthong of English with mid back vowel [ɔ] which changes their pronunciation to a greater extent. This research shows that the Indonesian learners of English struggle with [aʊ] sound because they tend to replace it with [ɔ] sound. For instance, they pronounce the word "house" [haʊs] as [hɔs] that indicates a sort of deviation from the standard pronunciation of this word.

The study was conducted involving ten Indonesian participants who were learning English as a second language. These ten participants were divided into two groups. One of the groups was experimental group and the other one was control group. The control group was not given any training but the experimental group was trained for a couple of weeks to pronounce English diphthongs ([aɪ], [aʊ], and [ɔɪ]) correctly. The learners of control group changed diphthongs into long monophthongs, so did the participants of experimental group in the beginning. But the participants of the experimental group showed improvement after training when their pre-training and post-training recording were compared and analyzed by three native speakers of English. Indonesian learners of English have tough time with [aɪ] sound as well. "Participant 4 in his pretest were found out that he produced the word [taɪm] as [tem]" (Palupi, 2021, p.65). They sometimes replace this diphthong with a monophthong [e] to make pronunciation a bit easier for them. It shows how Indonesian language affects their pronunciation of English diphthongs.

Chinese learners of English as a second language have difficulties pronouncing diphthongs as well. Pan, Xiaojing, and Jiaying (2024) commented that the diphthong [ɔɪ] causes problems for the Chinese students of English because they tend to replace this diphthong with long [o:] sound which is found in Chinese but this is not the right replacement of the diphthong [ɔɪ]. This research shows that Chinese students of English struggle with [ɔɪ] diphthong especially when this diphthong is used in two-syllable words. For example, the word

“boiling” [bɔɪlɪŋ] is a two-syllable word which has [ɔɪ] sound in it. This word is pronounced as [bo:lɪŋ] by the Chinese learners of English who replace [ɔɪ] diphthong with long [o:] sound. This is an example of negative transfer where some features of the native language of the participants affect their articulation of some words of their target language.

The same diphthongs [ɔɪ] proved to be problematic for the Serbian students who want to learn English as their second language. According to Marković and Jakovljević (2024):

> While producing /ɔɪ/, the subjects tend to pronounce the first target element as a somewhat closer sound of /ɔ:/ quality in words such as boys or joys where the sound is supposed to be longer. This also indicates that the subjects tend to transfer the phonological rules of their mother tongue, in which the longer realization of /o/ is considerably higher (closer) than in short syllables. (p. 124)

This research indicates that the native speakers of Serbian firstly tend to prolong the first syllable of the words which have [ɔɪ] sound in them. Secondly, they pronounce it as [ɔ:] monophthong rather than [ɔɪ] diphthong. This is another example of how the influence of a native language changes English diphthongs into monophthongs. In this research, 31 sentences were given to the participants to do the recording in a soundproof room. Each sentence had two different monosyllabic words containing diphthongs. The participants were 15 Serbian learners of English as a second language who were not given any phonetic training. The same sentences, which the participants recorded, were also recorded by three native speakers of English, two British and one American, so the recordings of the Serbian participants can be compared with them. All the recordings were analyzed using Praat software. The measurements included the durations of the diphthongs articulated by the participants, all three formant frequencies, intensity and pitch. The findings indicate that the participants tend to pronounce [ɔɪ] diphthong as a long monophthong which resembles to this sound [ɔ:] in English.

The learners of English as a second language often tend to replace an English diphthong with the closest available sound in their native language if that diphthong is not found in their language. This replacement of a diphthong with another sound makes it easier for them to pronounce a word but their pronunciation of that word is affected. Hussain (2011) commented that Urdu and Punjabi languages change and reshape English vowels sounds to the closest sounds found in Punjabi and Urdu. This vowel substitution changes the pronunciation of certain words of English. In this research, 421 English loanwords which are used in Urdu were transcribed and analyzed. Another source provided 292 words which were collected from Punjabi dramas and real-life conversations, were also analyzed by the researchers. The

International Phonetic Alphabet's symbol [:] was used to distinguish long vowels from short vowels. The transcriptions of the 421 loanwords used in Urdu and 292 words collected from Punjabi films and real-life conversations show that [ɒ] sound of English is replaced with [a:] sound in Punjabi, and the same sound is changed [o:] sound in Urdu. For instance, 'copy' [kɒpɪ] becomes [ka:pɪ] in Punjabi and [ko:pɪ] in Urdu. The research also shows that the diphthong [ɔ:] changes into [a:]. For example, the word 'ball' [bɔ:l] becomes /ba:l/. And the diphthong [eɪ] is changed into long /e:/ sound by the Punjabi speakers. This research gives valuable insights into how vowel sounds are changed with the closest sounds available in Punjabi and Urdu. But this research is a social study which analyzed how these vowels are replaced by with the closest sounds by the people of a particular society. The changes in pronunciation which are discussed in this research are made by the Punjabi speakers who are not well-educated. They tend to change the words like 'time' [taɪm] into [tæm] which shows how their native language influences their pronunciation.

The English learners from Punjab face challenges of pronouncing diphthongs correctly. For instance, they find it hard to pronounce the word "take" [teɪk] and tend to replace [eɪ] diphthong with a long [e] sound. Farooq and Mahmood (2017) explained that sometimes learners of English from Pakistan change /ɔɪ/ sound into /ɔe/ sound. This research indicates that the learners of English have hard time with English diphthongs. They find it easier to pronounce words like 'boy' and 'joy' when they replace [ɔɪ] sound found in them into [ɔe] sound. Here the learners replaced a diphthong with another diphthong but sometimes, as it is mentioned earlier, some Punjabi learners of English replace as diphthong with a monophthong. Sindhu (2019) commented that the learners of English as a second language, from Indian Punjab, tend to replace diphthongs like [ai] with a monothphong [æ] which affect their pronunciation. For example, they pronounce the word "file", which is correctly pronounced [fail] in English, as [fæl] replacing the diphthong [ai] with the monophthong [æ]. In short, the previous research has shed light on various aspects of how Punjabi language, as L1, exercises some influence on the pronunciation. But there are still some gaps in the previous research. A new research here can provide valuable insights into non-aspiration of voiceless plosives, influences on certain diphthongs, and the complexity of dental sounds along with gender-based differences in all these areas. These gaps highlights the importance of another investigation for better understanding of the influence of Punjabi on the English pronunciation of youth from Punjab.

3. RESEARCH DESIGN AND METHODOLOGY

This is a quantitative research which ensures systematic and objective analysis of the collected data about the influence of Punjabi language on the English pronunciation of certain consonant letters pronounced differently by the Punjabi learners of English. In this research, the carefully collected audio samples were thoroughly analyzed with the help of Praat 6.4.15 software to make sure that all the acoustic characteristics of the voice samples are cautiously examined.

3.1 Data Collection

The data for this research is collected mainly in the form of audio recordings of the young learners of English from Punjab. The participants of this research consist of male and female learners of English, aged 14 to 17, who are studying in grade 9 to 12 in different government and private educational institutions across Faisalabad division in Punjab. All the participants of this research have Punjabi as their mother tongue so they predominantly speak it at home and at school as well. A total number of 40 participants, 20 males and 20 females, were randomly selected from rural and urban areas for the study to ensure diversity. The audio samples of the Native American and British speakers were obtained from Cambridge Dictionary.

The audio recordings of the participants were conducted in the controlled and formal environment of the principal's office of their respective educational institutions. The identities of the participants are kept confidential throughout the research to make sure that their privacy is secured and respected. The voice samples of female participants were labelled as F1, F2, F3, and so on, while those of male participants were labelled as M1, M2, M3, etc. So the ethical research practices were ensured, and the sole focus was on the influence of Punjabi language on the English pronunciation of certain consonant sounds of English.

3.2 Evaluation Metrics and Technology

The acoustic features of the participants' voice samples were analyzed in detail with the help of Praat 6.4.15 software. Different evaluation metrics were used by the researchers to evaluate different phonemes. For instance, the evaluation metrics for the diphthongs included in this study are based on the first and second formant frequencies. The gap between these frequencies either increases or decreases depending on the diphthong as the sound glides from the first vowel element to the second. This variation in the gap serves as an indicator of whether the diphthong is pronounced accurately or not. These evaluation metrics help researchers to do a detailed analysis of these diphthongs to see how these English sounds are influenced by the

native language of the participants. The research used a laptop and high quality Plantronics headphones for the recordings. These headphones have noise-cancellation features to ensure a clear and noise free recording. Then Praat 6.4.15 was used to do a proper acoustic analysis of the audio samples which helped to do a detailed evaluation of pitch, voice onset time, and intensity etc.

4. DATA PRESENTATION AND ANALYSIS

The key findings and the results of the research are discussed in detail in this section. The research included [eɪ] and [əʊ] diphthongs to see how these diphthongs of English language are affected by the mother tongue of the learners of English from Punjab. The [eɪ] diphthong starts with [e] sound and glides towards [ɪ] sound. The formant frequencies F1 and F2 are to be evaluated at the beginning and at the end of this diphthong to find the gaps between initial frequencies (Initial F2 – Initial F1) and the final frequencies (Final F2 – Final F1). The value of F1 decreases and the value of F2 increases when the sound glides from [e] vowel to [ɪ] vowel in this diphthong. That is why the gap between these formant frequencies increases as the sound proceeds. The given below tables give a comprehensive details about the formant frequencies of each and every participant of this research along with the values of formant frequencies of a Native American and a British English speaker for a comparison.

Table 4.1 *Increase in F1 and F2 Difference in [eɪ] Diphthong in 'age' (Males)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Increase in difference
01	M-01	1949 – 551 = 1398	2145 – 477 = 1668	270
02	M-02	2121 – 477 = 1644	2108 – 355 = 1753	109
03	M-03	2268 – 514 = 1754	2219 – 428 = 1791	37
04	M-04	2133 – 416 = 1717	2072 – 379 = 1693	-24
05	M-05	1937 – 440 = 1497	2047 – 404 = 1643	146
06	M-06	1928 – 428 = 1500	2182 – 465 = 1717	217
07	M-07	1974 – 465 = 1509	2072 – 404 = 1668	159
08	M-08	2354 – 502 = 1852	2268 – 489 = 1779	-73
09	M-09	2305 – 563 = 1742	1949 – 404 = 1545	-197
10	M-10	2550 – 575 = 1975	2305 – 551 = 1754	-221
11	M-11	2243 – 404 = 1839	2108 – 391 = 1717	-122
12	M-12	2157 – 514 = 1643	2145 – 489 = 1656	13
13	M-13	2538 – 514 = 2024	2194 – 514 = 1680	-344
14	M-14	2268 – 539 = 1729	2427 – 428 = 1999	270
15	M-15	2182 – 453 = 1729	2182 – 465 = 1717	-12
16	M-16	2121 – 379 = 1742	2010 – 342 = 1668	-74
17	M-17	2170 – 551 = 1619	2072 – 455 = 1617	-2
18	M-18	2059 – 428 = 1631	2035 – 404 = 1631	0
19	M-19	2341 – 673 = 1668	2194 – 563 = 1631	-37
20	M-20	2072 – 489 = 1583	2170 – 367 = 1803	220
	Average			16.75 Hz
21	American	2243 – 453 = 1766	2562 – 269 = 2293	527 Hz
22	British	1998 – 526 = 1472	2305 – 256 = 2049	577 Hz

The above given table 4.1 and the below given table 4.2 show the values of the initial and final formant frequencies (F2 – F1) of each and every male and the female participant to find out the 'increase in F1 and F2 difference' as the sound glides from one vowel to the other. The gap between the F1 and F2 frequencies is supposed to increase when the sound glides from the first vowel sound to the second one. The increase in the difference of the Native American speaker is 527 Hz, and that of the British English speaker is 577 Hz. The values of the male participants show that the average increase in the gaps of these frequencies is only 16.75 Hz, and that of the female participants is -59 Hz. It means that the gap between these frequencies did not increase rather it decreased when it comes to talk about the values of the female participants.

Table 4.2 *Increase in F1 and F2 Difference in [eɪ] Diphthong in the word 'age' (Females)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Increase in difference
01	F01	2574 – 575 = 1999	2317 – 330 = 1987	-12
02	F02	2525 – 563 = 1962	2452 – 367 = 2085	123
03	F03	2648 – 624 = 2024	2317 – 551 = 1766	-258
04	F04	2660 – 416 = 2244	2329 – 244 = 2085	-159
05	F05	2562 – 502 = 2060	2292 – 453 = 1839	-221
06	F06	2476 – 563 = 1913	2280 – 379 = 1901	-12
07	F07	2599 – 453 = 2146	2623 – 440 = 2183	37
08	F08	2574 – 539 = 2035	2358 – 342 = 2016	-19
09	F09	2587 – 465 = 2122	2329 – 281 = 2048	-74
10	F10	2587 – 502 = 2085	2538 – 600 = 1938	-147
11	F11	2525 – 539 = 1986	2108 – 281 = 1827	-159
12	F12	2439 – 379 = 2060	2317 – 400 = 1877	-183
13	F13	2672 – 551 = 2121	2403 – 477 = 1926	-195
14	F14	2721 – 539 = 2182	2219 – 293 = 1926	-256
15	F15	2488 – 575 = 1913	2378 – 330 = 2048	135
16	F16	2783 – 465 = 2318	2709 – 318 = 2391	73
17	F17	2574 – 588 = 1986	2439 – 256 = 2183	197
18	F18	2476 – 477 = 1999	2378 – 330 = 2048	49
19	F19	2636 – 514 = 2122	2513 – 624 = 1889	-233
20	F20	2415 – 563 = 1852	2366 – 379 = 1987	135
	Average			-59 Hz
21	American	2243 – 453 = 1766	2562 – 269 = 2293	527 Hz
22	British	1998 – 526 = 1472	2305 – 256 = 2049	577 Hz

The lowest two red lines in the spectrogram of the given below Sound Wave & Transcription Chart: Figure 4.1, show that the difference between the F1 and F2 of the native speakers of English increases when the sound glides from the first vowel sound to the second vowel sound of this diphthong. The frequency lines in the samples of the male and the female participants tend to stay the same when the sound progresses which indicates that the

participants prolong the first vowel sound of the diphthong rather than gliding from the first sound to the second one.

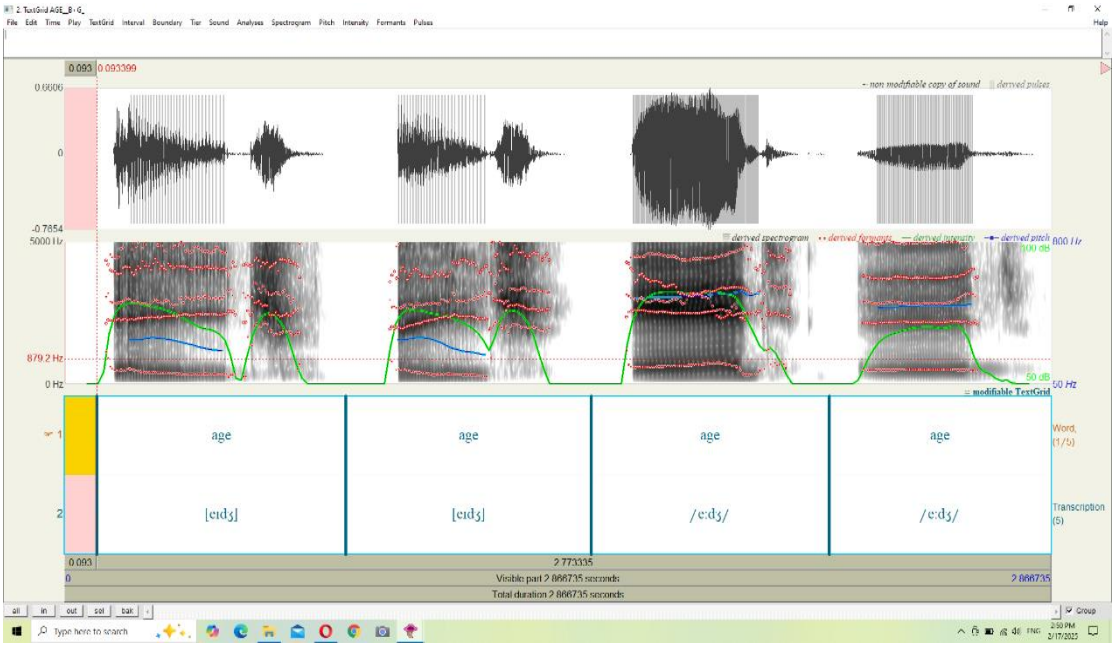

Figure 4.1 *Sound Wave & Transcription Chart*

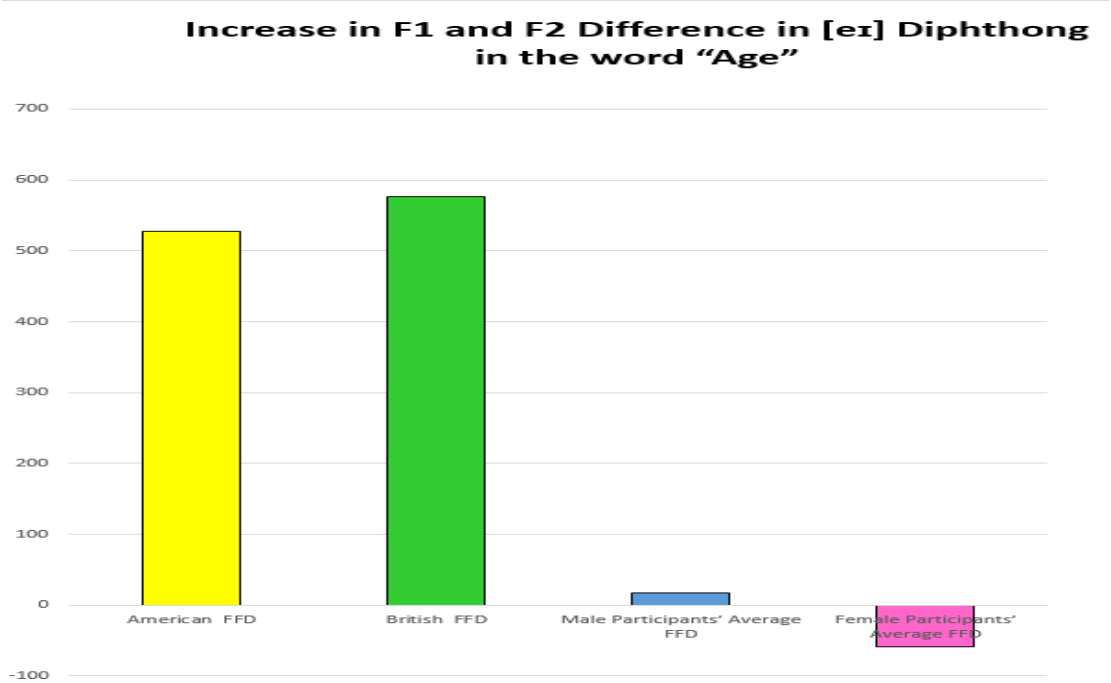

Figure 4.2 *Column Chart*

The figure 4.2 column chart shows that the difference between the native speakers' FFD and the average FFD of the participants is quite big. The participants' FFDs show that the gap between these frequencies stays the same from the beginning of this diphthong till its end. This static gap makes them deviate from the standard pronunciation of the words which contain this diphthong. The young learners of English from Punjab tend to articulate this sound similarly

when it appears in the middle of a word like ‘cake’. The given below tables 4.3 & 4.4 give complete details about the increase in the formant frequencies of each and every participant.

Table 4.3 *Increase in F1 and F2 Diphthong in [eɪ] Diphthong in ‘cake’ (Males)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Increase in difference
01	M-01	2513 – 453 = 2060	2366 – 428 = 1938	-122
02	M-02	2128 – 416 = 1712	2121 – 416 = 1705	-7
03	M-03	2047 – 404 = 1643	1974 – 404 = 1570	-73
04	M-04	2243 – 416 = 1827	2145 – 465 = 1680	-147
05	M-05	2243 – 453 = 1790	2354 – 440 = 1914	124
06	M-06	2562 – 649 = 1913	2427 – 588 = 1839	-74
07	M-07	2341 – 551 = 1790	2256 – 624 = 1632	-158
08	M-08	2305 – 428 = 1877	2292 – 379 = 1913	36
09	M-09	2133 – 502 = 1631	2035 – 526 = 1509	-122
10	M-10	2219 – 489 = 1730	2121 – 477 = 1644	-86
11	M-11	2427 – 453 = 1974	2464 – 440 = 2024	50
12	M-12	2072 – 575 = 1497	2157 – 391 = 1766	269
13	M-13	2243 – 465 = 1778	2403 – 453 = 1950	172
14	M-14	2317 – 637 = 1680	2317 – 563 = 1754	74
15	M-15	2256 – 575 = 1681	2341 – 551 = 1790	109
16	M-16	2538 – 514 = 2024	2476 – 612 = 1864	-160
17	M-17	2182 – 526 = 1656	2182 – 502 = 1680	24
18	M-18	2243 – 489 = 1754	2280 – 404 = 1876	122
19	M-19	2268 – 440 = 1828	2329 – 428 = 1901	73
20	M-20	2157 – 453 = 1704	2157 – 539 = 1618	-86
	Average			0.9 Hz
21	American	2403 – 612 = 1791	2488 – 244 = 2244	453 Hz
22	British	1974 – 526 = 1448	2243 – 293 = 1950	502 Hz

Table 4.4 *Increase in F1 and F2 Difference in [eɪ] Diphthong in ‘cake’ (Females)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Increase in difference
01	F01	2660 – 551 = 2109	2672 – 514 = 2158	49
02	F02	2439 – 575 = 1864	2685 – 502 = 2183	319
03	F03	2611 – 539 = 2072	2636 – 502 = 2134	62
04	F04	2525 – 440 = 2085	2464 – 342 = 2122	37
05	F05	2538 – 477 = 2061	2476 – 440 = 2036	-25
06	F06	2623 – 539 = 2084	2685 – 539 = 2146	62
07	F07	2525 – 465 = 2060	2488 – 502 = 1986	-74
08	F08	2721 – 539 = 2182	2513 – 551 = 1962	-220
09	F09	2611 – 489 = 2122	2599 – 502 = 2097	-25
10	F10	2415 – 453 = 1962	2501 – 477 = 2024	62
11	F11	2599 – 526 = 2073	2513 – 551 = 1962	-111
12	F12	2795 – 453 = 2342	2771 – 428 = 2343	1
13	F13	2550 – 563 = 1987	2488 – 551 = 1937	-50
14	F14	2550 – 440 = 2110	2525 – 416 = 2109	-1
15	F15	2672 – 551 = 2121	2648 – 502 = 2146	25
16	F16	2807 – 489 = 2318	2697 – 453 = 2244	-74
17	F17	2574 – 453 = 2121	2611 – 551 = 2060	-61
18	F18	2513 – 477 = 2036	2525 – 465 = 2060	24
19	F19	2587 – 477 = 2110	2611 – 502 = 2109	-1
20	F20	2439 – 465 = 1974	2476 – 477 = 1999	25
	Average			1.2 Hz
21	American	2403 – 612 = 1791	2488 – 244 = 2244	453 Hz
22	British	1974 – 526 = 1448	2243 – 293 = 1950	502 Hz

The above-given tables 4.3 & 4.4 show that the gaps between the formant frequencies of the native speakers of English increase when the sound glides from [e] sound to the [ɪ] sound in the [eɪ] diphthong when it appears in the middle of a work like ‘cake’. The difference

between the initial and the final gaps between these frequencies of a Native American is 453 Hz, and that of a British English speaker is 502 Hz. Whereas the average gap that increased in these formant frequencies of the male participants is only 0.9 Hz, and that of the female participants is 1.2 Hz. The straight lines of red dots in the given below spectrogram indicate that the gap stays the same from the beginning till the end of this diphthong.

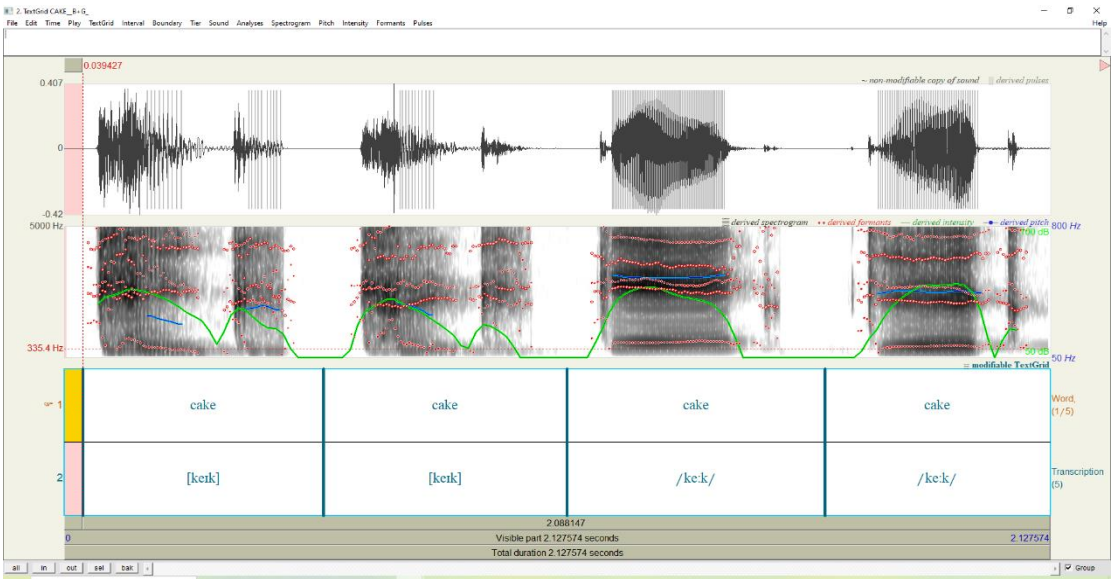

Figure 4.3 *Sound Wave & Transcription Chart*

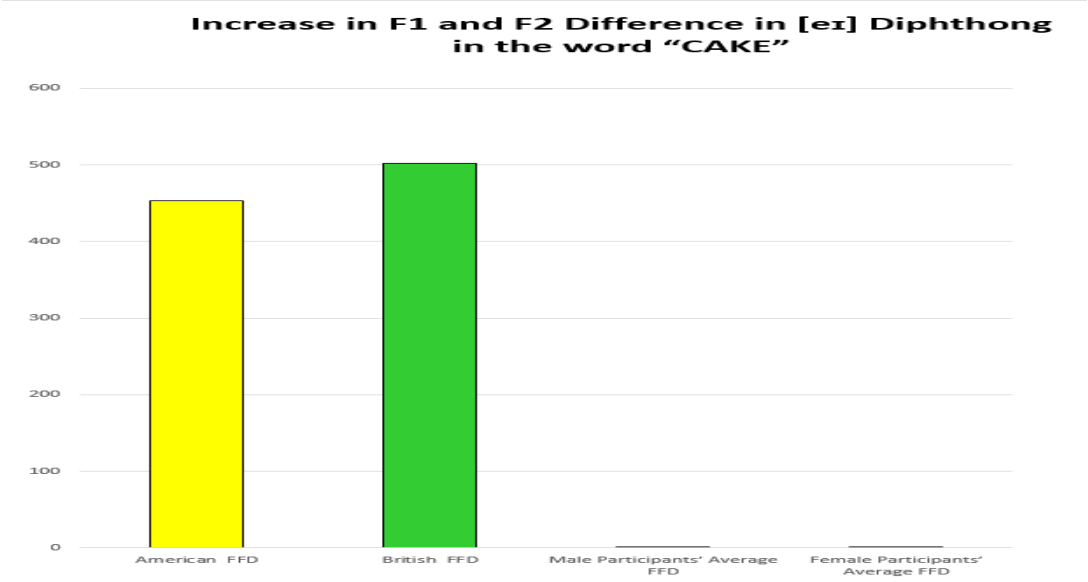

Figure 4.4 *Column Chart*

The above given column chart 4.4 shows that the columns of the male and the female participants are almost equal to zero which indicates that the gap between these frequencies stayed the same when the sound glided from [e] vowel to the [ɪ] vowel in this [eɪ] diphthong. It shows a significant deviation from the standard pronunciation of this diphthong.

The young learners of English from Punjab tend to articulate this sound similarly when it appears at the end of a word like 'say' or 'way' etc.

Table 4.5 *Increase in F1 and F2 Difference in [eɪ] Diphthong in 'way' (Males)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Increase in difference
01	M-01	1998 – 453 = 1545	2343 – 428 = 1915	370
02	M-02	2023 – 489 = 1534	2182 – 416 = 1766	232
03	M-03	1888 – 404 = 1484	2035 – 440 = 1595	111
04	M-04	1937 – 539 = 1398	2108 – 539 = 1569	171
05	M-05	1875 – 600 = 1275	2023 – 526 = 1497	222
06	M-06	2023 – 649 = 1374	2219 – 514 = 1705	331
07	M-07	1875 – 465 = 1410	2145 – 440 = 1705	295
08	M-08	1998 – 514 = 1484	2170 – 588 = 1582	98
09	M-09	2219 – 600 = 1619	2280 – 600 = 1680	61
10	M-10	1790 – 539 = 1251	1986 – 502 = 1484	233
11	M-11	2170 – 453 = 1717	2354 – 539 = 1815	98
12	M-12	2084 – 502 = 1582	2154 – 477 = 1717	135
13	M-13	2231 – 600 = 1631	2341 – 600 = 1741	110
14	M-14	2525 – 502 = 2023	2795 – 526 = 2269	246
15	M-15	1961 – 539 = 1422	2280 – 563 = 1717	295
16	M-16	2110 – 551 = 1559	2292 – 563 = 1729	170
17	M-17	2305 – 514 = 1791	2415 – 465 = 1950	159
18	M-18	1912 – 563 = 1349	2084 – 404 = 1680	331
19	M-19	2072 – 502 = 1570	2305 – 477 = 1828	258
20	M-20	2121 – 416 = 1705	2184 – 502 = 1682	-23
	Average			195 Hz
21	American	1569 – 539 = 1030	2339 – 416 = 1923	893 Hz
22	British	1839 – 931 = 908	2452 – 575 = 1877	969 Hz

Table 4.6 *Increase in F1 and F2 Difference in [eɪ] Diphthong in the word 'way' (Females)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Increase in difference
01	F01	2268 – 440 = 1828	2427 – 514 = 1913	85
02	F02	2157 – 661 = 1496	2501 – 649 = 1852	356
03	F03	2035 – 686 = 1349	2403 – 514 = 1889	540
04	F04	2157 – 428 = 1729	2317 – 342 = 1975	246
05	F05	2072 – 428 = 1644	2623 – 428 = 2195	551
06	F06	2476 – 453 = 2023	2268 – 293 = 1975	-48
07	F07	2709 – 428 = 2281	2488 – 342 = 2146	-135
08	F08	2317 – 551 = 1766	2636 – 391 = 2245	479
09	F09	2427 – 404 = 2023	2623 – 242 = 2281	258
10	F10	2452 – 416 = 2036	2587 – 242 = 2245	209
11	F11	2415 – 477 = 1938	2329 – 404 = 1925	-13
12	F12	2525 – 367 = 2158	2685- 318 = 2367	209
13	F13	2513 – 428 = 2085	2660 – 416 = 2244	159
14	F14	2488 – 440 = 2048	2354 – 453 = 1901	-147
15	F15	2305 – 502 = 1803	2439 – 404 = 2035	232
16	F16	2746 – 428 = 2318	2501 – 367 = 2134	-184
17	F17	2366 – 539 = 1827	2685 – 404 = 2281	454
18	F18	2378 – 391 = 1987	2672 – 440 = 2232	245
19	F19	2501 – 404 = 2097	2488 – 342 = 2146	49
20	F20	2427 – 453 = 1974	2354 – 355 = 1999	25
	Average			178 Hz
21	American	1569 – 539 = 1030	2339 – 416 = 1923	893 Hz
22	British	1839 – 931 = 908	2452 – 575 = 1877	969 Hz

The tables 4.5 & 4.6 show that the difference between the initial and the final gaps between these frequencies of a Native American is 893 Hz, and that of a British English speaker is 969 Hz. Whereas the average gap between the participants' formant frequencies is quite low which shows they deviated from the standard pronunciation of this diphthong.

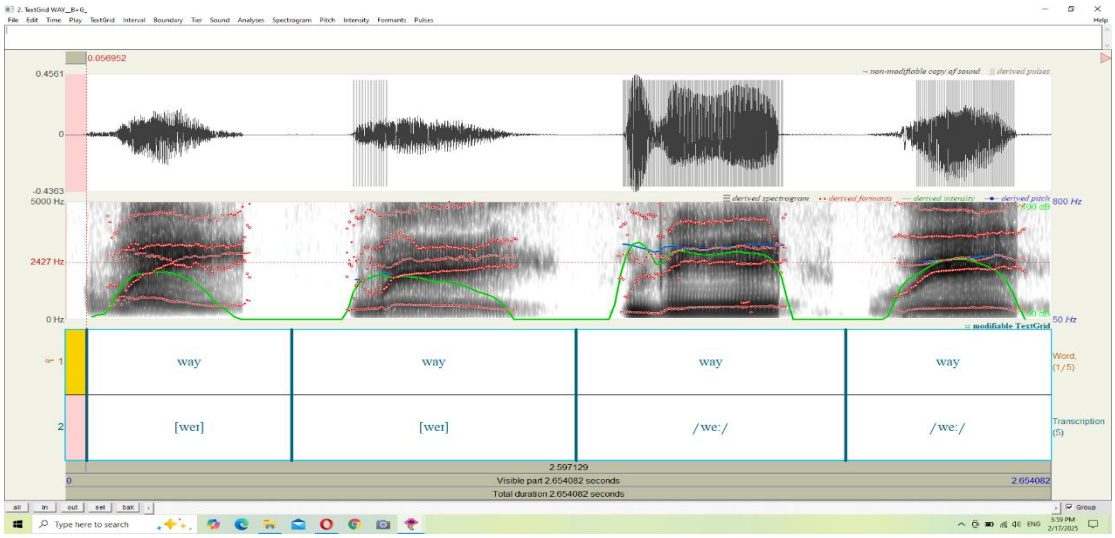

Figure 4.5 *Sound Wave & Transcription Chart*

The lowest two red lines in the samples of the male and the female participants in the figure 4.5 run parallel to each other when the sound progresses which indicates that the participants deviated from the standard pronunciation. The second diphthong included in this study is [əʊ] Diphthong. The tables 4.7 & 4.8 provide details about the F1 and F2 frequencies of [əʊ] diphthong in word 'oath' pronounced by the male and the female participants.

Table 4.7 Decrease in F1 and F2 Difference in [əʊ] Diphthong in "OATH" (Males)

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Decrease in difference
01	M-01	1078 – 514 = 564	1152 – 575 = 577	-13
02	M-02	1042 – 588 = 454	1005 – 588 = 417	37
03	M-03	968 – 551 = 417	931 – 526 = 405	12
04	M-04	968 – 575 = 393	992 – 612 = 380	13
05	M-05	943 – 526 = 417	992 – 575 = 417	00
06	M-06	870 – 416 = 454	931 – 600 = 331	123
07	M-07	1078 – 588 = 490	955 – 747 = 208	282
08	M-08	845 – 551 = 294	943 – 575 = 368	-74
09	M-09	3003 – 710 = 2293	2807 – 833 = 1974	319
10	M-10	1054 – 600 = 454	1140 – 575 = 565	-111
11	M-11	1115 – 515 = 515	919 – 600 = 319	-196
12	M-12	992 – 563 = 429	992 – 539 = 453	-24
13	M-13	1029 – 563 = 466	980 – 526 = 454	12
14	M-14	808 – 612 = 196	919 – 465 = 454	-258
15	M-15	821 – 465 = 356	722 – 379 = 343	13
16	M-16	943 – 575 = 368	919 – 551 = 368	00
17	M-17	1078 – 612 = 466	992 – 722 = 270	196
18	M-18	992 – 575 = 417	1115 – 686 = 429	-12
19	M-19	1189 – 600 = 589	980 – 526 = 454	135
20	M-20	919 – 526 = 393	1029 – 575 = 454	-61
	Average			19.6 Hz
21	British	2407 – 1275 = 1132	1814 – 1508 = 306	826 Hz
22	American	2745 – 992 = 1753	2452 – 1311 = 1141	612 Hz

Table 4.8 Decrease in F1 and F2 Difference in [əʊ] Diphthong in the word 'oath' Female Participant

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Decrease in difference
01	F01	1250 – 673 = 577	1189 – 710 = 479	98
02	F02	1569 – 882 = 687	1275 – 968 = 307	380
03	F03	1005 – 808 = 197	1164 – 808 = 356	-159
04	F04	894 – 551 = 343	1005 – 673 = 332	11
05	F05	980 – 526 = 454	1029 – 563 = 466	-12
06	F06	1299 – 870 = 429	1250 – 833 = 417	12
07	F07	1164 – 808 = 356	1177 – 735 = 442	-86
08	F08	1005 – 600 = 405	1115 – 624 = 491	-86
09	F09	1054 – 600 = 454	1226 – 882 = 344	110
10	F10	992 – 575 = 417	1042 – 526 = 516	-99
11	F11	894 – 355 = 539	992 – 428 = 564	-25
12	F12	919 – 489 = 430	1078 – 661 = 417	13
13	F13	882 – 453 = 429	894 – 453 = 441	-12
14	F14	980 – 600 = 380	1029 – 612 = 417	-37
15	F15	821 – 514 = 307	796 – 710 = 86	221
16	F16	1373 – 845 = 528	1250 – 833 = 417	111
17	F17	955 – 588 = 367	1029 – 539 = 490	123
18	F18	1152 – 771 = 381	1152 – 735 = 417	-36
19	F19	931 – 600 = 331	1103 – 624 = 479	-148
20	F20	1078 – 600 = 478	1029 – 526 = 503	-25
	Average			17.7
21	British	2407 – 1275 = 1132	1814 – 1508 = 306	826 Hz
22	American	2745 – 992 = 1753	2452 – 1311 = 1141	612 Hz

Tables 4.7 and 4.8 provide a comprehensive account of [əʊ] diphthong's first two formant frequencies. The difference between the first two formant frequencies is supposed to decrease here when the sound progresses. Tables 4.7 and 4.8 show that the overall reduction in the gap between the initial and final values is 826 Hz for the British English speaker and 612 Hz for the Native American speaker. In contrast, the average reduction in the difference between the initial and final formant frequencies for the male participants is only 19.6 Hz, and that of the female participants, is17.7 Hz. This discrepancy demonstrates that both Punjabi male and female participants deviate significantly from the Standard English pronunciation of this diphthong.

The given below column chart 4.6 clearly shows the difference between the gap of the initial and the final formant frequencies. When the gap decreases, the column gets taller.

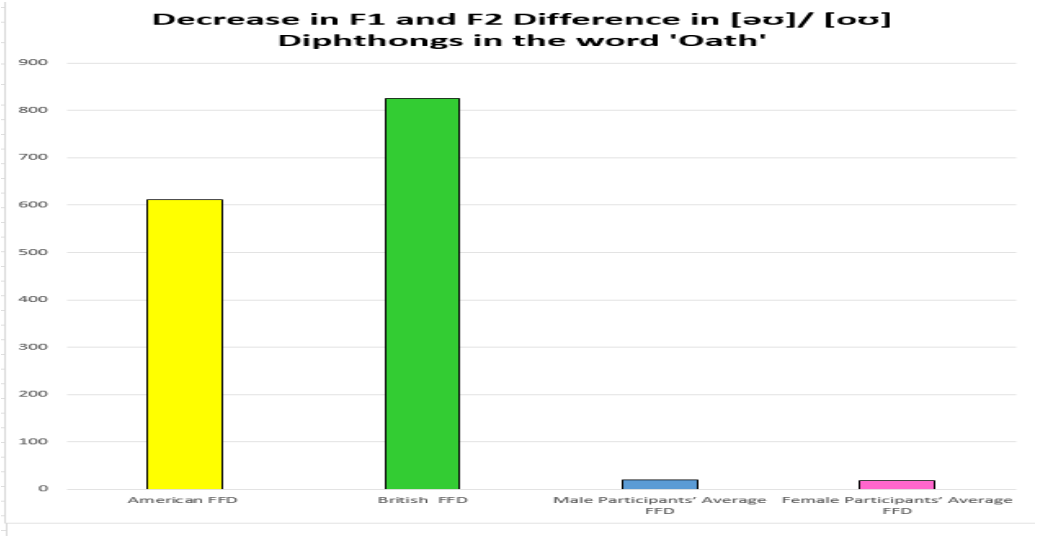

Figure 4.6 *Column Chart*

The same phenomenon takes place when [əʊ] sound appears in the middle of the words like 'road'. The below given tables give in-depth explanation about the initial and the final formant frequencies (F1 and F2).

Table 4.9 *Decrease in F1 and F2 Difference in [əʊ] Diphthong in 'ROAD' (Males)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Decrease in difference
01	M-01	1103 – 514 = 589	1177 – 624 = 553	36
02	M-02	1127 – 612 = 515	1164 – 624 = 540	-25
03	M-03	1005 – 563 = 442	1140 – 600 = 540	-98
04	M-04	1331 – 526 = 805	1275 – 624 = 651	154
05	M-05	1213 – 673 = 540	1078 – 551 = 527	13
06	M-06	1115 – 722 = 393	1054 – 722 = 332	61
07	M-07	1127 – 551 = 576	1250 – 563 = 687	-111
08	M-08	1287 – 514 = 773	1324 – 526 = 798	-25
09	M-09	919 – 465 = 454	931 – 440 = 491	-37
10	M-10	1285 – 588 = 797	1483 – 588 = 895	-98
11	M-11	1348 – 588 = 760	1238 – 637 = 601	159
12	M-12	1373 – 600 = 773	1495 – 563 = 932	-159
13	M-13	1422 – 514 = 908	1287 – 588 = 699	201
14	M-14	1164 – 489 = 675	1201 – 551 = 650	25
15	M-15	1287 – 563 = 724	1262 – 526 = 736	-12
16	M-16	1213 – 588 = 625	1140 – 588 = 552	-73
17	M-17	1091 – 600 = 491	1189 – 600 = 589	-98
18	M-18	1446 – 588 = 858	1360 – 735 = 625	233
19	M-19	1422 – 649 = 773	1287 – 735 = 552	221
20	M-20	1164 – 551 = 613	1262 – 477 = 785	-172
	Average			9.75
21	British	1667 – 600 = 1067	992 – 256 = 736	331 Hz
22	American	2623 – 1017 = 1606	2452 – 1508 = 944	662 Hz

The above given table 4.9 belongs to the male participants from Punjab, and the below given table 4.10 presents formant frequencies of the female participants. The difference

between the gaps of the initial and the final formant frequencies (F2 – F1) of the [əʊ] sound in the word ‘road’ pronounced by a British English speaker is 331 Hz and that of the Native American is 662 Hz. The average of the same difference of the female participants from Punjab is only 14.05 Hz, and that of the male participants is 9.75 Hz.

Table 4.10 *Decrease in F1 and F2 Difference in [əʊ] Diphthong in the word ‘road’ Females*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Decrease in difference
01	F01	1324 – 539 = 785	1410 – 784 = 626	158
02	F02	1360 – 612 = 748	1446 – 661 = 785	-37
03	F03	1348 – 563 = 785	1471 – 663 = 798	-13
04	F04	1103 – 526 = 577	1226 – 686 = 540	37
05	F05	1336 – 514 = 822	1238 – 588 = 650	172
06	F06	1348 – 477 = 871	1201 – 649 = 552	319
07	F07	1189 – 502 = 687	1164 – 539 = 625	-123
08	F08	1434 – 465 = 969	1544 – 612 = 932	37
09	F09	1336 – 551 = 785	1483 – 736 = 747	38
10	F10	1213 – 563 = 650	1226 – 563 = 663	-13
11	F11	1275 – 379 = 896	1250 – 428 = 822	74
12	F12	1422 – 539 = 883	1410 – 539 = 871	12
13	F13	980 – 404 = 576	1201 – 428 = 773	-197
14	F14	882 – 416 = 466	1177 – 416 = 761	-295
15	F15	1140 – 477 = 663	1397 – 600 = 797	-134
16	F16	1140 – 489 = 651	1213 – 489 = 724	-73
17	F17	1324 – 539 = 785	1508 – 686 = 822	-37
18	F18	1385 – 440 = 945	1348 – 575 = 773	172
19	F19	1177 – 477 = 700	1275 – 514 = 761	-61
20	F20	1311 – 416 = 895	1213 – 563 = 650	245
	Average			14.05 Hz
21	British	1667 – 600 = 1067	992 – 256 = 736	331 Hz
22	American	2623 – 1017 = 1606	2452 – 1508 = 944	662 Hz

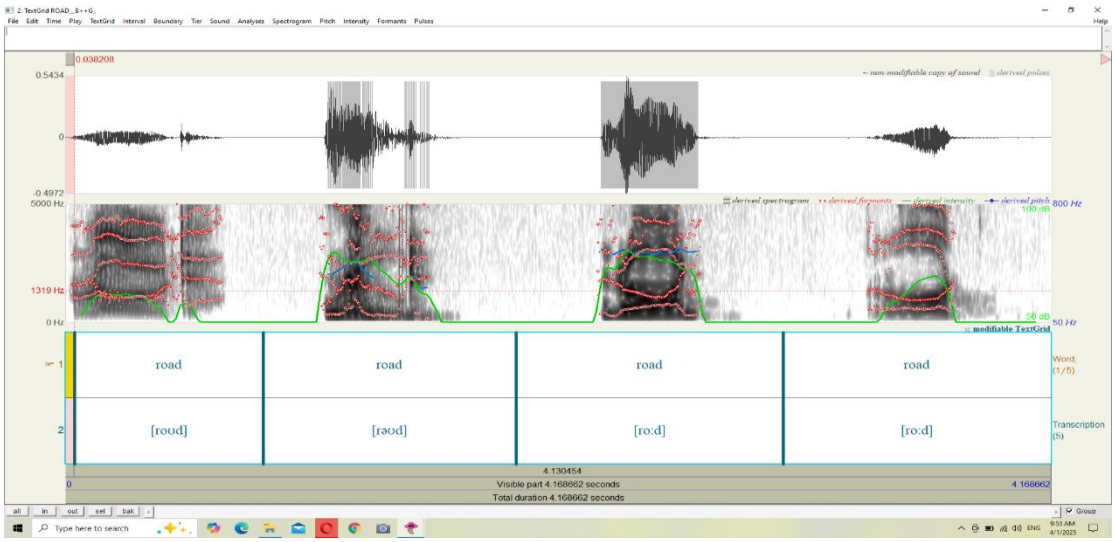

Figure 4.7 *Sound Wave & Transcription Chart*

The Sound Wave & Transcription Chart: 4.7 shows that the gap between F1 and F2 frequencies is supposed to decrease when the sound proceeds from the first vowel to the second vowel sound of the diphthong as shown in the samples of the native speakers of English. But

the female participant here tends to prolong the first vowel sound rather than gliding from the first vowel to the second vowel in this diphthong.

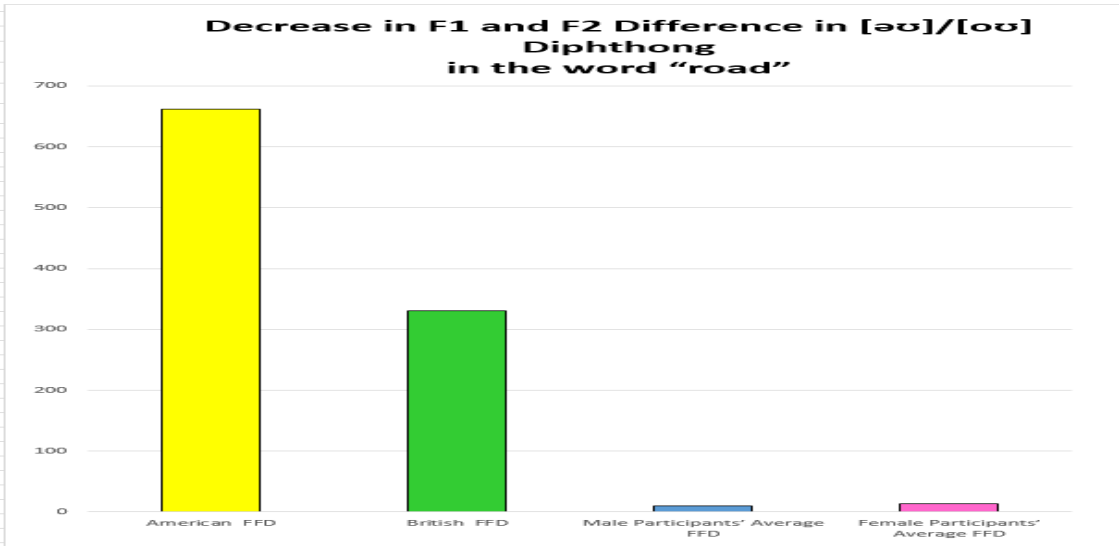

Figure 4.8 *Column Chart*

The column chart 4.8 clearly shows that the difference between gaps of initial and final formant frequencies of [əʊ] sound is massive when it is articulated by an American or British English speakers. Almost similar phenomenon takes place when [əʊ] sound appears at the end of a word like 'go'. The tables 4.11 and 4.12 show the details of the [əʊ] sound in the word 'go'. The very small gap between the initial and the final formant frequencies of the participants show that they tend to prolong the first vowel sound and do not change it much.

Table 4.11 *Decrease in F1 and F2 Difference in [əʊ] Diphthong in 'GO' (Males)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Decrease in difference
01	M-01	968 – 575 = 393	931 – 575 = 356	37
02	M-02	1054 – 440 = 614	955 – 440 = 515	99
03	M-03	821 – 465 = 356	845 – 489 = 356	00
04	M-04	992 – 551 = 441	943 – 575 = 368	73
05	M-05	1066 – 514 = 552	1066 – 551 = 515	37
06	M-06	2599 – 833 = 1766	2807 – 906 = 1901	-135
07	M-07	1103 – 477 = 626	1189 – 440 = 749	-123
08	M-08	894 – 575 = 319	1005 – 588 = 417	-98
09	M-09	980 – 404 = 576	980 – 575 = 405	171
10	M-10	1091 – 428 = 663	1017 – 514 = 503	160
11	M-11	1311 – 612 = 699	1397 – 637 = 760	-61
12	M-12	931 – 440 = 491	1005 – 526 = 479	12
13	M-13	1017 – 489 = 528	955 – 489 = 466	62
14	M-14	1213 – 489 = 724	1103 – 698 = 405	319
15	M-15	968 – 502 = 466	992 – 489 = 503	-37
16	M-16	1078 – 551 = 527	1068 – 489 = 577	-50
17	M-17	906 – 514 = 392	992 – 588 = 404	-12
18	M-18	919 – 318 = 601	906 – 588 = 318	283
19	M-19	1029 – 502 = 527	1005 – 563 = 442	85
20	M-20	771 – 391 = 380	1054 – 391 = 663	-283
	Average			26.95 Hz
21	American	1667 – 588 = 1079	1189 – 735 = 454	625 Hz
22	British	2047 – 379 = 1668	1422 – 293 = 1129	539 Hz

Table 4.12 *Decrease in F1 and F2 Difference in [əʊ] Diphthong in the word 'GO' (Female)*

Serial #	Participants	Initial F1 and F2 Difference (F2 - F1)	Final F1 and F2 Difference (F2 - F1)	Decrease in difference
01	F01	1127 – 539 = 588	1115 – 710 = 405	183
02	F02	1410 – 465 = 945	955 – 465 = 490	455
03	F03	1029 – 440 = 589	1115 – 342 = 773	-184
04	F04	1127 – 440 = 687	1029 – 502 = 527	160
05	F05	1066 – 477 = 589	968 – 502 = 466	87
06	F06	1250 – 489 = 761	1042 – 502 = 540	221
07	F07	1201 – 465 = 736	1005 – 514 = 491	245
08	F08	1127 – 502 = 625	1287 – 722 = 565	60
09	F09	1140 – 539 = 601	1115 – 539 = 576	25
10	F10	931 – 379 = 552	1569 – 539 = 1030	-478
11	F11	1091 – 502 = 589	1091 – 379 = 712	-123
12	F12	1078 – 440 = 638	1152 – 342 = 810	-172
13	F13	943 – 514 = 429	1201 – 624 = 577	-148
14	F14	1029 – 440 = 589	968 – 502 = 466	123
15	F15	1091 – 465 = 626	759 – 440 = 319	307
16	F16	1164 – 477 = 687	1029 – 477 = 552	135
17	F17	1005 – 465 = 540	968 – 514 = 454	86
18	F18	1201 – 465 = 736	980 – 489 = 491	245
19	F19	1127 – 514 = 613	1287 – 747 = 540	73
20	F20	1042 – 526 = 516	1115 – 391 = 724	-208
	Average			54.6 Hz
21	American	1667 – 588 = 1079	1189 – 735 = 454	625 Hz
22	British	2047 – 379 = 1668	1422 – 293 = 1129	539 Hz

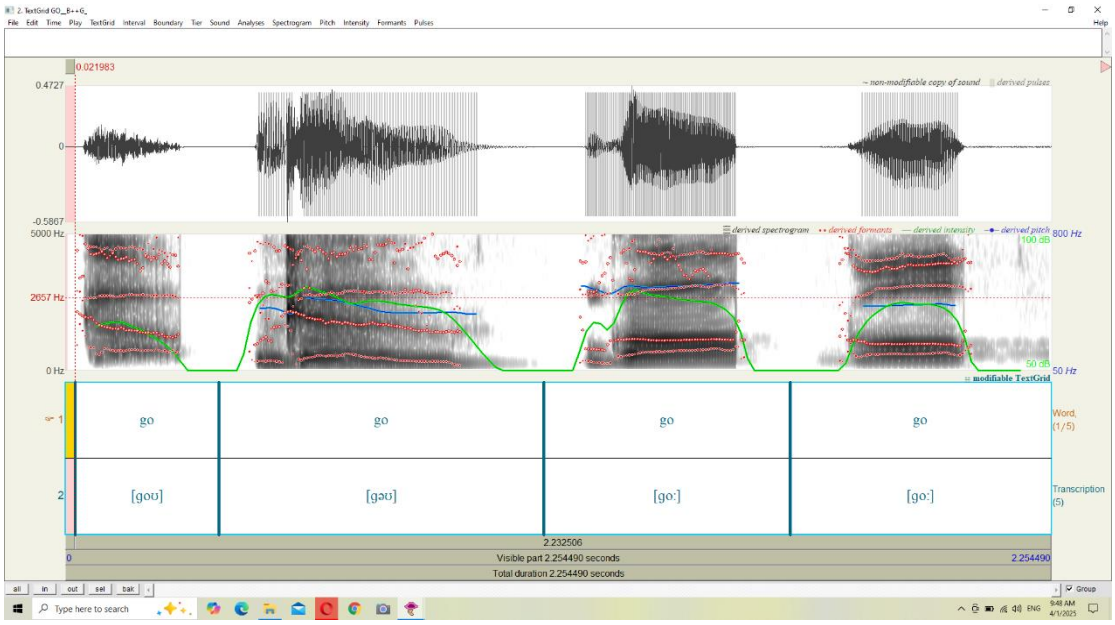

Figure 4.9 *Sound Wave & Transcription Chart*

The figure 4.9 shows that the gap between F1 and F2 frequencies decreases when the sound proceeds from the first vowel to the second vowel sound of the diphthong as shown in the samples of the native speakers of English. But the male and the female participants tend to prolong the first vowel sound rather than gliding from the first vowel to the second vowel in this diphthong.

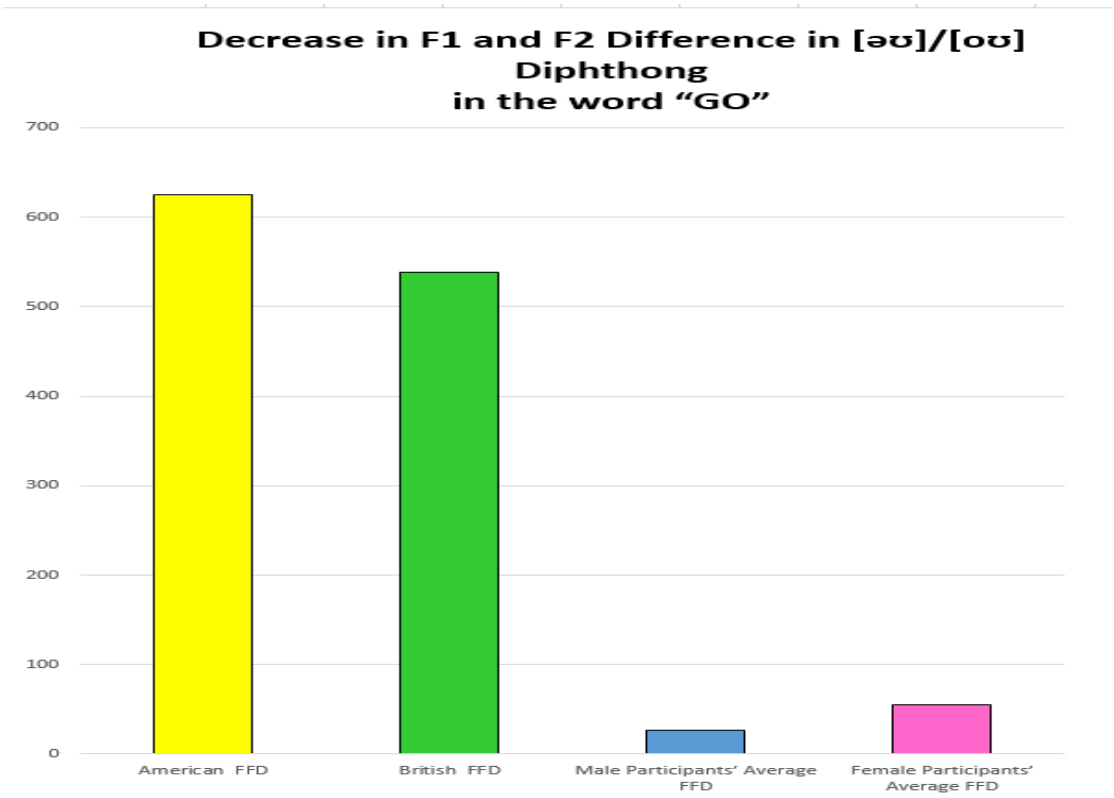

Figure 4.10 *Column Chart*

The column chart 4.10 clearly shows that the difference between gaps of initial and final formant frequencies of [əʊ] sound is massive when it is articulated by a British and American English speakers at the end of a word like 'go'. This research proves that the phenomenon of prolonging the first vowel sound in a diphthong is quite common among Punjabi learners of English which affect their overall pronunciation.

5. Discussion and Conclusion

The research shows that young learners of English from Punjab deviate from the Standard English pronunciation due to the influence of their mother tongue. The guiding research question is: How do certain diphthongs, influenced by Punjabi, affect the English pronunciation of Punjabi youth? In the diphthongs examined in the study, the gap between the first and second formant frequencies is expected to either widen or narrow as the sound glides from the first vowel to the second. However, the findings reveal that learners tend to prolong the first vowel in the [əʊ] and [eɪ] diphthongs. As a result, the glide to the second vowel does not occur which marks a significant deviation from standard articulation.

Although this study focused on diphthongs in isolated words rather than connected speech, it provides a solid foundation for future research on how these sounds behave in sentences. Such work could explore whether diphthongs remain stable or shift under the influence of surrounding words and sounds. The future studies should also include

suprasegmental features such as intonation and rhythm, which were not addressed here. The research objectives have been successfully achieved which demonstrates that the study has effectively met its goals.

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