PHONETIC ADAPTATION OF ENGLISH LOANWORDS: AN ACOUSTIC STUDY OF LINGUISTIC VARIATION ACROSS EDUCATIONAL BACKGROUNDS

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ABSTRACT

This research focuses on the acoustic analysis of English loanwords in the speech of both educated and uneducated Punjabi speakers. It investigates how uneducated speakers modify the pronunciation of English loanwords within Punjabi phonology. The study employs a qualitative research design, collecting data from 52 native Punjabi speakers residing in Gujranwala. Data collection proceeded through two phases: initial focus group discussions and interviews where relevant words were selected, followed by pronunciation sessions involving three educated and uneducated Punjabi speakers for each word, recorded and analyzed using PRAAT software. Analysis reveals that uneducated speakers adapt English loanwords by altering monophthongs, and diphthongs, and employing epenthesis in syllable-initial and final consonant clusters. Short vowels are lengthened, and English diphthongs are simplified to align with Punjabi phonology. Notably, consonant clusters are declusterized due to Punjabi's phonotactic constraints. The study highlights how the influence of Punjabi shapes these adaptations, contrasting with patterns observed in educated speakers who tend to maintain closer phonetic fidelity to standard English. This research contributes insights valuable for English language learners and educators, aiding in pronunciation accuracy and error identification. It underscores the impact of mother tongue influence on pronunciation adaptation processes.

INTRODUCTION

This research examines the acoustic analysis of English loanwords in Punjabi, focusing on how educated and uneducated speakers adapt these loanwords. Both Punjabi and English possess distinct linguistic structures, necessitating specific adaptation processes for English loanwords to integrate effectively into Punjabi. This study aims to examine, describe, and analyze the acoustic characteristics involved in the adaptation of English loanwords by educated and uneducated speakers of Punjabi. Understanding these patterns is crucial for comprehending the integration of loanwords into the Punjabi language, aiding English language educators and learners in inaccurate pronunciation and differentiation of loanwords in Punjabi discourse.

The study involves data collection from Punjabi speakers residing in Gujranwala, collected in two phases. Phase one includes focus group discussions and interviews, from which relevant words were selected. Three native Punjabi speakers were chosen to pronounce these words, each uttering them thrice for acoustic analysis. The recordings were analyzed using PRAAT software, focusing on acoustic parameters such as vowels, diphthongs, the addition of (r), and

epenthesis, measured through formant frequencies (F1, F2, F3).

Research Questions

Following are the research questions that the current study will respond to:

1. What are the specific acoustic patterns observed in the pronunciation of English loanwords by educated and uneducated speakers?
2. How do educated and uneducated speakers differ in their acoustic pronunciation of English loanwords?

The Rationale of the Study:

English functions as a widely spoken second language across the globe, including in Pakistan, where it holds official status alongside indigenous languages such as Punjabi (Chohan & García, 2019). This study examines the phonetic adaptation of English loanwords in the speech of both educated and uneducated Punjabi speakers. Understanding the patterns of loanword integration is essential for enhancing English language acquisition among Punjabi speakers, particularly those from diverse educational backgrounds.

The research investigates the incorporation of English loanwords into Punjabi speech, analyzing the phonetic modifications and structural adjustments involved in this process. As Lehmann (1962) asserts, all languages undergo borrowing and adaptation when assimilating lexical items from other linguistic systems, necessitating modifications to align with the phonetic, morphological, and cultural conventions of the recipient language. By focusing on the speech patterns of educated and uneducated Punjabi speakers, this study seeks to identify systematic variations in the phonetic realization of English loanwords. The findings contribute to a broader understanding of language contact phenomena and their implications for linguistic theory, language education, and cultural integration.

The phonetic adaptation of English loanwords exhibits notable differences between educated and uneducated speakers, influenced by variations in linguistic exposure and phonological structures. This study employs an acoustic analysis to examine these adaptations, with a particular focus on the realization of vowels, diphthongs,

epenthesis, and the insertion of /t/. By analyzing formant frequencies (F1, F2, and F3), the study provides empirical insights into the phonetic patterns that distinguish the speech of educated and uneducated individuals. These findings have significant implications for English language pedagogy, particularly in refining pronunciation training and comprehension strategies for non-native speakers.

LITERATURE REVIEW

Punjabi: Linguistic Background and Contemporary Status

Punjabi is an officially recognized language in India, where it holds primary status in Punjab and Chandigarh and secondary status in Haryana, Delhi, and Himachal Pradesh (Kaur, Nidhi, & Kaur, 2012). In Pakistan, it enjoys provincial language status and serves as the dominant language of Punjab province, though it lacks national recognition (Kaur, Nidhi, & Kaur, 2012). Despite its wide usage, Punjabi remains underrepresented in formal education and administration, particularly in Pakistan, where Urdu and English are prioritized.

Linguistically, Punjabi is classified as a tonal language, employing three primary tones—high-rising-falling, mid-rising-falling, and low-rising—to differentiate meanings (Ghai & Singh, 2012). The mastery of these tones is essential for intelligibility, making tonal acquisition particularly challenging for second-language learners (Brinton & Traugott, 2005). The tonal nature of Punjabi distinguishes it from other Indo-Aryan languages, adding complexity to phonetic analysis and language learning.

Punjabi exhibits significant dialectal variation, influencing mutual intelligibility and phonemic differences across regions. These variations function similarly to accents in other languages, affecting pronunciation and lexical choices (Chen, Tam, Shen, & Campbell, 2013; Purnell, Idsardi, & Baugh, 1999). The name "Punjabi" originates from the Persian words Punj (five) and Aab (water), referring to the historical five rivers of Punjab spanning Pakistan and India (Colin, 1991). This geographical and historical context has shaped the linguistic diversity within Punjabi, contributing to distinct regional varieties.

In Pakistan, Punjabi is spoken as a first language by the majority of the population, while in India, it is one of 22 officially recognized languages

(Ethnologue, 2016; Chohan & García, 2019). The language is further divided into three major dialect groups: Majhi, Dogri, and Western Punjabi (Lahnda) (Campbell, 1991). Among these, Majhi is considered the standard dialect, used in academic and formal contexts.

The Majhi dialect is spoken in central Punjab, encompassing cities such as Lahore, Sheikhupura, Kasur, Okara, Gujranwala, Wazirabad, Sialkot, Narowal, Gujrat, and parts of Jhelum in Pakistan, as well as Amritsar in India (Tariq, 2016). Other notable dialects include Pothohari, Dhanni, Chachi, Jangli, and Majhi, with phonetic variations resembling Sindhi and Saraiki languages (Colin, 1991). Linguists recognize Majhi as the most influential dialect due to its role in media, literature, and education.

Despite Punjabi's strong cultural presence, its status in Pakistan remains limited in official and institutional domains. Although it is widely spoken, Punjabi is not formally used in government, law, or higher education, which has implications for language policy and linguistic identity (Dr. Sidhi, 1992; Nascem, 2002). This restricted status has contributed to ongoing discussions about linguistic preservation and the impact of bilingualism on Punjabi speakers.

Linguistic Variations Among Educated and Uneducated Punjabi Speakers

Language serves as a fundamental tool for expressing emotions, conveying ideas, and facilitating global communication. English, often regarded as a universal language, plays a pivotal role in connecting diverse civilizations and enabling seamless interaction across borders (Hall & Hall, 1959). In multilingual nations such as Pakistan, linguistic diversity is deeply rooted in historical and socio-political influences, particularly colonialism. British colonial rule left a lasting impact on Punjab by introducing English through educational institutions and administrative structures, thereby fostering multilingualism. Today, Punjabi, Urdu, and English function in distinct domains, with English assuming a crucial role in official, academic, and professional contexts. The incorporation of English loanwords into Punjabi reflects ongoing cultural globalization and the influence of foreign products and technologies (Mahmood et al., 2011).

The significance of English in Pakistan extends beyond its historical and institutional presence. As a developing nation, Pakistan heavily relies on imported technology, machinery, and scientific advancements from Western countries. Proficiency in English is essential for operating these technologies and engaging in international trade and business. Furthermore, for Pakistani students pursuing higher education abroad, English proficiency is a prerequisite for academic success and effective communication. The ability to speak and comprehend English enhances their adaptability in foreign academic and professional environments. Despite the prevalence of regional languages and Urdu in daily interactions, English remains the primary medium of social mobility and economic advancement. It functions as a language of power, granting individuals access to higher education, employment opportunities, and global networks (Mahboob, 2007).

Educational disparities between Urdu, Punjabi, and English mediums of instruction have been a subject of scholarly investigation. Mansoor (1993) examined these variations, highlighting a pronounced preference for English due to its perceived advantages in securing employment and attaining social prestige. Recognizing these disparities, the governments of Punjab and Sindh made English a compulsory subject in schools beginning in 1994, aiming to create a more equitable educational landscape (Mansoor, 1993; Riaz Fatima). However, the effectiveness of this policy remains debatable, as its implementation has been hindered by challenges such as a shortage of qualified English teachers and inconsistent instructional practices. In many cases, English instruction is limited to early education levels, restricting its long-term impact on linguistic proficiency (Mahboob, 2007).

Historically, Punjabi has undergone linguistic transformations due to prolonged contact with Arabic and Persian. However, the influence of these languages has gradually diminished, while English continues to shape contemporary linguistic practices. Initially, foreign linguistic influences were perceived as a threat to linguistic purity, yet over time, Punjabi speakers have incorporated lexical items from multiple languages, including Arabic, Persian, and Turkish (Sadeed, 2006; Hussain et al., 2012). For instance, the traditional Punjabi term Gatta (meaning 'stick candy') has been replaced by the English-derived

term lollipop, illustrating the ongoing adaptation of language to cultural and technological shifts (Hussain et al., 2012). Linguistic change occurs through various mechanisms, including phonological modifications, semantic shifts, and morphological adjustments, all of which reflect the dynamic nature of language evolution (Hussain et al., 2012). Francis (1965) underscores the significance of borrowing as a key process in linguistic development, highlighting its role in the expansion of modern English vocabulary.

Phonological Features of Punjabi

Punjabi exhibits a distinct phonological system compared to English, comprising a rich inventory of 10 vowels, 29 consonants, and notable variations in nasalization and semivowels (Gill & Gleason, 1969). As a tonal language, Punjabi relies on pitch variations to differentiate word meanings, a characteristic it shares with other tonal languages (Colin, 1991; Pickett, 1999). Studies indicate that vowel qualities in Punjabi undergo modifications due to linguistic influences, with shifts such as /ɪ/ and /ʊ/ evolving into /e/ and /o/, effectively broadening the vowel inventory to five (Colin, 1991; Karamat, 2001). These phonological adaptations highlight the dynamic nature of Punjabi speech and its responsiveness to linguistic change.

	Front	Central	Back
High	i:		u:
	i		u
Mid	e	schwa	o
	ai	a:	au
Low			

Phonological Comparison Between Punjabi and English

Punjabi and English exhibit significant differences in their phonological structures. While English phonology has been extensively researched, studies on Punjabi phonology remain comparatively limited (Karamat, 2012). Key distinctions between the two languages include syllabification, diphthongs, and nasalization. English permits complex consonant clusters in both onset and coda positions, whereas Punjabi has a more restricted consonant cluster inventory, lacking initial clusters entirely and imposing constraints on medial and final clusters. Borrowed words from Urdu or Hindi that contain impermissible clusters often undergo modifications through insertion or alteration of sounds (Gill & Gleason, 1969).

Punjabi syllable structures also differ from those in English. Singh (2005) identified seven types of syllables in Punjabi: V, CV, VC, CVC, VCC, CVCC, and CCVC. His research in Punjabi text-to-speech synthesis highlighted that the first five syllable types were the most commonly used, whereas the last two, involving consonant clusters, were rare in Punjabi. Additionally, nasalization plays a crucial role in Punjabi phonology. Unlike English, which does not feature nasalized vowels, Punjabi vowels consistently have nasalized allophones (Campbell, 1995). Vowel nasalization occurs when an oral vowel appears before a nasal consonant, such as in en ('moon'), or follows a nasal consonant in final position, as seen in na ('no') (Gill & Gleason, 1969).

Diphthongs further distinguish Punjabi from English phonology. While English has an extensive range of diphthongs and triphthongs, Punjabi primarily features diphthongs, with no confirmed triphthongs. Some identified diphthongs in Punjabi include /ɪ/, /ɪa/, [ʊa], /ɪo/, /ɪə/, /i/, /e/, and /u/ (Gill & Gleason, 1969; Mahmood et al., 2011). These phonological distinctions demonstrate the structural complexity and linguistic uniqueness of Punjabi.

Conceptualizing Borrowing in Linguistics

Borrowing involves the adoption of foreign lexical elements into a recipient language to express new concepts (Mojela, 1991). When speakers from diverse educational backgrounds interact, borrowing enriches vocabulary and expands meanings (Mojela, 1991; Haugen, 1950). Additionally, Fanti differentiates between pure borrowing, which retains the original form, and adapted borrowing, which adjusts to the recipient language's structure (Hall-Lew, 2002). Some loanwords fully integrate into the borrowing language, while others retain foreign characteristics, influencing linguistic evolution (Katamba, 1994).

Borrowing extends beyond individual words to include sounds, linguistic structures, and even

grammatical elements. These borrowed features often undergo modifications in phonology, morphology, syntax, and semantics to conform to the recipient language (Haspelmath, 2009). Furthermore, convenience borrowing emerges when speakers replace existing native terms with foreign words for perceived efficiency, particularly among individuals of varying educational backgrounds (Stalhammar, 2004).

A distinction exists between direct loans, which preserve the original pronunciation, and translation loans, which adapt directly to the recipient language's phonological and grammatical norms. These adaptation strategies highlight differences in linguistic processing between educated and uneducated speakers (Stalhammar, 2004). While borrowed terms seamlessly integrate into monolingual speech, they differ from code-switching, where linguistic alternation is more overt (Haspelmath, 2009). Borrowing is shaped by language contact, bilingualism, and sociolinguistic factors, impacting phonological, phonetic, syntactic, and morphological structures (Thomason & Kaufman, 1992). Linguists continue to debate the distinctions between borrowing and related linguistic phenomena such as code-switching, emphasizing overlaps in adaptation and cultural exchange (Poplack & Meechan, 1995; Appel & Muysken, 1987; Muysken, 1990).

Linguistic Dimensions of Borrowing

Borrowing manifests at multiple linguistic levels, leading to systematic modifications in the recipient language. Görlach (1997) emphasizes that these modifications influence fundamental linguistic structures, including writing systems, phonology, morphology, syntax, and lexicon.

1.   Orthographic Influence: Borrowing can affect the writing and spelling systems of a language. For instance, the Latin alphabet, introduced to Old English through language contact, reshaped its orthographic conventions. Additionally, Renaissance scholars reinforced Latin and Greek spellings in borrowed words, further modifying English orthography.

2.   Phonological Adaptation: Borrowing can introduce phonetic modifications, requiring adjustments in pronunciation, articulation, and stress placement. This process is socio-linguistically significant, as speakers' proficiency in the source language often determines the extent of phonetic accuracy in borrowed words.

3.   Morphological Integration: Languages differ in their capacity to absorb foreign morphemes. Görlach (1997) highlights the distinction between open-class borrowing, where content words (e.g., nouns, verbs) are easily borrowed, and closed-class borrowing, where function words (e.g., prepositions, pronouns) are less likely to be adopted.

4.   Syntactic Influence: Borrowed syntactic structures can reshape sentence patterns in the recipient language. Unidiomatic translations or deliberate modifications of foreign syntactic rules may introduce new grammatical constructions. The imitation of Latin syntax in Renaissance prose serves as an example of such syntactic influence.

5.   Lexical Expansion: The lexicon is the most dynamic site of borrowing. Loanwords, loan blends, loan shifts, doublets, and calques enrich the recipient language, offering new means of expression and communication.

Classifying Borrowing Mechanisms

Bloomfield (1933) categorizes borrowing into two primary types:

•   Dialectal Borrowing: This occurs when linguistic features are borrowed from closely related speech varieties. For example, pronunciation variations within a single language may spread between regional dialects.

•   Cultural Borrowing: This involves adopting words from foreign languages, typically in reference to cultural artifacts or concepts. For instance, the word spaghetti, borrowed from Italian, reflects cultural diffusion. This type of borrowing is increasingly significant, especially in the context of global English influence.

Phonemic, Morphemic, and Syntactic Borrowing

Borrowing occurs at different structural levels, influencing pronunciation, morphology, and syntax.

Phonemic Borrowing:

This involves adopting foreign phonemes, altering the phonetic inventory of the borrowing language.

English, for instance, incorporated sounds from French (individuals, labor, chair) and Russian (sputnik), reflecting phonological adaptation (Kadim, 2016).

Morphemic Borrowing:

This controversial process entails the adoption of foreign morphemes, which, once assimilated, become integral to the recipient language's lexicon. Such borrowings contribute to linguistic diversity and adaptability (Weinreich, 1953).

Syntactic Borrowing:

This refers to the structural adaptation of foreign syntactic patterns. Nouns are the most commonly borrowed category due to their thematic flexibility, as observed in various language contact scenarios (Myers-Scotton, 2002; Van Hout & Muysken, 1994).

Conceptualizing Loanwords in Linguistic Studies

Loanwords are foreign words incorporated into a recipient language, often coexisting with native synonyms. Bloomfield (1933) argues that loanword integration is a gradual process, emphasizing that full assimilation requires linguistic adaptation over time. Haugen (1950) classifies loanwords as direct outcomes of borrowing, while Görlach (1997) defines them as foreign lexical elements integrated at or above the word level. Tugen and Sankoll (2002) further emphasize that authentic loanwords undergo phonological and morphological assimilation within the recipient language.

Categories of Loanwords

Loanwords undergo varying degrees of modification to align with the recipient language's linguistic framework. Haugen (1950) states that complete integration requires adherence to the recipient language's phonological and syntactic norms. Peperkamp & Dupoux (2003) identify phonological adaptations, including segmental and suprasegmental modifications, epenthesis, and deletion, as key strategies in loanword assimilation. Unadapted Loanwords: Some loanwords retain their original pronunciation and structure, though slight modifications may occur based on speaker familiarity with the donor language (Svobodová, 2000). Sociolinguistic Variation: Educated and uneducated speakers may exhibit differing pronunciation and usage patterns, reflecting disparities in linguistic exposure and register familiarity.

Functional Aspects of Loanwords in Language Evolution

Loanwords serve various linguistic functions, contributing to lexical expansion and semantic refinement. Gürlach (1997) identifies several key functions:

1. Identification of Foreign Objects and Concepts: Loanwords provide precise terminology for foreign cultural and technological innovations.
2. Filling Lexical Gaps: They address linguistic deficiencies where native equivalents are absent or inadequate.
3. Enhancing Conceptual Differentiation: Loanwords refine semantic distinctions within the lexicon.
4. Facilitating Cross-Linguistic Communication: They improve mutual intelligibility in multilingual settings.

Jespersen (1919) argues that loanwords act as linguistic markers of historical and cultural exchange. The volume and nature of loanword adoption reflect power dynamics and cultural influence between languages. Wild (1976) expands on this, suggesting that loanwords referring to tangible objects serve as material evidence of intercultural contact, as seen in the integration of Latin and Roman terms into English.

Processes of Loanword Integration

Weinreich (1974) identifies three main stages of loanword integration:

1. Semantic Overlap: In initial stages, loanwords may create ambiguity when their meanings overlap with existing native terms.
2. Lexical Replacement: Over time, loanwords may completely replace native words, leading to shifts in lexical preference.
3. Specialization and Refinement: Fully integrated loanwords often acquire specialized meanings, resulting in linguistic differentiation and the emergence of doublets.

Despite extensive research on borrowing in various linguistic contexts, the acoustic analysis of English loanwords among educated and

uneducated Punjabi speakers remains an underexplored area. Previous studies have documented loanword integration across languages, yet there is a lack of literature examining its phonetic and phonological dimensions in Punjabi. This study aims to address this gap through an acoustic analysis of English loanwords in the speech of Punjabi speakers, contributing to the broader field of linguistic borrowing research.

RESEARCH METHODOLOGY
This study is primarily qualitative and exploratory, aiming to uncover patterns of adaptation among educated and uneducated speakers of Majhi Punjabi. Data was collected in naturalistic settings to observe language usage. Qualitative research is chosen for its ability to capture perceptions and behaviors (Krathwohl, 1993). It allows the exploration of non-measurable aspects such as feelings, attitudes, speech, thoughts, and culture (Morrison, 1989), making it suitable for this language-focused study. Qualitative research provides the greatest chance to examine prevalent patterns of loan words which include substitution, epenthesis, and addition processes in Punjabi by native speakers. There are two stages to describe the methodology

Methods of Data Collection
Data collection included focus group discussions and interviews.

Sampling
Three native Punjabi speakers from Gujranwala, representing both educated and uneducated backgrounds, were purposively selected. The purposive technique was used in which only a selected number of students can serve as primary data sources.

Techniques for Data Analysis
Acoustic analysis was conducted on recordings of these speakers using PRAAT software. The analysis focused on formant frequencies (F1, F2, F3) to understand adaptations like substitution, epenthesis, and addition of English loanwords in Punjabi speech.

Articulatory Phonetics
There are three types of phonetics, here all three types, are articulatory phonetics, auditory phonetics, and acoustic phonetics but the researcher's main focus is on acoustic phonetics. The development of different components of the vocal tract for discourse creation is managed by articulatory phonetics (Universitat Bielefeld, 2010). Additionally, articulatory phonetics educates us about the location and manner of verbalization of different phonemes. (Farooq, 2015) The verbalization of discourse depends on the accompanying three procedures;
a) The airstream procedure,
b) The phonation procedure,
c) The oro-nasal procedure

Auditory Phonetics
Auditory phonetics deals with how sounds are recognized and understood. It focuses on how the ear processes auditory signals and sends them as neural signals to the brain for interpretation. Unlike articulatory phonetics, which studies speech production, auditory phonetics explores the chain of events from sound reception in the ear to its neural processing in the brain, crucial for understanding speech generation and recognition (Universitat Bielefeld, 2010; Farooq, 2015).

Acoustic Phonetics
Acoustic phonetics analyzes the physical characteristics of sound waves in speech production, including pitch, loudness, amplitude, quality, and spectrographic features (Universitat Bielefeld, 2010; Farooq, 2015).

PRAAT
PRAAT is a computer program used to analyze sound waves and spectrograms, providing detailed insights into formant frequencies (Farooq, 2015).

Spectrogram
A spectrogram visually represents sound waves by illustrating their frequencies over time, essential for analyzing formant frequencies (Universitat Bielefeld, 2010; Farooq, 2015).

Formant Frequencies
Formants are delivered within the vocal tract with the vibrations of the air stream, and these vibrations may or may not be consistent. In Brict, the formants are the attention of the acoustic force, and the bunches of connotations compared to the echo rate of the air in the vocal tract are the

energy centers that control the quality of the sound waves, especially the vowels. (Universitat Bielefeld, 2010; Farooq, 2015)

Research Approach

This study is primarily qualitative and exploratory, aiming to uncover patterns of adaptation among educated and uneducated speakers of Majhi Punjabi. Data was collected in naturalistic settings to observe language usage authentically. Qualitative research was chosen due to its ability to capture perceptions and behaviors (Krathwohl, 1993). It enables the exploration of non-measurable aspects such as feelings, attitudes, speech, thoughts, and culture (Morrison, 1989), making it well-suited for this language-focused study. This research method provides a comprehensive approach to examining patterns of loanword adaptation, including substitution, epenthesis, and addition processes in Punjabi speech. The methodology is structured in two stages: Data Collection and Data Analysis.

Methods of Data Collection

Data collection methods included focus group discussions and interviews to obtain insights from participants regarding their language use and adaptation of loanwords.

Sampling

The study employed a purposive sampling technique, selecting three native Punjabi speakers from Gujranwala representing both educated and uneducated backgrounds. This technique ensures that only specific individuals, who are most relevant to the research objectives, serve as primary data sources.

Techniques for Data Analysis

Acoustic analysis was conducted on the recorded speech samples using PRAAT software. The analysis focused on formant frequencies (F1, F2, F3) to examine phonetic adaptations such as substitution, epenthesis, and addition in English loanwords spoken by Punjabi speakers.

Phonetics: Theoretical Background

Phonetics is divided into three branches:
1) **Articulatory Phonetics**
2) **Auditory Phonetics**
3) **Acoustic Phonetics**

This study primarily focuses on acoustic phonetics, though articulatory and auditory aspects are also discussed.

Speech Production Mechanisms (Articulatory Phonetics)

Articulatory phonetics studies how speech sounds are physically produced using different components of the vocal tract (Universitat Bielefeld, 2010). It examines the location and manner of articulation of different phonemes (Farooq, 2015). The articulation of speech sounds depends on three key physiological processes:

a) The Airstream Process – controls airflow for speech production.
b) The Phonation Process – governs the vibration of vocal cords.
c) The Oro-Nasal Process – regulates airflow between the oral and nasal cavities.

Speech Perception (Auditory Phonetics)

Auditory phonetics examines how speech sounds are recognized and processed by the human auditory system. It explores the mechanisms by which the ear receives sound waves, converts them into neural signals, and transmits them to the brain for interpretation (Universitat Bielefeld, 2010; Farooq, 2015). Unlike articulatory phonetics, which focuses on speech production, auditory phonetics is crucial for understanding speech perception and recognition.

Sound Properties and Structure (Acoustic Phonetics)

Acoustic phonetics studies the physical properties of speech sounds, including:
- Pitch
- Loudness
- Amplitude
- Spectrographic Features
- Sound Quality

These aspects help analyze how speech sounds vary across speakers and linguistic contexts (Universitat Bielefeld, 2010; Farooq, 2015).

PRAAT Software for Acoustic Analysis

PRAAT is a computer program used for acoustic analysis of speech. It enables researchers to examine spectrograms and sound waves, providing

detailed insights into formant frequencies (Farooq, 2015).

Spectrogram as a Visualization Tool

A spectrogram visually represents sound waves by mapping their frequencies over time. It is a crucial tool in acoustic phonetics, helping to analyze formant frequencies and identify phonetic adaptations in speech (Universitat Bielefeld, 2010; Farooq, 2015).

Understanding Formant Frequencies

Formants are resonant frequencies produced within the vocal tract as the airstream vibrates. These vibrations may be consistent or variable, influencing speech clarity. Formants are considered the energy centers that define vowel quality and influence speech intelligibility (Universitat Bielefeld, 2010; Farooq, 2015).

In summary, this research employs qualitative analysis and acoustic phonetics to examine loanword adaptation patterns in Punjabi speakers. By using PRAAT software to analyze formant frequencies, the study provides insights into phonetic changes in loanword pronunciation across different educational backgrounds.

DATA ANALYSIS

The data was analyzed based on substitution, addition, deletion, and epenthesis. Recordings of participants were analyzed using PRAAT software, with results presented through spectrographs. The study focused on acoustically analyzing vowels, diphthongs, and the addition of (r) and epenthesis by evaluating formant frequencies (F1, F2, F3), which enhance understanding of language variations.

Substitution of Monophthongs

Substitution is a primary adaptation method, often preceding other methods like addition, epenthesis, or deletion. It involves replacing sounds not found in the recipient language with phonetically similar ones (Hussain et al., 2011; Hock, 1991). This method prevents the deletion of sounds by substituting them with the closest phonetic equivalents, maintaining linguistic integrity. The average formant frequencies (FI, F2, F3) of nine words spoken by three native speakers of Majhi Punjabi were analyzed to study vowel articulation (Sciences, 2003).

Substitution of /ɒ/into/aː/

The tongue is near the top of the vocal track in the /ɒ/ vowel. This vowel is referred to as the back vowel (Ladefoged & Johnson, 2014). English phoneme/p/is substituted with/a: /. So, /a:/is change to English phoneme/ɒ/.

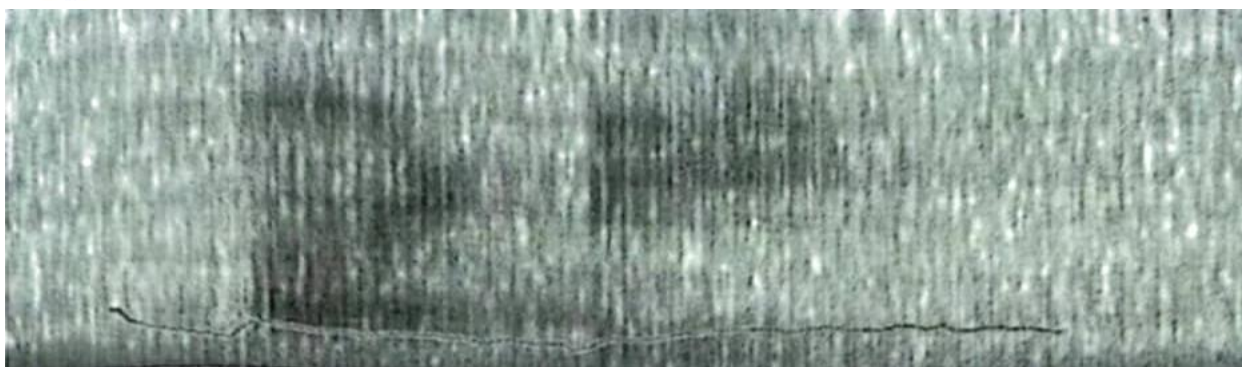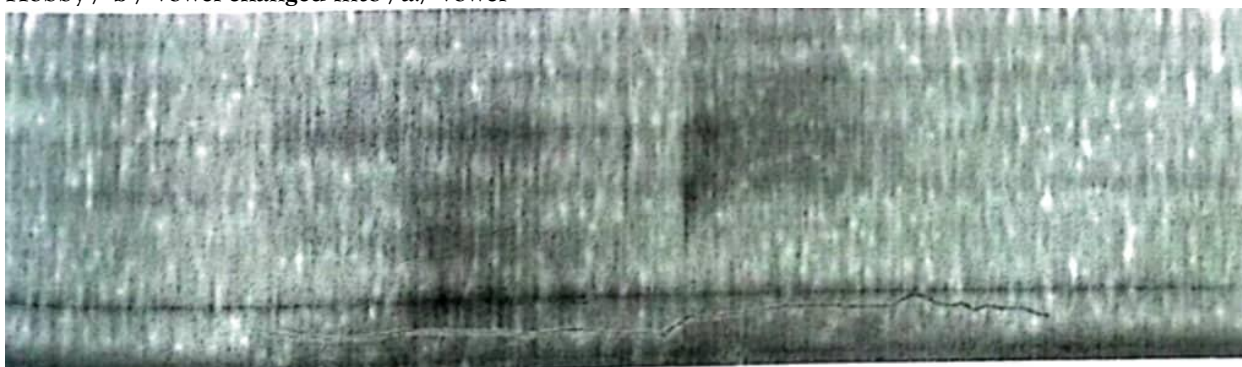**Coffee/ ɒ / vowel changed into /aː/ vowel**
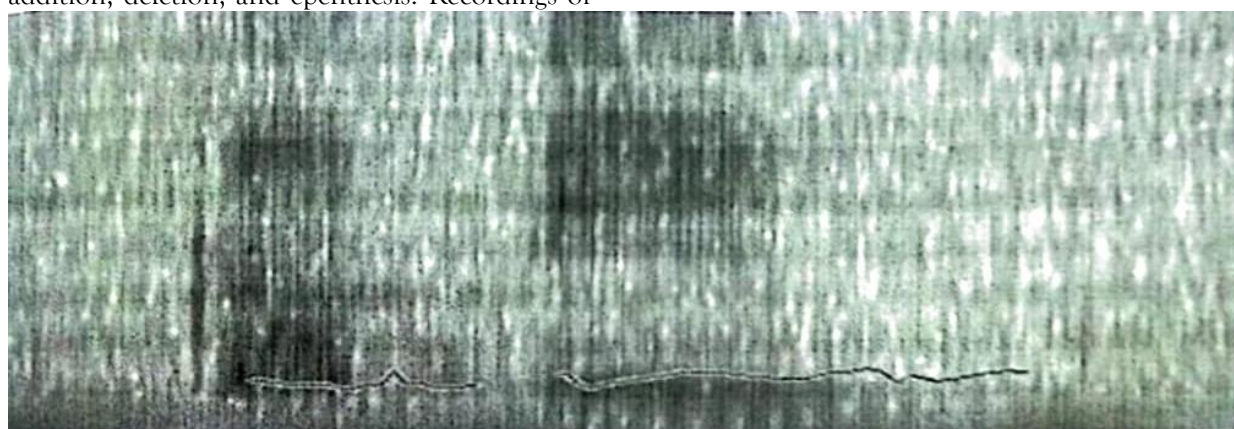
English / ɒ / vowel value: F1: 560, F2: 920, F3: 2560. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Coffee, 'kɒfi into ka: fi), and the average value of /a:/ in the word coffee is F1: 670, F2: 1150, F3: 2100. The frequency values show a clear adaptation difference.

Vowel	F1	F2	F3
English /ɒ/	560	920	2560
Punjabi /aː/ in	670	1150	2100

Dollar / ɒ / vowel changed into /aː/ vowel

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English / ɒ / vowel value: **F1: 560, F2: 920, F3: 2560**. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Dollar, 'dɒlər into da: lər), and the average value of /a:/ in the word dollar is **F1: 690, F2: 1205, F3: 1955**. This shows that the frequency value of the English vowel is completely different from the adapted one.

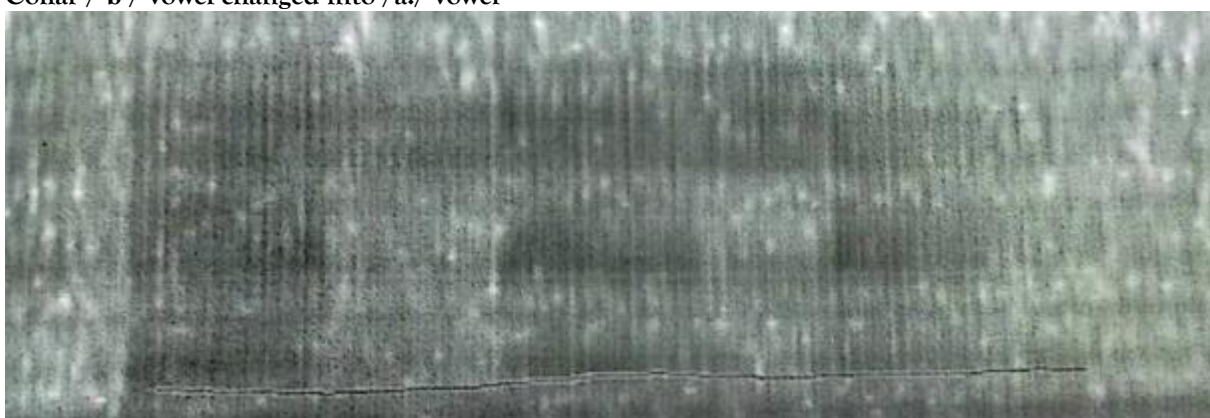| Vowel	F1	F2	F3
English /ɒ/	560	920	2560
Punjabi /aː/ in	690	1205	1955

Hobby / ɒ / vowel changed into /aː/ vowel

English / ɒ / vowel value: **F1: 560, F2: 920, F3: 2560**. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Hobby, 'hɒbi into ha: bi), and the average value of /a:/ in the word hobby is **F1: 680, F2: 1280, F3: 1850**.

Vowel	F1	F2	F3
English /ɒ/	560	920	2560
Punjabi /aː/ in	680	1280	1850

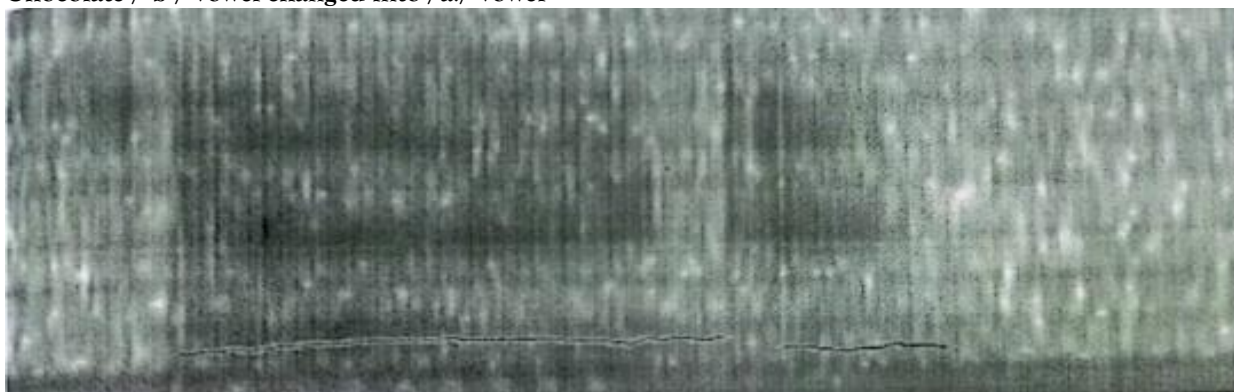**Collar / ɒ / vowel changed into /aː/ vowel**

English / ɒ / vowel value: **F1: 560, F2: 920, F3: 2560**. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Collar, 'kɒlər into ka: lər), and the average value of /a:/ in the word collar is **F1: 675, F2: 1250, F3: 1920**.

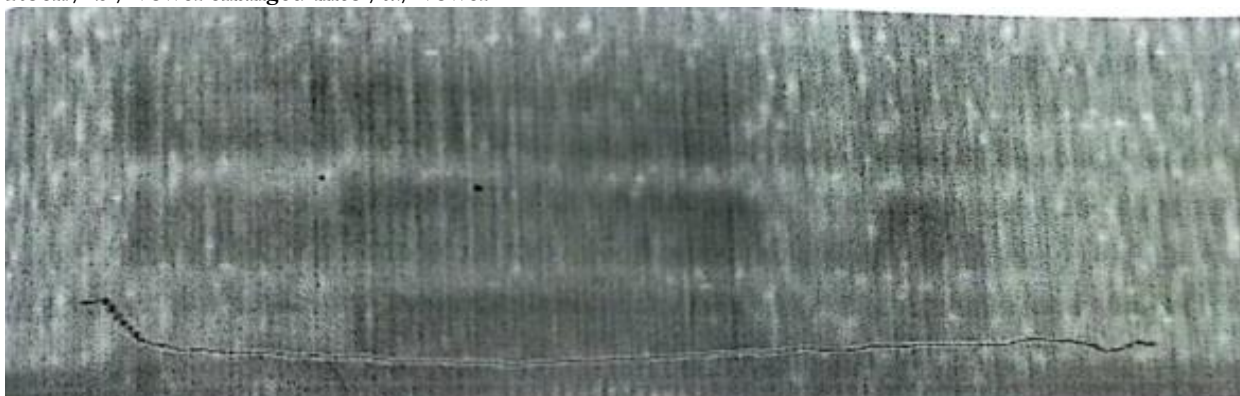| Vowel	F1	F2	F3
English /ɒ/	560	920	2560

| Punjabi /aː/ in | 675 | 1250 | 1920 |

Chocolate / ɒ / vowel changed into /aː/ vowel

English / ɒ / vowel value: **F1: 560, F2: 920, F3: 2560**. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Chocolate, 'tʃɒklət into tʃaː klət), and the average value of /aː/ in the word chocolate is **F1: 660, F2: 1180, F3: 2000**.

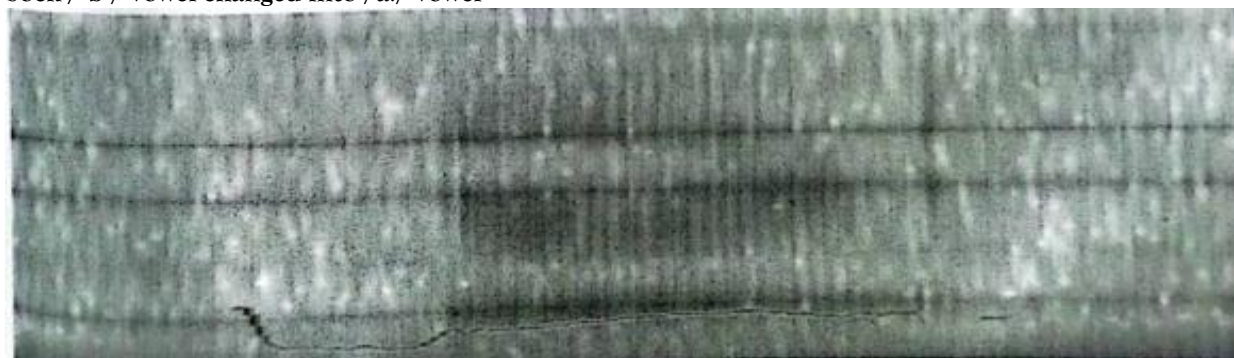| Vowel	F1	F2	F3
English /ɒ/	560	920	2560
Punjabi /aː/ in	660	1180	2000

Rock / ɒ / vowel changed into /aː/ vowel

English / ɒ / vowel value: **F1: 560, F2: 920, F3: 2560**. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Rock, 'rɒk into raː k), and the average value of /aː/ in the word rock is **F1: 670, F2: 1260, F3: 1890**.

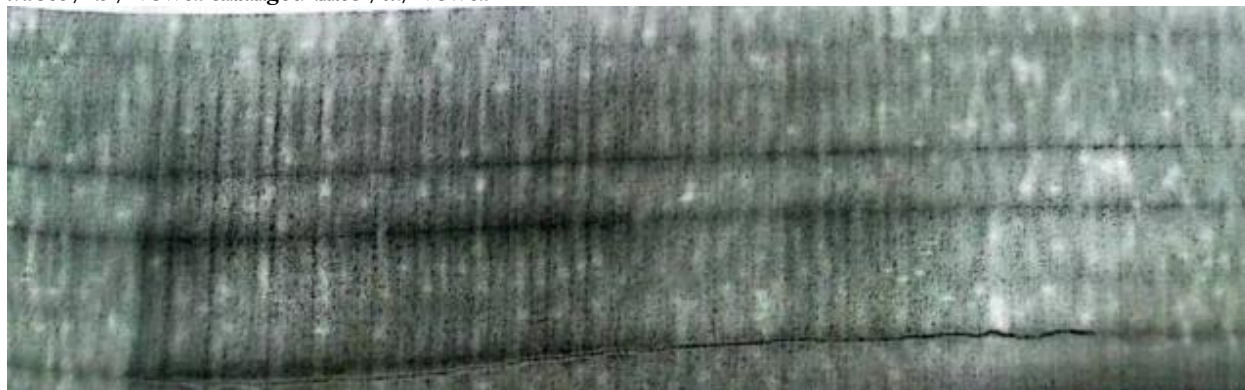| Vowel	F1	F2	F3
English /ɒ/	560	920	2560
Punjabi /aː/ in	670	1260	1890

Sock / ɒ / vowel changed into /aː/ vowel

English / ɒ / vowel value: **F1: 560, F2: 920, F3: 2560**. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Sock, 'sɒk into saː k), and the average value of /aː/ in the word sock is **F1: 665, F2: 1210,**

F3: 1955.

Vowel	F1	F2	F3
English /ɒ/	560	920	2560
Punjabi /aː/ in	665	1210	1955

Frost / ɒ / vowel changed into /aː/ vowel

English / ɒ / vowel value: **F1: 560, F2: 920, F3: 2560**. Punjabi speakers changed the /ɒ/ vowel into /aː/ (Frost, 'frɒst into fra: st), and the average value of /a:/ in the word frost is **F1: 690, F2: 1255, F3: 1800**.

Vowel	F1	F2	F3
English /ɒ/	560	920	2560
Punjabi /aː/ in	690	1255	1800

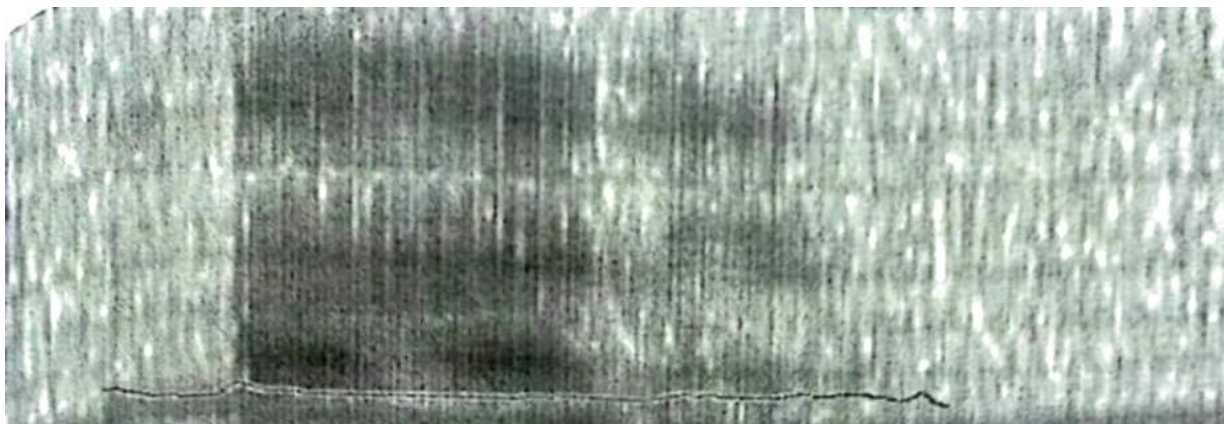| Words	/ ɒ/ Educated Speakers	/aː/ Uneducated Speakers
Coffee	kɒfi	ka: fi
Dollar	dɒlər	da: lər
Hobby	hɒbi	ha: bi
Collar	kɒlər	ka: lər
Chocolate	tʃɒklət	tʃa: klət
Rock	rɒk	ra: k
Sock	sɒk	sa: k
Frost	frɒst	fra: st
Coffee	kɒfi	ka: fi

Substitution of /ɔː/ into /aː /or/o: /

The tongue's body is close to the vocal tract's back surface. /2:/ vowel is known as a Long, open mid-low back vowel (Ladefoged & Johnson, 2014). / ɔ:/ back vowel is additionally substituted as /a: /or/o: / there are limitations when adjusting this in Punjabi, sometimes /ɔ:/ is adjusted as /o:/. It goes before bilabial /b/, /p/. In case /ɔ: / takes after or before /l/, /k/, /r/, /f/, /, /f/, or /b/ at that point the foremost fitting could be /a:/.

Talk
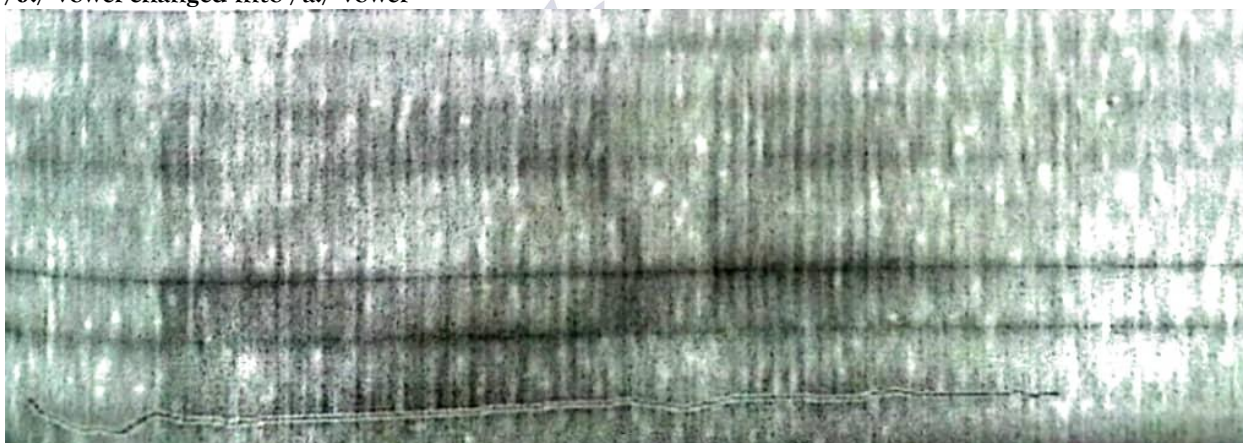**/ɔː/ vowel changed into /aː/ vowel**

English /ɔ:/ vowel value of F1, 480 F2, 760 F3, 2620, with the comparison of educated and uneducated Punjabi speakers, adapted /ɔ:/ vowel into /a:/ (Talk, tɔ:k into ta:k) and the average value of /a:/ in the word talk is F1, 650 F2, 1310 F3, 2205. Punjabi lacks the /ɔ:/ vowel, so they replace it with the nearest available vowel. In this word, the frequency value of the English vowel is completely different from the adapted one.

Vowel	F1	F2	F3
English /ɒ/	650	1310	2205
Punjabi /a:/ in	690	1255	1800

Chalk
/ɔ:/ vowel changed into /a:/ vowel

English /ɔ:/ vowel value of F1, 480 F2, 760 F3, 2620, with the comparison of educated and uneducated Punjabi speakers, adapted /ɔ:/ vowel into /a:/ (Chalk, tʃɔ:k into tʃa:k) and the average value of /a:/ in the word chalk is F1, 648 F2, 1287 F3, 1902. In this word, the frequency value of the English vowel is completely different from the adapted one.

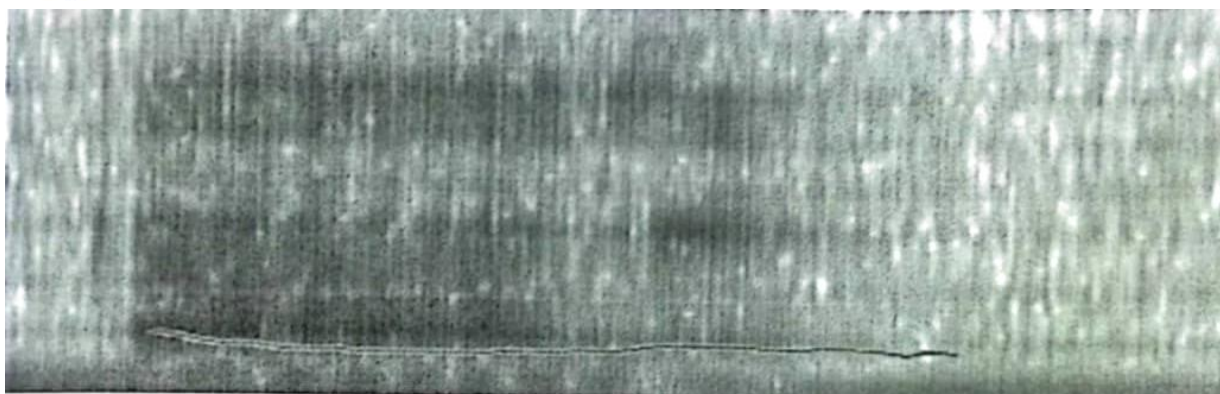| Vowel	F1	F2	F3
English /ɒ/	480	760	2620
Punjabi /a:/ in	648	1287	1902

Sword
/ɔ:/ vowel changed into /o:/ vowel

English /ɔ:/ vowel value of F1, 480 F2, 760 F3, 2620, with the comparison of educated and uneducated Punjabi speakers, adapted /ɔ:/ vowel into /o:/ (Sword, swɔ:d into swo:rd) and the average value of /o:/ in the word sword is F1, 410 F2, 1008 F3, 2098. In this word, the frequency value of the English vowel is completely different from the adapted one.

Vowel	F1	F2	F3
English /ɒ/	480	760	2620
Punjabi /aː/ in	410	1008	2098

Words	/ ɔ:/ Educated speaker's Transcription	aː /or/o: / uneducated speaker's transcription
Talk	tɔ:k	ta:k
Walk	wɔ:k	wa:k
Chalk	tʃɔ:k	tʃa:k
Vault	vɔ:lt	va:lt
Yawn	jɔ:n	ja:n
Flaw	flɔ:	fla:
Sword	swɔ:d	swo:rd
Door	dɔ:r	do:r
Core	kɔ:r	ko:r
Author	ɔ:θər	a:θər

Epenthesis

Words	Educated speaker's Transcription	uneducated speaker's transcription
Sport	/spɔ:rt/	/səpɔ:rt/
Spray	/spreɪ/	/səpreɪ/
Stress	/strɛs/	/sətɹɛs/
Street	/stri:t/	/sətɹi:t/
Scratch	/skrætʃ/	/səkɹætʃ/
Spoon	/spu:n/	/səpu:n/
Spring	/sprɪŋ/	/səprɪŋ/
Scholar	/ˈskɒlər/	/səkɒlər/
Skirt	/skɜ:rt/	/səkɜ:rt/

Substitution of diphthongs

Words	Educated speaker's Transcription	uneducated speaker's transcription
Light	/laɪt/	/læt/
Ride	/raɪd/	/ræd/

Mile	/maɪl/	/mæl/
Title	/ˈtaɪtəl/	/ˈtætəl/
Cycle	/ˈsaɪkəl/	/sækəl/
Dine	/daɪn/	/dæn/
Silent	/ˈsaɪlənt/	/ˈsælent/
Violet	/ˈvaɪələt/	/ˈvælət/

CONCLUSION:

This study's acoustic analysis of English loanwords in the speech of educated and uneducated Punjabi speakers reveals significant insights into how Punjabi phonology influences pronunciation adaptations. The research demonstrates that uneducated speakers tend to modify English loanwords by altering monophthongs, simplifying diphthongs, and employing epenthesis in both syllable-initial and final consonant clusters. Additionally, short vowels are often lengthened, and consonant clusters are declusterized to conform to Punjabi phonotactic constraints. The qualitative approach, involving focus group discussions and detailed pronunciation sessions analyzed through PRAAT software, highlights the distinct patterns of adaptation among uneducated speakers compared to their educated counterparts. While educated speakers tend to maintain closer phonetic fidelity to standard English, uneducated speakers' pronunciations are more heavily influenced by the phonological rules of Punjabi.

This research underscores the profound impact of mother tongue influence on pronunciation adaptation processes. The findings are particularly valuable for English language learners and educators, as they provide a deeper understanding of common pronunciation errors and the underlying phonological reasons. By acknowledging these adaptations, educators can develop more effective teaching strategies to improve pronunciation accuracy among Punjabi speakers learning English. In summary, this study contributes to the broader understanding of language adaptation and the interplay between native phonology and foreign language pronunciation. It emphasizes the need for tailored educational approaches that consider the linguistic background of learners to enhance their proficiency in English.

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