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ACQUISITION OF ENGLISH [D] BY KHOWAR LEARNERS

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Abstract
This study examines the acquisition of the English alveolar stop [d] by Khowar-speaking learners, focusing on phonetic substitution patterns influenced by their native language. Using acoustical analysis and Voice Onset Time (VOT) measurements, it compares the production of [d] by Pakistan-based and foreign-based Khowar speakers. Findings indicate that Pakistan-based learners substitute [d] with a retroflex or dental-alveolar plosive due to L1 influence, while foreign-based learners show improved acquisition. The study highlights the role of exposure to native English input in shaping pronunciation accuracy and confirms that L1 phonetic inventory constrains L2 sound category formation, aligning with Flege's Speech Learning Model.

Keywords: Second language acquisition, VOT, Retroflex, Speech learning Model

Introduction

The study of second language (L2) phonetics and phonology has long explored how learners acquire non-native sounds, particularly when these sounds do not have direct equivalents in their first language (L1). One such issue arises in the acquisition of English [d] by Khowar speakers, a group whose phonemic inventory includes retroflex and dental-alveolar plosives but lacks an exact counterpart to the English alveolar stop. This research investigates the production of the English [d] sound by Khowar adult learners, analyzing the role of native language influence, exposure, and linguistic environment in shaping their pronunciation patterns. A comparative approach is adopted by examining the performance of Pakistan-based and foreign-based Khowar speakers to assess the impact of L2 exposure on phonetic acquisition. Using acoustical analysis and Voice Onset Time (VOT) measurements, the study aims to determine whether Khowar learners successfully differentiate English [d] from their native retroflex and dental stops, or if they substitute it with the closest L1 equivalents.

Research Questions

1. How do Khowar learners of English produce the English alveolar stop [d] in comparison to native English speakers?
2. To what extent does the phonemic inventory of Khowar influence the substitution patterns observed in Khowar learners' production of English [d]?
3. What role does exposure to native English input play in the perception and production of English [d] among Khowar learners based in Pakistan versus those based abroad?

Research Objectives

1. To examine the production of English [d] by Khowar learners and determine whether they classify it as a distinct phonetic category or substitute it with an L1 equivalent.
2. To analyze the production of English [d] among Khowar learners through acoustical analysis and F3 formant measurements, identifying any systematic phonetic substitutions.

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3. To compare the phonetic performance of Pakistan-based and foreign-based Khowar learners, assessing the influence of native English exposure on the acquisition of English [d].

Literature Review

Previous studies have demonstrated that L1 phonemic structures significantly influence L2 phonetic acquisition (Flege, 2021; Syed, 2012). Research on South Asian languages, including Urdu, Punjabi, Pashto, and Sindhi, indicates a tendency to substitute English alveolar stops with retroflex sounds due to the absence of the exact phonetic equivalent in these languages (Mahboob, 2012; Syed, 2016). Khowar, like other Indo-Aryan languages, lacks an exact alveolar plosive, leading to potential substitution with post-alveolar retroflex [ɖ] or dental-alveolar [d̪].

The role of markedness theory in phonetic acquisition suggests that less marked sounds are more easily acquired, whereas highly marked sounds pose greater difficulty for learners (Syed, 2012). The English alveolar stop [d] is considered more marked compared to its Khowar counterparts, which may explain the challenge faced by Khowar learners. Furthermore, studies on bilingualism and phonetic perception highlight that exposure to native-like input plays a crucial role in accurate phoneme acquisition (Brown, 2010). Learners with greater exposure to native English environments demonstrate improved perception and production of L2 phonemes compared to learners in monolingual L1 environments (Flege, 2020).

The phenomenon of equivalence classification, as proposed by Flege (2020), suggests that if an L2 sound closely resembles an L1 sound, learners may classify the L2 sound as an instance of the L1 category rather than forming a distinct phonetic category. This aligns with the hypothesis that Khowar learners may fail to develop a separate phonetic representation for English [d] and instead substitute it with an L1 equivalent. Additionally, research on Pakistani English (PakE) indicates that regional variations and educational input influence pronunciation patterns, often leading to non-native-like realizations of English phonemes (Mahboob & Rahman, 1990, 2004). This is particularly relevant to Khowar learners, who may receive non-native input from their educational institutions, further reinforcing L1 phonetic interference.

Research Methodology

Participants

- **Pakistan-based (n=15)**: No exposure to native English.
- **Foreign-based (n=15)**: Regular exposure to native English.

Data Collection

1. **Production Test**: Participants read words with [d], recorded for analysis.
2. **Acoustic Analysis**: Praat software measured formant frequency and retroflexion.
3. **Statistical Analysis**: A t-test compared pronunciation differences between groups.

Stimuli containing the target sound [d] given in the word ‘door’ presented for production to Pakistan-based and foreign-based and the average and standard deviation result obtained from simple T test is presented below.

Table 8

Std. Deviation and Significance of [d] of UK-based participants

		Mean	N	Std. Deviation
Door	Adj.F3	2.43	15	490.08088
	Dist.F3	2.89	15	430.06393

Table 9

Std. Deviation and Significance of [d] of Pakistan-based participants

	Mean	N	Std. Deviation

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Door	Adj.F3	2.31	15	489.34003
	Dist.F3	2.66	15	395.76505

The above T test verifies the result between Pakistan and foreign-based participants which is different significantly (.000).

1.1.1 Findings and Discussion

Study of the English sound [d] will go according to hypothesis that English alveolar stop sound [d] is substituted with retroflex in Saraiki (Syed, 2016), Same substitution with retroflex sound is noticed in most major languages of Pakistan such as Urdu, Sindhi, Pashto and Panjabi (Mahboob, 2012) therefore, it is also predicted that Khowar learners would also substitute with the nearest L1 sound which are dental alveolar plosive [d̪] and post alveolar plosives [ɖ]. Thus, this portion carries the presentation of the perception and production of English sound [d] by Khowar L1 participants along with result followed by analysis and finally conclusions are presented. One of the reasons of difficulties is due to the differences of L1 sound from L2 in terms of markedness, and unmarked sound is easier then marked and less marked (Syed, 2012). However, some other factors are involved such as environment, input, and experience. According to Brown (2010) age of exposure and age are the hindrance if the particular sound of L2 is active in the L1.

In the identification test of English [d] by foreign-based participants is 98% accuracy in perception of English [d] from native speaker. However, they would not be able to produce separate phonetic category for the said sound because either they have substituted with English alveolar stop [d̪] or L1 post alveolar plosives [ɖ] but they succeeded in identification of voicing of sound whereas Pakistan based participants identified it as voiceless alveolar stop which they have mention by writing in Urdu. According to Syed (2012) Pakistani language learners mostly considered English [d] as retroflex as retroflex sound is exited in their L1 not fricative sound and for English fricative sound Pakistani English speakers use dental stop [d̪] similarly, Khowar also has post alveolar retroflex in the phonemic inventory which means that Khowar learners of English also substitute English [d] with post alveolar retroflex [ɖ]. It is found that Pakistan-based participant perceived English [d], deciphered as English alveolar stop or post alveolar retroflex [ɖ] of L1 but the same sound is perceived from native speaker is alveolar voiceless stop which shows the voicing issue as Khowar is voiced language. Voicing problem will be discussed through VOT (voice onset time). Foreign-based participant perceived English alveolar stop or post alveolar plosives [ɖ] of L1will be understood from production test.

However, acoustical analysis of the word ‘door’ which is recorded to check the production of [d] sound. According to Syed (2012) and Hamann (2003) when F3 which also called third formant cues are lowered which means that the sound is produced with retroflex and if F3 formants are higher in the production of English sound [d] then it means the sound is produced without retroflexion. F3 values of English [d] taken in two positions: one from the adjacent to the consonant [d] and the second F3 value is taken from the distance of adjacent. Adjacent F3 value will show the impact of English [d] on the nearest vowel while producing whereas the distant F3 formants show the normal production frequency without the influence of consonant production nearby. L2 segment may be relatively easier to acquire in onset than in coda position because coda position is more marked than onset position (Archibald 1998). Therefore, English [d] is presented at onset position for production and acoustical analysis. The given table shows F3 average of Pakistan and foreign-based participants.

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Table 10

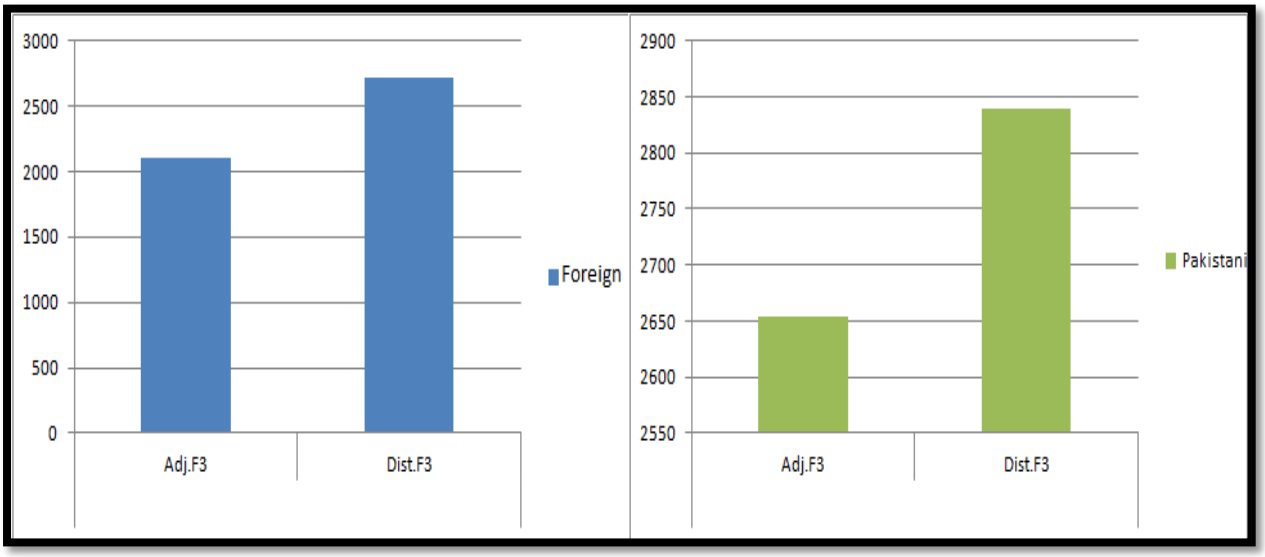
F3 and Std. deviation of production of English [d]

	Group	N	Mean	Std. Deviation
Adj.F3	Foreign	15	2.4387	490.08088
Dist.F3	Foreign	15	2.8945	430.06393
Adj.F3	Pakistan-based	15	2.3193	489.34003
Dist.F3	Pakistan-based	15	2.6626	395.76505

Above table shows F3 findings of both group where Pakistan based produced more retroflexion then abroad based participants in the production of [d] at onset position as the F3 of Pakistan-based is lowered then foreign-based participants. UK-based participants performed higher F3 frequencies then Pakistan-based participants and the higher F3 frequency indicate the production of English [d] as dental stop and lower formants of F3 shows [d] sound produced with retroflexion which means that foreign-based group are more inclined towards improved acquisition of English sound [d] then Pakistan based learners. P. value which .000 shows the significant difference of values between two groups. The Std. deviation shows the dispersion between F3 adjacent and distant vowel. Thus, the dispersion values in the production of English [d] by foreign-based participants is lesser than Pakistan-based participants which indicates that foreign-based production of the target consonant is less disturbed by the adjacent vowels therefore, the dispersion of Std. deviation values are less then Pakistan-based group. However, Std. deviation of Pakistan-based participants is higher which shows production is affected by adjacent vowels and got lower and the dispersion is increased between adjacent and distant F3 values which indicate the Pakistan-based Khowar participants failed to produce English [d] sound as alveolar stop rather substituted with retroflex which present in their L1.

Figure 2

Pakistani and foreign F3 values chart for 'door'



F3 formants show resistance (Syed, 2013). It is important to note that the foreign-based participants produced English [d] without retroflexion they produced it dental stop but the key point to note here is to stop L1 influence in acquisition on L2 sound (Syed, 2012) which is done by foreign-based participants through stopping the interference of retroflexion in the production English [d] which is produced without retroflexion that means that abroad group of participants improved in learning English [d] sound then Pakistan based learners. English [d] is alveolar stop whereas Khowar participants identified it as dental alveolar stop

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or retroflex which are present in the L1 of Khowar so, such situation new phonetic category is not created because Khowar participants substituted with Khowar alveolar stop or retroflex and new phonetic category is created when the given sound considered different from the sound of L1therefore, Khowar learners did not create new phonetic category for English [d] (Flege, 2021). It is also noticed that English [d] is mostly taken as retroflex due to the input received from Pakistan educational institutions. According to Mahboob and Rahman (1990, 2004) English [d] is substituted with retroflex regional languages of south Asia. Syed (2012) also endorsed the opinion that India, Bangladesh, and Pakistan also perceived and produced as retroflex of English [d] which can be considered as regional influence of languages which also affected Khowar learners in terms of an acquisition of English [d]. When Pakistani English perception test was conducted from Pakistan based participants noted down the word 'door' for target sound [d] which is perceived as Khowar retroflex because they familiar with sound they heard from their teachers in Pakistan but the same word they heard the native speaker they deciphered the word containing target sound [d] as English voiceless [t] which is might be the reason that this sound is phonologically closer to the sound of Khowar dental alveolar stop [d]. Another reason of error production English [d] sound by Khowar learners is due to the difference in feature geometry of both languages as English [d] is [+interior] while producing at alveolar ridge whereas Pakistani English (PakE) this sound is produced with –interior (Syed, 2017). This could be the reason with Khowar learners too that they produced English alveolar with –interior which is produced with +interior by native English speakers which is why Khowar learners produced with retroflexion. This notion is further endorsed by Arsenault (2009) that if the distinctive features of L1are active in the L2 then there is a less chances of sound variation.

It is also noticed from the existing literature on Pakistani language that more specifically (Jackson & Syed 1981,2012) Pakistani languages do not have dental fricative sounds in their phonemic inventory therefore they substituted the absent sound (dental fricative) with respective dental stop. English [d] is replaced with retroflex and English fricative substituted with regional dental stop similarly, Khowar does not have English dental fricative in phonemic inventory consequently, English dental fricatives replaced with Khowar dental stop [d̪] and English [d] is substituted with Khowar retroflex [ɖ].

Another error in perception and production is due the input Khowar learners receive from Pakistani educational institutions as it observed that PakE is used by English teachers is not native-like so, the indigenous input Pakistan based learners specially Khowar learners received is erroneous input or not native-like. This idea is also confirmed from the perception test of Pakistan-based participants when they heard PakE stimuli without any confusion. Thus, it is confirmed from findings that correct input led to correct production Flege (2020) if Khowar learners received correct input of English alveolar from Pakistani teacher they could have produced English alveolar stop rather than retroflex. In addition, foreign based participants improved in terms of learning from retroflex to dental stop which is because of the input they received of English [d].

In terms of perception Pakistan based participants identified English [d] as voiceless stop whereas foreign-based participants improved in perception of English [d] and perceived [d] as retroflex. So, in order to see why Pakistan-based participants perceived English [d]as voiceless will be looked through comparing L1 and L2 laryngeal difference or contrast. According to Simon, Syed and Bibi (2009&2021) world languages are divided on the basis of voicing and aspiration and both these features are laryngeal. Simon (Ibid) when English [d] is differentiated from [t] on the basis of aspiration then the contrast indicates English is the language of aspiration. Khowar is also voicing language like other Indo-Aryan languages if we see, the difference of English [d]and [t] on the basis of voicing as Pakistan-based participants perceived English [d[as voiceless stop, could be the reason of voicing problem

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which can be further explained through study voice onset time (VOT)of English [d] and Khowar [t] but such study is going beyond the level of VOT due to the positive perception of English [d] by foreign-based participants which means this issue is only the reason of voicing of sound but could be the reason of lack native input because Pakistan-based participants does not have native input in Pakistan. Exposure of input does matter in acquiring L2 sound unless distinctive feature is active in the L1 (Brown, 2000).

However, another investigation is carried out to see why English is voiced [d] is taken as voiceless by Khowar participants based in Pakistan which would be looked through the manner of articulation of the participants. As we came to know through the above discussion and findings that Khowar learner could not perceive and produce English alveolar sound and foreign-based participants were better in perception and production. 100 % Pakistan-based Khowar participants identified as voiceless of English [d] whereas 98% foreign-based participants identified English [d] as voiced. So, this result shows that foreign-based participants have removed the error and Pakistan-based participants did not overcome the issue. As discussion earlier that English is aspiration language which differentiate English sound [d & t] based on aspiration contrast (Syed, 2012) whereas Khowar is voicing language and it will differentiate the given sound on the basis of contrast in voicing. In order to see the voicing contrast of Khowar in terms of identifying English [d & t] it confirmed from voice onset time (VOT) of Khowar stops that Khowar has short-leg for [t] and English has same short-leg VOT for [d]. However, [d] pre-voiced in Khowar. VOT shows the duration of time between the burst created by stop and starting point of voicing at onset of adjacent vowel which is followed (Docherty, 1992). VOT is measured through milliseconds (msec) and there is 1000 msec in one second. Thus, the error of identifying English voiced [d] as voiceless [t] is due to the similarity in short-leg VOT which is why Khowar learners mostly Pakistan-based perceived voiceless, but VOT could not be the sole reason of error because foreign-based identified the same sound correctly.

1.1.2 Conclusion and Recommendation

It is also noticed that L1 influence L2 which is proved from the acquisition of English [d] as Khowar participant produced it with retroflex due to the influence of L1 Khowar learners and the application of retroflex for English [d] shows existence of retroflex sound in the L1 in the form of ɖ. Another important factor: Khowar learners used Khowar dental sound for English dental fricatives which also discovered other Pakistani languages such as Saraiki (Syed, 2012).

Results confirmed that Pakistan-based group produced English [d] with retroflex and foreign-based group produced without retroflex which means that they have produced it with dental stop. So, this study confirms Flege's hypothesis (5) that new phonetic category formation is blocked with the process of equivalence classification which is obvious from result of English [d] thus, it also indicates that neither of the group discriminated English [d] and the point came to the surface that Pakistani group took English [d] as retroflex whereas foreign-based group classified it as dental which means that no new category is formed which endorse the hypothesis of Flege (2020) that when sound of L2 equally distributed with the similar sound of L1 then new category formation is not possible. Syed (2012) of the view that if classification of sound is strong and no improvement is done in terms of acquisition.

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