

BENGALI AND DUTCH: A PHONOLOGICAL CONTRASTIVE ANALYSIS OF THE FRONT MONOPHTHONGS

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Abstract

This paper investigates the monophthongs of Bengali and Dutch, analyzing the similarities and differences in the phonetic characteristics between the two languages, particularly focusing on front monophthongs. The study determines the challenges faced by Bengali-speaking learners of Dutch (BLD) and Dutch-speaking learners of Bengali (DLB) as a foreign language. Using a quantitative-contrastive phonemic analysis (Haque, 2015; Haque & Jannat, 2022; Haque & Sharfuddin, 2023), the study mathematically demonstrates that BLD learners face greater difficulty in acquiring their target language, as Dutch has twice as many front monophthongs as Bengali. Additionally, no front vowels in both languages share identical phonetic qualities, and there are no mutual phonemes. These phonological differences indicate significant challenges for learners in acquiring their target languages.

Keywords: Contrastive phonology, front monophthong, interference, mispronunciation, phonological difference, Indo-European languages, Dutch, Bengali

1. Introduction

Bengali and Dutch belong to Indo-European (IE) languages, which is one of the biggest language families, originally spoken from Europe to India a few thousand years ago. Currently, the IE language family comprises eight existing sub-families. The Dutch language falls under the West-Germanic branch of the IE language family. On the other hand, the Bengali language falls under the Indo-Aryan (Indic) group within the Indo-Iranian branch (Kapović et al., 2017). Since the 16th century, along with the French, Portuguese, and English, the Dutch have arrived in Bengal (Chattarjee, 2015), and eventually words from these languages made an entrance into the Bengali vocabulary.

Several studies have delved into the social, cultural, and political exchanges between the Dutch and Bengali communities. Awal (2023) asserts that the Dutch first arrived in the Indian subcontinent in 1595 for the purpose of setting up businesses, focusing their operations in Bengali, particularly. Evidence points to a linguistic coexistence between the Dutch East India Company and the local Bengali community since then, driven by frequent interactions for mutual benefit. Thus, the Dutch and Bengali linguistic interaction persisted for nearly two centuries, profoundly shaping the Bengali language in Bangladesh through lexical borrowings and influences (Awal, 2023).

Despite belonging to the same language family, the phonological characteristics of the two languages concerning vowels vary considerably, highlighting the diversity of the IE language family. For instance, the set of front monophthongs present in the Dutch language are wholly distinct from the Bengali language. Monophthongs, also known as pure vowels, are defined as “vowels during the articulation of which the tongue maintains its position” (Huthaily, 2003, p. 24). Front monophthongs refer to these vowels generated with the peak of the tongue in a relatively forward position in the mouth towards the hard palate and is arched to an extent. It is worth identifying as well as exploring the influence of mother tongue interference on the pronunciation of the two different target languages Dutch and Bengali, for both Bengali-speaking learners of Dutch and Dutch-speaking learners of Bengali. The study can reveal areas of potential difficulty for learners of these two languages and aid them with beneficial insights and practicable solutions to overcome any learning barriers relating to pronunciation, phonological rules, and the presence or absence of certain phonemes. A solid foundation in contrastive vowel phonology will facilitate better communication and elevate the overall experience of learning a new language.

2. Literature Review

2.1. Vowel production: a phonetic overview

Vowels are speech sounds that are generated from the larynx to the lips without any obstruction from other elements of the vocal system (Roach, 2009). Universally, all vowel sounds are produced on a “pulmonic egressive airstream with central airflow” and in a highly constraint ‘vowel space’ (McMahon 2002, p. 68). Through three primary ways, the shape of the oral cavity can be changed to produce different vowel sounds: a) through the movement of the tongue and the lower jaw, b) through the movement of the highest part of tongue by pushing it forward or backward, and c) through rounding or spreading the lips (Shomali, 1983). Placing the tongue at different heights and positions can generate various vowel sounds. Collins and Mees (2003) highlight that changes in the shape of the vocal tract play a major role in producing various types of vowel sounds. According to Haque (2015), of all the articulators involved in vowel sound production, the tongue is the most dynamic and adaptable vocal organ that moves three-dimensionally and is capable of generating a diverse array of linguistic sounds.

Lekova (2010) emphasizes that the dynamics of the tongue are vital for accurate articulation of speech sounds. For instance, in the English vowel system, producing the sound /i:/ requires the tongue to move forward and raise higher inside the mouth. The vowel, in this case, would require the lip to widen (in a spread position). On the other hand, to produce the sound /u:/, the back of the tongue would be required to raise with rounded lips. An inappropriate movement of the tongue can lead to mispronunciation. Therefore, it is fundamental to be aware of the varying motions and movements of the tongue.

To display the position of the vowels, a quadrilateral diagram is typically used to represent the oral space in three dimensions. Shomali (1983) added that the vowels can be positioned as high, mid, or low (positioned vertically), as front, central, or back (positioned horizontally), and can be either rounded or unrounded (shape of the lip). The horizontal lines represent the tongue, and the vertical lines represent the jaw (see figure 1, 2 & 3 below).

Undoubtedly, vowel sounds play a major role in how we speak and write. When learning a new language, mastering the different vowel sounds can help learners to produce accurate pronunciations in the target language. In order to do so, understanding the different positions of the vowels within the oral space is crucial.

2.2. Phonemic awareness and vowel contrasts

Phonemic awareness is a subcategory of phonological awareness. While phonological awareness is the awareness of the variations of the sound dimensions of an oral language (as distinct from its meaning), phonemic awareness, on the other hand, is more specific, in a sense that it is the ability to distinguish and manipulate the smallest unit of speech, also known as phoneme (Chapman, 2003). However, producing phonemes in isolation carry no meaning on their own, thus “phonemic awareness requires the ability to attend to a sound in the context of the other sounds in the word” (Griffith & Olson, 1992, p. 516). Phonemic awareness is an auditory skill and plays a pivotal role in language acquisition as it involves comprehending words (morphemes) that are made up of small individual sound units. This foundational skill is considered a significant factor in literacy development and learning among EFL/ESL learners. Evidence exhibits that phonemic awareness and literacy acquisition has a “reciprocal relationship” (Chapman, 2003, p. 95). This reciprocal relationship indicates that children who are familiar with the aspects of phonemic awareness are more likely to succeed in developing their reading and writing skills, and, learning to read and write aids children with developing phonemic awareness (Weaver, 1998b, as cited in Chapman, 2003). Having phonemic awareness helps children understand the letter-sound relationships between separate sound units, which is essential to produce an estimated pronunciation and spelling besides decode words into their accurate meanings.

Some of the key aspects of phonemic awareness include a) the ability to recognize individual phonemes in words. For example, recognizing that the word “bat” consists of three phonemes: /b/, /æ/, and /t/; b) the ability to blend/combine

individual phonemes to form words. For example, blending /b/, /æ/, and /t/ to form the word “bat;” c) the ability to segment/break down words into their individual sounds. For example, segmenting the word “bat” into /b/, /æ/, and /t/ and; d) the ability to manipulate, in other words, substitute, add, or remove phonemes to produce new words. For example, replacing the /b/ in “bat” with /r/ to form “rat.” Having phonemic awareness supports overall language development by enhancing the language skills of both children and adults alike, hence effective systematic phonemic awareness instruction holds significant value in literacy acquisition.

2.3. Phonemic vowel length in L1-L2 contexts

One of the phonetic parameters of the vowel system is the vowel quantity. According to Hameed (2024), “vowel quantity pertains to the length of the phonetic unit,” which is considered to be an essential component of its phonemic identity. Vowel length is the time duration a vowel sound is sustained. The length of a vowel can be short or long, and in some languages, it plays a key role in differentiating meaning.

In Bengali, the vowel length carries less significance and prominence since it is not an essential differentiating factor in the language (Barman, 2009), as it is for Dutch. In Dutch, the phonemic length can change the meaning of a word. For example, the word “tak” in Dutch uses a short vowel, meaning “branch” in English. Through spelling conventions, long vowels are generally written with double letters. The word “taak” in Dutch with a long vowel represents a completely different meaning of the word, which is “task” in English. In this case, Dutch is similar to the English language as such differences in the vowel sound length affect the word meaning. For example, the word “bit” with a short vowel written as /bɪt/ in the IPA and “beat” with a long vowel which is indicated by a colon sign ‘:’, written as /bi:t/, have distinct meanings.

Contrastingly, in Bengali, the phonemic length of a vowel can also differentiate meaning between words, however, it is hardly distinguishable. For example, the word “pan” (spelling - পান) in Bengali has two distinct meanings. One is “betel leaf,” another is “to drink.” The pronunciation, however, is similar in terms of the vowel length. The former is pronounced with a short vowel, and the latter with a slightly longer vowel sound. The vowel length is more context dependent as it is not explicitly marked in the Bengali script as it is in the scripts of other languages. This can be a challenge for learners of the Bengali language as they need to have a clear understanding of the context to avoid any ambiguity that may negatively affect their comprehension. Apart from grasping contextual meanings, an understanding of tone and nuances, along with cultural references and situational context is also crucial to enrich comprehension. Understanding these differences can help language learners to grasp the pronunciation and comprehend meaning in both languages.

2.4. Phonemic interference in Second Language Learning and vowel misarticulation

Interference is a barrier to linguistic transmission in bilingual language systems. Widiyanti et al. (2021) define interference as “the divergence of the target language as a result of their acquaintance with more than one language” (p. 2). The interference of the mother tongue (L1) while acquiring a second language (L2) is a common phenomenon in foreign language acquisition, both in speaking and writing. It is when the linguistic system of the native language “interferes with our attempts to function in the L2 (target language)” (Wells, 2000, p. 118). Interference occurs when the learner makes an error in applying their first language (L1) to the second language (L2). This interference (negative transfer) is often perceived as a failure in language acquisition (Pitaloka, 2023). Bilinguals most commonly encounter the interference problem as they navigate two distinct sets of linguistic systems. The mother tongue interference can stem from various aspects of language learning, including syntax, grammar, vocabulary, and pronunciation. Considering the focus of this study, the phonology system of the native and target language is highlighted.

The phonetic elements of languages around the world vary in different aspects, such as in quantity, length, and pronunciation. When learners acquire a new foreign language, they tend to transfer their L1 sound patterns into their target language, especially when the sounds in the target language do not exist in their L1 phonology system. For instance, the six front monophthongs present in Dutch do not exist in the Bengali phonology system. Therefore, it is only natural that due to the absence of phonemes in the L1, the phonology system may interfere with or negatively transfer to the target language. A Bengali-speaking learner of Dutch may face difficulties due to the systematic differences in vowel inventories between the two languages. For instance, Dutch-speaking learners of Bengali might have trouble distinguishing between the Bengali high front lax phoneme /i/ and the Dutch mid front tense phoneme /ɪ/, potentially confusing the vowel length of /dim/ (meaning ‘egg’ in Bengali) and /lɪd/ (meaning ‘member’ in Dutch). This absence of phonemes in the target language is one of the significant factors that influence misarticulation in foreign language learning. Moreover, in some cases, the IPA appears the same, but may have different articulatory movements, hence produce different vowel sounds. Haque and Sharfuddin (2023) point out that “mispronunciation and miscommunication are often interrelated and the former causes the latter” (p. 32), thus, pronunciation errors can make learning new sounds of the target language challenging, and eventually hinder communication and comprehension between the speaker and listener. When learning a foreign language, pronunciation is of paramount importance to ensure effective communication (Ulfayanti & Jelimun, 2018). As noted by Haque and Uddin (2019), if a foreign language learner internalizes a phoneme properly, they can expect accurate production of the associated phone “as correct pronunciation largely depends on correct concept of a speech sound” (p. 20). Therefore, to be

able to produce the correct pronunciation in L2, learners must first become aware that the two sounds possess different phonological properties in terms of the movement and position of the tongue, and make an active effort to suppress the L1 habit and interference when producing L2 phonemes.

3. Methodology

This study primarily relied on secondary research methods. Data were sourced from existing literature, including peer-reviewed journal articles, books, and reputable online sources to investigate the front monophthongs of Bengali and Dutch.

The quantitative-contrastive analysis developed and employed by earlier works (Haque, 2015; Haque & Jannat, 2022; Haque & Sharfuddin, 2023) has been applied to this study to mathematically calculate and demonstrate the degree of similarity and dissimilarity between Bengali and Dutch front vowels. The calculations provide insightful indications about the workload a learner could potentially encounter, along with the substratum counter-influence required to efficiently acquire the sounds of the target languages. The interface and divergence value of the front monophthongs at each level (high, mid, low) in a quadrilateral oral space have been calculated using a similar approach. Applying the established analysis, the interface and divergence value have been calculated for all front monophthongs of Bengali and Dutch, both separately and as a whole.

A representation of the calculation can be found below:

Table 1: Calculation of earlier established analysis
(Haque, 2015; Haque & Jannat, 2022; Haque & Sharfuddin, 2023)

Number of high front vowels	Number of total front vowels	Result	Interface value %	Divergence value %
2	6	$2/6 = 0.33$	33%	$100-33 = 67\%$

4. Findings and discussion

4.1. Bengali and Dutch Front Monophthongs: Contrast and Implications

The Bengali vowel system consists of a total of 25 vowels as opposed to 13 in the Dutch system. Out of the 25 vowels in Bengali, three are considered as the front vowels: /i/, /e/, and /æ/. On the other hand, out of 13 vowels in Dutch, six are considered as the front vowels: /ɛ/, /e:/, /ɪ/, /i:/, /y/, and /y(:)/. The orthographic and phonological monophthongs symbolised in terms of the IPA for the Bengali language can be displayed in the following manner:

Table 2: Bengali total monophthongs (Barman, 2009; Islam, 2019)

/ɔ/	/a/	/i/	/u/	/e/	/o/	/æ/
অ	আ	ই ঈ	উ ঊ	এ	ও	No graph
Back	Central	Front	Back	Front	Back	Front
Rounded	Unrounded	Unrounded	Rounded	Unrounded	Rounded	Unrounded

The front monophthongs in Bengali are as follows:

Table 3: Bengali front monophthongs

/i/	/e/	/æ/
ই ঈ	এ	No graph
Front	Front	Front
Unrounded	Unrounded	Unrounded
High	Upper-mid	Lower-mid

In contrast, the vowels in the modern Dutch language are 12 in number. Their phonological representation is presented below:

Table 4: Dutch monophthongs (Collins & Mees, 2003)

/ɑ/	/a:/	/ɛ/	/ə/	/e:/	/i/	/i:/	/ɔ/	/o:/	/u:/	/ø:/	/ʏ/	/y(:)/
a		e			i		o		u			
Back	Back	Front	Central	Front	Front	Front	Back	Back	Back	Central	Front	Front
Unrounded	Unrounded	Unrounded	Unrounded	Unrounded	Unrounded	Unrounded	Rounded	Rounded	Rounded	Rounded	Rounded	Rounded

The front monophthongs in Dutch (Collins & Mees, 2003, p. 127) are as follows:

Table 5: Dutch front monophthongs

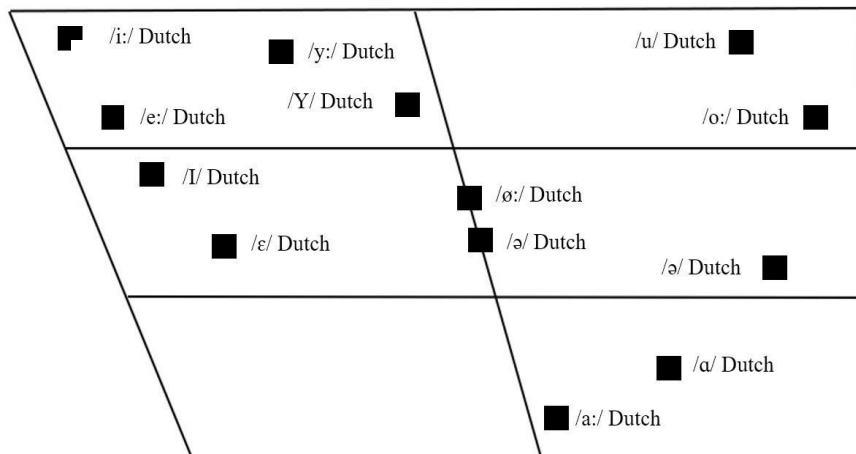
/ɛ/	/e:/	/ɪ/	/i:/	/ʏ/	/y(:)/
e		i		u	
Front	Front	Front	Front	Front	Front
Unrounded	Unrounded	Unrounded	Unrounded	Rounded	Rounded
Low-mid	High	High-mid	High	High	High
Lax	Tense	Lax	Tense	Lax	Tense
Short	Long	Short	Long	Short	Long
Checked	Free	Checked	Free	Checked	Free

Table 6: Contrastive phonemic inventory of Dutch and Bengali vowels

	Dutch	Bengali
Monophthong	13	07
Diphthong	03	18
Vowels shown in the alphabet	05	12
Total number of vowels	16	25

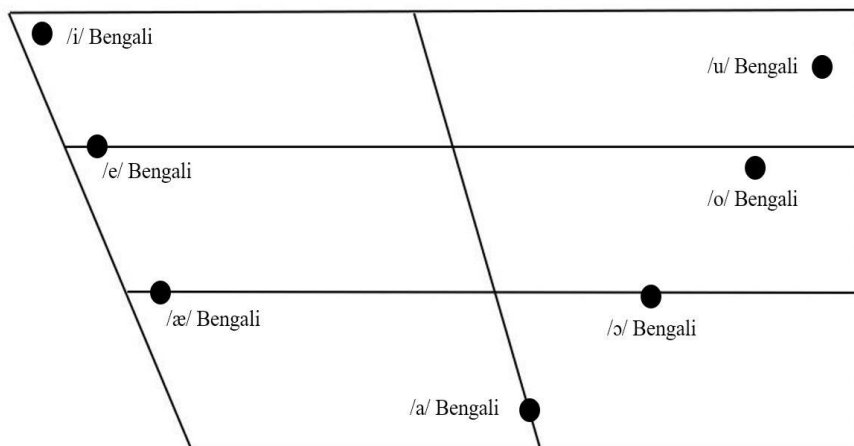
The illustrative diagram drawn in the shape of a trapezium of the interior of the oral tract can be used to display the points of origin of the pure vowels of the Dutch language (Verhoeven, 2005, p. 245):

Figure 1: The points of origin of Dutch monophthongs



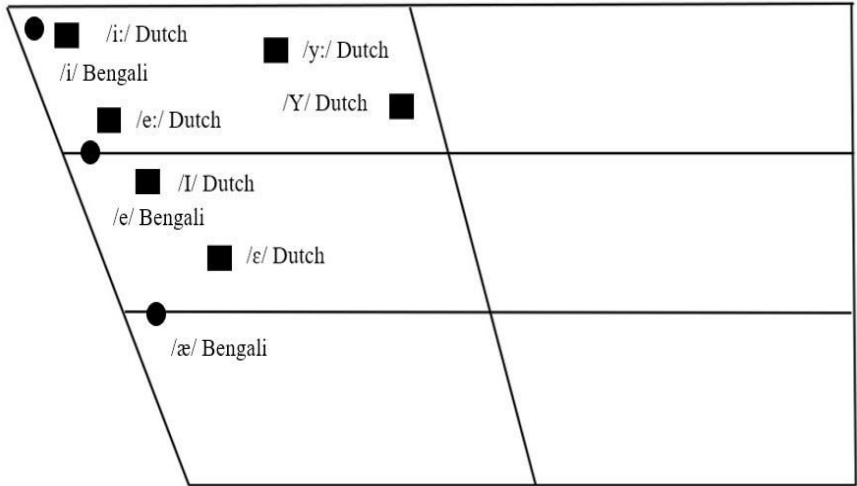
The schematic diagram of the inside of the oral tract may be used to present a view of the points of origin of the vowels of Bengali:

Figure 2: The points of origin of Bengali monophthongs



The following schematic diagram of the oral tract shows a zonal contrast between Bengali and Dutch front monophthongs:

Figure 3: Zonal contrast between Bengali and Dutch front monophthongs



The above chart visualizes the front pure monophthongs of Bengali and Dutch within the vowel space. The monophthongs can be identified, reviewed, and contrasted in the following table:

Table 7: Characteristics of front vowels and their representation/absence

Front monophthong	Bengali (3)	Dutch (6)
/i/ e.g., in Bengali <i>kin</i> (<i>buy</i>)	High, front, lax, strong, short, moderately loud pure vowel	Absent
/e/ e.g., in Bengali <i>nesha</i> (<i>addiction</i>)	Mid, front, lax, strong, short, moderately high pure vowel	Absent
/æ/ e.g., in Bengali <i>bela</i> (<i>morning</i>)	Mid, front, lax, weak, short, moderately loud pure vowel	Absent
/i:/ e.g., in Dutch <i>spier</i> (<i>muscle</i>)	Absent	High, front, tense, strong, long
/e:/ e.g., in Dutch <i>beet</i> (<i>north</i>)	Absent	High, front, tense, strong, long
/y/ e.g., in Dutch <i>fut</i> (<i>energy</i>)	Absent	High, front, lax, weak, short
/y(:)/ e.g., in Dutch <i>duur</i> (<i>expensive</i>)	Absent	High, front, tense, strong, long
/I/ e.g., in Dutch <i>lid</i> (<i>member</i>)	Absent	Mid, front, lax, weak, short
/ε/ e.g., in Dutch <i>bler</i> (<i>yell</i>)	Absent	Mid, front, lax, weak, short

4.2. High Front Monophthongs

There are 4 high front monophthongs in Dutch compared to 1 in Bengali. The high front vowels with complete interface are zero in number. The following is a contrast of both the languages:

Table 8. High front monophthongs interface

Bengali	Dutch	Interfacing Phonemes	HFV Interface
01	04	00	00.00%

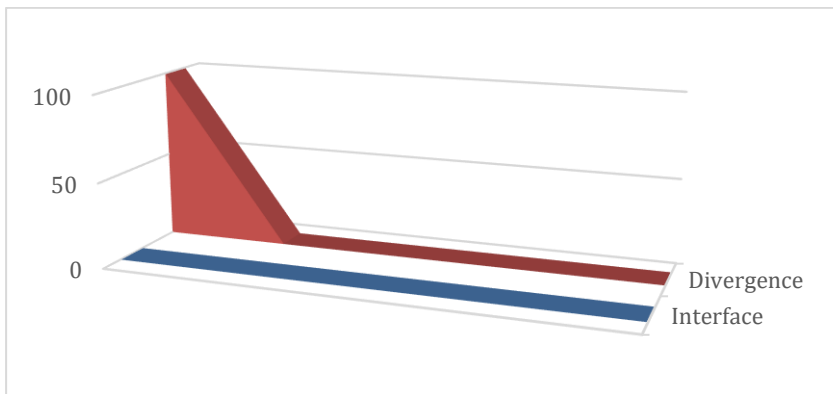
Therefore,

Interface = 00.00%

HFM Divergence = 100%

Thus, from the table above, it can be seen that both high short and high long pure vowels are present in both the languages. However, there are no similar phonemes that exist in the high front vowels of both the languages, thus, there is 100% divergence in the languages as far as high front monophthongs are concerned.

Figure 4: Interface and divergence of the HFM



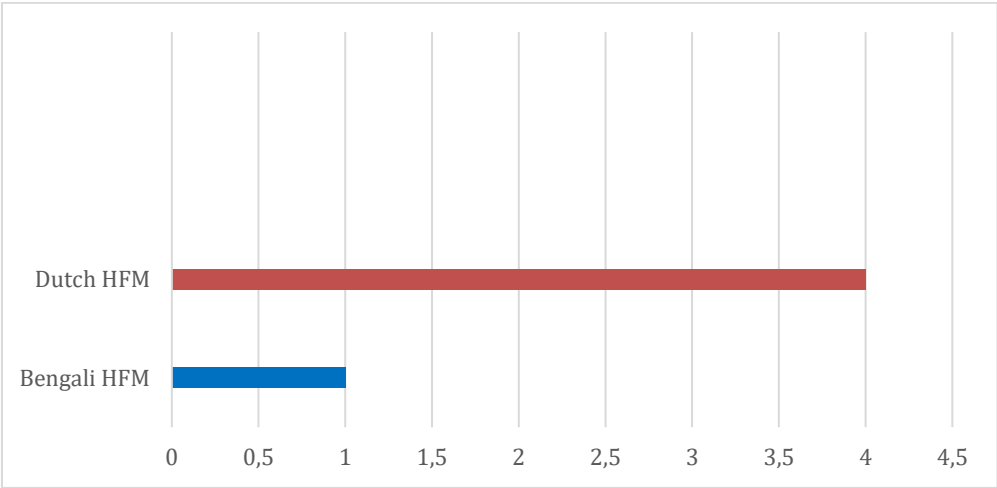
The implication of this difference for the learners of Dutch and Bengali can be summarised as follows:

Table 9: Implications for BLD and DLB

Learner	Acquisition L2 HFM	Transfer L1 HFM
Bengali speaking learner of Dutch	4 /i:/, /e:/, /y:/, /y/	0
Dutch speaking learner of Bengali	1 /i/	0

From the above table, it can be derived that the Bengali speaking learner of Dutch has to learn four high front monophthongs from the Dutch phonology, whereas the Dutch speaking learner of Bengali has to acquire only one sound from this category.

Figure 5: The Dutch vowel system is 400% richer than the Bengali system when taking high front monophthongs into account.



4.3. Mid Front Monophthongs

In the phonology system of Dutch, there are two mid front monophthongs as opposed to one in Bengali. Moreover, the mid front vowels have zero interface.

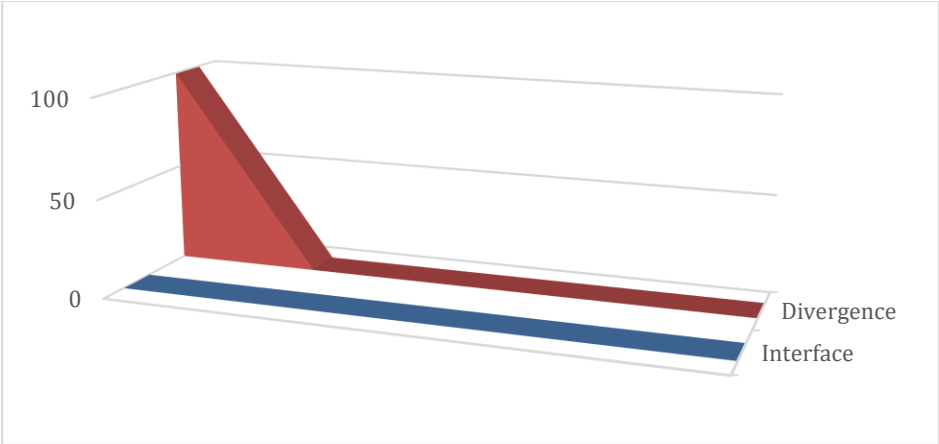
Table 10: Mid front monophthongs interface

Bengali	Dutch	Interfacing Phonemes	MFV Interface
01	02	00	00.00%

Therefore,
Interface = 00.00%
MFM Divergence = 100%

With regard to mid front monophthongs, it can be observed that only short vowels are present as well as no identical sounds can be found in both the languages. Hence, the vowels are highly dissimilar in this category.

Figure 6: Interface and divergence of the MFM

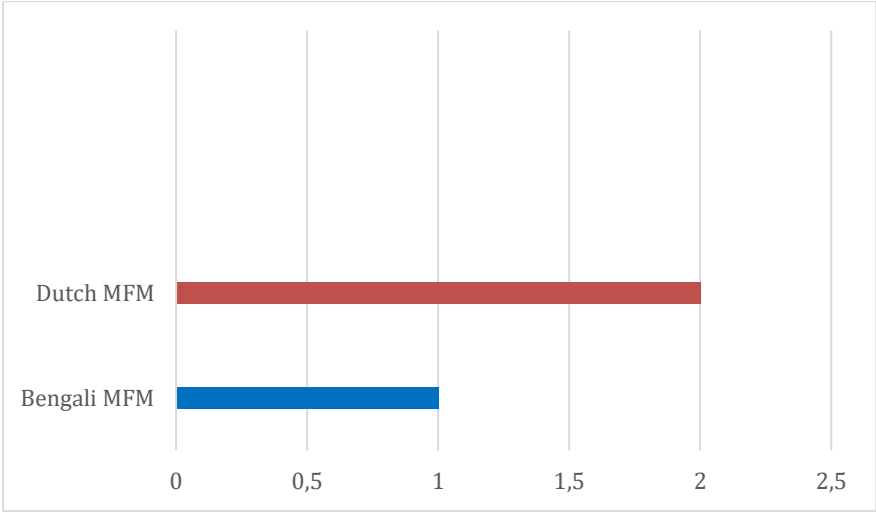


The result of this difference for the learners of Dutch and Bengali can be outlined below:

Table 11: Implications for BLD and DLB

Learner	Acquisition L2 MFM	Transfer L1 MFM
Bengali speaking learner of Dutch	2 /æ/, /ɪ/	0
Dutch speaking learner of Bengali	1 /e/	0

Figure 7: The Dutch vowel system is 200% richer than the Bengali counterpart for mid front monophthongs



Therefore, the Dutch-speaking learning of Bengali will need to acquire one sound while the Bengali-speaking learner of Dutch will need to acquire two sounds from their target phonology. Since there is no common sound in both languages in this category, DLB and BLD will not have any sound to transfer and use in their target language. Speakers of both the languages need to learn the sounds of mid front vowels of the other language.

4.4. Low Front Monophthongs

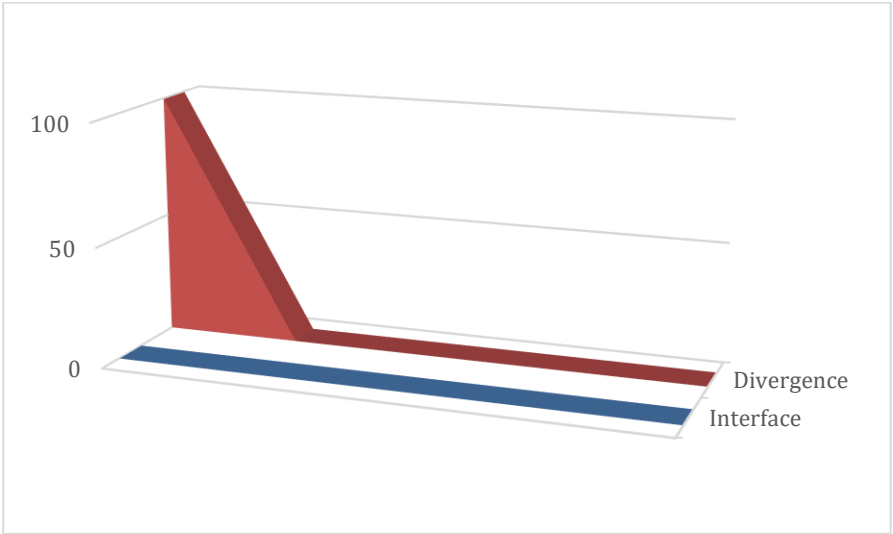
Lastly, there is only one low front monophthong present in Bengali whereas Dutch does not have any vowel present in this category. Therefore, it is evident that the two languages lack interface between them.

Table 12: Low front monophthongs interface

Dutch	Bengali	Interfacing phonemes	LFM interface
00	01	00	00%

Therefore,
Interface = 00%
LFM Divergence = 100%

Figure 8: Interface and divergence of the LFM

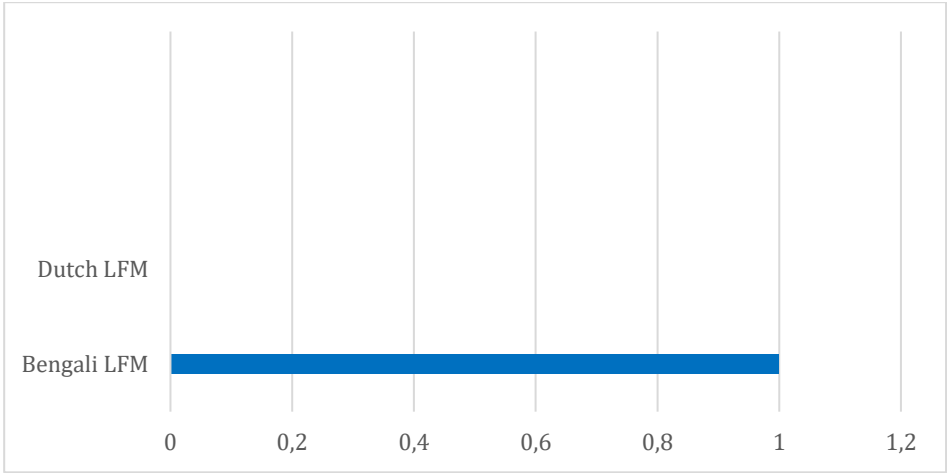


The implications of the variations for the learners of Dutch and Bengali can be summarised as follows:

Table 13: Implications for BLD and DLB

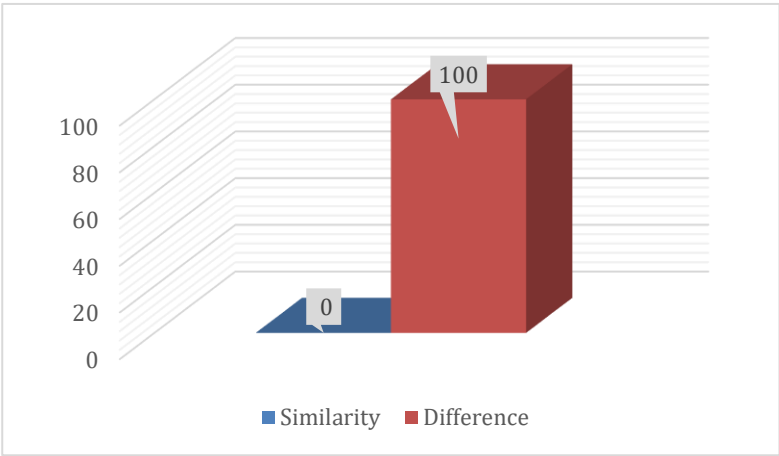
Learner	Acquisition L2 LFM	Transfer L1 LFM
Bengali speaking learner of Dutch	0	0
Dutch speaking learner of Bengali	1 /æ/	0

Figure 9: The Bengali language is 100% richer than Dutch in terms of low front monophthong



Therefore, Dutch-speaking learners of Bengali will have to acquire the one low front monophthong that exists in the Bengali phonology and Bengali-speaking learners of Dutch will have none to learn as there are no low front monophthongs in the Dutch phonology system. This indicates that no sounds can be transferred as a result of having zero interface. This illustrates that DLB will face substantial hurdles in learning the sound as their phonology inventory have no vowel that is produced with the tongue relatively flat and positioned low in the mouth.

Figure 10: Similarity versus differences between Dutch and Bengali front monophthongs



For the complete set of front monophthongs in Dutch and Bengali, the following is the contrast:

Table 14: Interface value of the front monophthongs

Dutch	Bengali	Interfacing phonemes	FM interface
06	03	00	00.00%

Dutch and Bengali front monophthong systems have zero similarities
Therefore,
Interface = 00.00%
FM divergence = 100%

It can be observed that as far as the front monophthongs are concerned, Dutch and Bengali are completely different from each other, posing difficulty for the BLD and DLB to acquire Dutch and Bengali, respectively. The implications of the phonetic differences for the learners of Dutch and English can be summarised as follows:

Table 15: Final analysis of Dutch and Bengali front monophthongs

Sound type	Learner	Retention or Transfer (L1)	Acquisition/ Learning (L2)	Substratum counterinfluence (L1)
Front Monophthong	Bengali learner of Dutch as a foreign language	0 0% L1	6 /ɛ/ /e:/ /ɪ/ /i:/ /ʏ/ /y(:)/ 100% L2	3 /i/ /e/ /æ/ 100% L1
	Dutch learner of Bengali as a foreign language	0 0% L1	3 /i/ /e/ /æ/ 100% L2	6 /ɛ/ /e:/ /ɪ/ /i:/ /ʏ/ /y(:)/ 100% L1

Conclusion

From the zonal and mathematical frames of references, it can be clearly observed that the Bengali and Dutch front monophthong systems are considerably different. The points of origin of the vowel sounds in the vocal tract and their phonetic properties, such as height, backness, roundness, tension, and length are distinct in both languages. From the above information, we discover that there are a total of six front monophthongs in the Dutch language compared to only three in Bengali. From the charts, it can be derived that the Dutch language is more sophisticated than the Bengali language for high front (four against one in Bengali) and mid front (two against one in Bengali) monophthongs while Bengali is more sophisticated than Dutch where the low front monophthongs are concerned (one against zero in Dutch). In the final analysis, the total number of interfacing front monophthongs in Dutch and Bengali is zero as there are no corresponding front vowels that exist in both languages, meaning they do not share any equivalent sounds. This implies that Bengali learners of the Dutch language will have to acquire all six front vowels that exist in the Dutch phonology inventory, as opposed to three vowels that the Dutch learners of the Bengali language will have to acquire that exist in the Bengali phonology. This analysis of differences in vowel inventory and pronunciation would be beneficial for linguists, language teachers, and language learners, as it would provide useful insights into potential areas of challenges in learning pronunciation of the target languages. Further research is suggested to examine the central and back vowels in conjunction with the front vowels for a comprehensive understanding of the complexity involved in acquiring the vowel sounds in a foreign language. Additional investigation on other phonological aspects of vowel production and retention is also advised.

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