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Phonological Processes of Hindi Loanwords in Indonesian: A Comparative Study with Indian Languages

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Abstract:
The primary objective of this study was to examine the phonological processes that occur in the adaptation of Hindi loanwords into the Indonesian language. To achieve this goal, the researcher employed a qualitative descriptive approach, relying on documented data of Hindi loanwords as used in Indonesian. The data set consisted of lexical items presented in phonetic transcription, which facilitated systematic phonological analysis. The findings of the study revealed two central aspects of the adaptation process. The first aspect concerns vowels, where three main phonological processes were identified: lowering, weakening, and shortening. Lowering, often referred to as vowel drop, involves the modification of vowel height within the vowel space, whereas weakening refers to the reduction in the strength or prominence of a vowel sound. Shortening further indicates the reduction of vowel duration in specific contexts. The second aspect pertains to consonantal processes, which include several modifications such as epenthesis, de-affrication, de-aspiration, consonant deletion, alveolarization, and the velarization of nasal sounds. These processes demonstrate the structural adjustments required to integrate Hindi phonological forms into the phonetic system of Indonesian. In summary, the study concludes that phonological adaptation in Hindi loanwords encompasses two major domains vowel processes and consonant processes each contributing to the naturalization of borrowed lexical items.

Keywords: Hindi Language; Indonesian Language; Phonological Processes.

Introduction

Most of the languages occasionally incorporate vocabulary from other languages to facilitate communication. The incorporation of words from other languages is a linguistic phenomenon. It arises from the presence of two or more languages (Dalilan, 2023). A loanword is another term for borrowing words. Numerous expert perspectives exist regarding loanwords. A loanword refers to a concept that has been adopted through borrowing (Akmal et al., 2023). Borrowing is the process of integrating language elements from one linguistic system into another, occurring whenever two cultures interact for a specific duration (Trisna et al., 2021). Languages from other countries, including Hindi, Arabic, Chinese, Dutch, English, Japanese, and Persian, influence Indonesian loanwords, as do languages such as Portuguese, Sanskrit, and Tamil (Ul Muyassaroh, 2021). Loanwords represent an additional method for enriching a language's lexicon. Loanwords are terms adopted from one language into another (Fajrina & Irawan, 2024). Loanwords represent a specific category of linguistic borrowing that transpires across language boundaries. A loanword is a term adopted from one language into another, serving to enrich the vocabulary of a language. For example, Hindi loanwords have been incorporated into Indonesian, which are modified to conform to the Indonesian phonetic system.

Historically, the evolution of the Indonesian language has reflected interactions with Hindu, Muslim, Dutch, English, Spanish, and Portuguese influences, which have shaped its phonemic system. Consequently, this circumstance facilitates the influx of numerous loanwords from various languages into Indonesian. In addition, the donor languages for loanwords in Indonesian include Hindi, Chinese, Dutch, English, Arabic, and Japanese. Persian, Portuguese, Sanskrit, and Tamil. Indonesian loanwords are proficiently assimilated from Arabic, English, Javanese, Dutch, Sanskrit, Hindi.

This study defines phonological process as the production of words by combining morphemes, wherein the segments of adjacent morphemes are juxtaposed and may undergo alterations (Prihandani & Subiyanto, 2021). (Teng et al., 2022) assert that the phonological process transpires when the sound of one morpheme alters to another sound because of the effect of adjacent morphemes. In summary, it is a process during which phonological alterations transpire in specific portions of a word.

Hindi, one of the Indian languages, is classified within the Indo-European language family, specifically under the Indo-Iranian branch and more precisely in the Indo-Aryan subgroup. It holds the status of India's official language, although national affairs are also conducted in English and in several other languages legally recognized by the Indian Constitution. As reported by (Liu et al., 2023), Hindi is spoken as a mother tongue by over 425 million individuals in India, while an additional 120 million speakers use it as their second language.

In comparison, Indonesian represents the sole language officially designated as the national language of Indonesia (Oktaviana et al., 2025). Both its spoken and written forms are employed in state ceremonies, governmental functions, and other formal contexts, thereby serving as the principal medium of national communication. This linguistic role, as emphasized by (Faridah et al., 2026) contributes significantly to sustaining Indonesia's national development.

The researcher aims to investigate the phonological processes involved in the assimilation of Indian loanwords into Indonesian, as outlined in the theoretical conceptions of phonology. As a result of the researcher's fascination with the subject of phonology, particularly concerning phonological processes, the study has been titled "Phonological Processes between Indonesian and Indian Languages in Relation to Hindi Loanwords in the Indonesian Language." A significant number of studies have been conducted to determine the phonological processes involved in the acquisition of loanwords from Sanskrit, English, Dutch, Japanese, Chinese, and Arabic into the Indonesian language. Despite this, no presentation has yet discussed the phonological mechanisms involved in translating Hindi loanwords into Indonesian. The purpose of this study is to investigate the phonological changes that occur in Indonesian when Hindi loanwords are used.

In the Indonesian vocabulary, there are a great number of loanwords from Hindi, each of which possesses a unique set of characteristics. The phonological aspect is one instance of a characteristic. After that, the primary concern addressed by this investigation is articulated in the following question: The purpose of this study is to shed light on the phonological mechanisms involved in the incorporation of Hindi loanwords into the Indonesian native language.

Literature Review

Transformational Generative Phonology as the Basic Theory

The underlying framework adopted in this study is transformational generative phonology. This theoretical model conceptualizes distinctive features as the minimal units of analysis, while simultaneously linking

these features and the lexicon with phonological rules (S et al., 2021). This theory was developed by Risingarniwa and colleagues in 2021. It is essential to note that structural phonology differs from generative phonology when discussing phonology. In generative linguistics, which is the study of the surface structure of language, generative phonology is covered. This field of study connects the surface structure of language with other structures in language, such as grammar, meaning, lexicology, and context. According to (Hegde, 2021), generative phonologists can observe and comprehend genuine speech sounds in context by examining them from the perspective of language function. In the field of generative linguistics, generative phonology is a subfield that establishes a fundamental set of rules that are responsible for supervision (Arsala et al., 2022). The study of language structure is the focus of structural phonology, a subfield of structural linguistics. This subfield emphasizes the distinction between "substance" and "form," as well as the distinction between phonemic and morphemic status, and the analytical or discovery processes involved in these distinctions. This ultimately results in the formation of the ideas of complementarity and contrast. If the substitution of two sounds that occur in the same environment results in a change in meaning, then those sounds must be considered to be two distinct phonemes. For instance, the sounds /p/ and /b/ in the words "pat" and "bat"; /t/ and /d/ in the words "mat" and "mad" are examples of phonemes that fit this description. According to (Creel, 2022), word pairings that contain these sounds are considered to be known as minimum pairs.

Before beginning to work with generative phonology, it is necessary first to learn what the term "generative" means and have an understanding of what it means. "The capacity of a grammar to define a set of grammatical sentences in a language" is, according to the definition of the term, "generative." In the field of generative linguistics, two distinct subfields can be identified: generative phonology and computational syntax. Generative phonology has been the theory most frequently utilized in phonological research. To provide an introduction to the fundamental theory and practice of phonology, generative phonology is employed.

Furthermore, according to (Rosa et al., 2022), this theory defines a series of guidelines that can be followed in order to generate the surface phonetic form of a language. On the other hand, generative syntax is a significant subfield of generative grammar, which emphasizes the modeling of linguistic patterns in a traditional manner. Generative syntax is a departure from the structuralist tradition since it does not place significance on the discovery techniques and does not consider the exact description of each language to be the ultimate objective of linguistics.

Phonology and phonetics represent two interrelated branches of linguistics that, when examined together, provide a comprehensive perspective on the sound systems of a language. Phonology, in particular, plays a crucial role in accounting for the underlying reasons behind specific phonetic patterns and processes, as well as illustrating how these processes shape and sustain the structural organization of a language ((Yani Lubis et al., 2023). As a core area within linguistics, phonology primarily concentrates on the systematic study of sounds across one or multiple languages, emphasizing the analysis of their distribution, patterns, and governing principles in spoken communication (Olson, 2024). Essentially, phonology is intrinsically linked to the recognition of patterns, as each language possesses a distinct system of sound structures and segmental features. These segmental units are typically categorized within phonetics through the broad classifications of vowels and consonants (Cahyaningrum, 2023).

Phonological Processes and Rules Phonological Processes:

According to (Barke et al., 2019), phonological processes are codified as conditional rewriting rules that change the base form of a word, which is generally equivalent to the word's unique recorded form, into the

surface form of the word, which would be the word as it is intended to be said. Assimilation, syllable structure processes, weakening and strengthening, and neutralization are the four categories of phonological processes identified by (Adnania Nugra & Subiyanto, 2023). The process by which segments become more similar is known as assimilation. During the process of assimilation, a segment picks up traits from the segments that are in its immediate vicinity. The syllable structure is the place where changes in the distribution of vowels and consonants begin to take place. (Prihandani & Subiyanto, 2021) state that the processes of weakening and strengthening are characterized by the modification of segments based on their position within the word, whereas neutralization refers to the merger of segments within a certain environment. Additionally, Muthi'ah & Rangkuti (2022) provided a more in-depth presentation of this phonological process. They stated that phonological processes were categorized into different kinds, which are as follows:

Assimilation.

Assimilation is the process by which one phoneme is transformed into another phoneme as a result of the combination of morphemes occurring in a language. An example of the process known as assimilation is when two independent sounds converge to form sounds that are either identical or substantially identical to one another. This occurs because these noises are articulated in a sequential manner, which enables them to affect one another and ultimately results in a practically identical environment. The process of assimilation can be broken down into two distinct categories: (1) consonants acquiring vowel characteristics and (2) vowels adopting consonant profiles. Three consonants take on the characteristics of other consonants, while four vowels integrate the characteristics of other vowels. These are the characteristics of the vowels. There are four distinct types of assimilation, each of which is governed by the influence of vowels and consonants that are particularly:

- Assimilation of consonants with consonants (C-C), consonants are also assimilated with consonants.
- Assimilation of consonants with vowels (C-V) forms of consonants combined with vowels.
- Assimilation of vowels with vowels (V-V), a form of assimilation between vowels and vowels.
- Assimilation of vowels with consonants (V-C), assimilation between vowels and consonants.

The rule form of the assimilation process in generative phonology is: [+syllable] → [+nasal] / [+nasal].

Syllable structure

The process of syllable architecture has an impact on the function of consonant-vowel interactions, specifically the interrelationship between consonants and vowels within words. The processes include (1) the release of consonants, (2) the release of vowels, (3) the insertion of consonants or vowels, (4) the merger of consonants and vowels, (5) the merging of consonants or vowels, (6) the modifications in primary clusters, and (7) metathesis, in addition to weakening and strengthening. As a result of weak or strong portions contained within a word or morpheme, this process entails an alteration in the structure of the syllable it contains. When the vowel in the CVCV configuration is removed, the structure of a syllable becomes more complicated. This is because the consequence is consonants that are next to one another. These deletions are typically attributed to the segment's unstable position within the syllable, which occurs quite frequently. Three distinct types of weakening can be distinguished from one another: (1) syncope, (2) apocope, and (3) vocal reduction. The process of strengthening simultaneously includes the following: (4) diphthongization and (5) vowel shifting.

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Syllable Structure Process

Numerous approaches for syllable structure can be utilized. It is possible to delete a sound segment from within another sound segment through the use of a technique known as deletion. It can appear with vowels as well as consonants. When the sound is produced, it is not included in the production. The act of introducing a phonetic component into a word is referred to as the process of introduction. It can appear with vowels as well as consonants. A case of insertion occurs when the schwa [ʙ] is incorporated into the word grow [gəroʊ], serving as an example. It is possible to combine two or more votes into a single vote through a process known as merging when using this strategy. It can appear with vowels as well as consonants. As an example, consider the situation in which the consonants [d] and [j] are located in proximity to the consonant [dʒ] from the phrase "would you." Major class characteristics refer to the processes that occur when there are changes in major class membership. For example, the vowel [i] in the word "pavilion" is transformed into the consonant [j] in the word "pavilion." Metathesis is the process by which two segments switch places with one another. Specifically, this occurs when people use the word "aesk" rather than "aeks".

Weakening and Strengthening

Alterations in basic syllable structures can result in complicated syllable structures, and vice versa. This can lead to both weakening and strengthening of the syllable structure. Various procedures can either weaken or strengthen something. The term "syncope" refers to the phenomenon in which a vowel that is close to a stressed vowel gets elided. For example, the word "brown" can be spelled "brown." Apocope is distinguished by the absence of a terminal vowel that is not stressed. An illustrative example of apocope is the decrease of schwa, which is demonstrated by the pronunciation of "animal" as [aenɪml] rather than [aenɪ m(ə)l]. A prime example of the phenomenon known as vowel reduction is the transformation of an unstressed vowel into a schwa. This phenomenon is represented by the pronunciation of the word "banana" as [bəˈnænə]. The process of converting a vowel sound into a diphthong sound, for example, is referred to as diphthongization. It is more accurate to pronounce tin as [taɪn] rather than [tɨn]. The term "vowel shift" refers to the process by which a stressed vowel moves to a different position within the structure of vowels. This particular word, for example, is pronounced as [ðez], rather than [ðɪz].

Neutralization

Neutralization refers to a phonological phenomenon in which the distinction between two or more phonological units is eliminated within a particular linguistic context. This process may involve both consonantal and vocalic sounds. A common example can be observed in cases where the voiced consonant [d] is realized as its voiceless counterpart [t] when it appears in word-final position.

Phonological Rules:

(Arsala et al., 2022) state that phonological rules, also known as phonological processes, define the mapping between two different levels of sound representation. There are four types of phonological processes as follows:

1. Assimilation is a phonological process whereby one sound segment exerts an influence on an adjacent segment, resulting in the modification of its features. This process is typically formalized through explicit phonological rules that describe the conditions under which assimilation occurs:

   a. [-sonorant] → [+voiced] / _ [−sonorant]+ make a sound

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b. [-sonorant] → [-voiced] / _ [−sonorant]−make a sound

2. Dissimilation is a phonological process in which two similar sounds undergo modification in order to become less alike. This change typically involves the alteration of one sound feature so that it contrasts more clearly with that of a neighboring segment, thereby increasing perceptual distinctiveness. To represent this process systematically, phonological rules can be formulated to illustrate the conditions under which dissimilation occurs:

[-sonorant] → [−cont.]/[+cont.]_ [-cont.]/[+cont.]_

B. Deletion is when a sound, searched as an unstressed syllable or weak consonant, is not pronounced. The deletion rules:

$[k{+}stop] \rightarrow \emptyset$ _[$n{+}nasal$]

C. Insertion can not only delete segments; sometimes, they can be included instead

C

$\emptyset \rightarrow$ [+high] / #C_C

+ round

The Concept of Phonological System between Hindi and Indonesian Languages

Consonants in Hindi are classified into two major categories. Within this system, the language possesses fifteen aspirated consonants. Of these, eleven aspirated consonants are represented by unique graphemic symbols, such as ख [k^h] and भ [b^h]. The remaining four aspirated consonants are formed through a combination of a basic consonant with the marker of aspiration, represented by the grapheme ह [h]. For instance, the construction of ल [l] plus ह [h] results in the aspirated consonant ल्ह [l^h]. In addition, Hindi contains twenty-nine non-aspirated consonant symbols, each of which corresponds to a distinct phoneme. It is worth noting that in some cases different orthographic forms may represent the same phonetic value, such as श (SHA) and ष (SSA), both of which denote the phoneme [ʊ]. Regarding vowels, the Hindi vowel system comprises eleven vowels, ten of which can be nasalized. These vowels are expressed through symbols referred to as maatraas. The system includes eleven independent vowel characters, such as आ [ɑ], ऊ [u], and औ [ɔ], along with ten dependent vowel forms, for example ◌ा [ɑ], ◌ू [u], and ◌ौ [ɔ]. As noted by (LaFond, 2024)independent vowel symbols are employed when a vowel occurs at the initial position of a word or syllable, whereas dependent forms are used in non-initial positions.

The vocal cord vibration, articulation location, and pronunciation manner are the three categories that are used to classify the 23 consonants that comprise the Indonesian language. Depending on the vibration of the vocal chords, sounds can be classified as either voiceless or voiced within the human voice. When it comes to articulation, it may be broken down into the following categories: pharyngeal sounds, bilabial sounds, dental sounds, labial sounds, anterior tongue sounds, posterior tongue sounds, and root of the tongue sounds. Plosives, fricatives, nasals, approximants, lateral sounds, and semi-vowels are the different types of sounds that can be classified according to their individual pronunciations (Hasel, 2022). In the Indonesian language, there are four vowels and six vowels.

On the other hand, there are additional studies that exist that build systems by utilizing various vowels, notably the open mid vowels /ɞ/ and /ɘ/. In standard Indonesian orthography, the Latin alphabet is utilized.

This alphabet comprises five vowels: a, i, u, e, and o. The diacritic é is sometimes used to differentiate the mid front vowel /e/ from the mid front vowel /ʙ/ in educational resources. This is done to distinguish the two vowels correctly. Stopasia.com, the year 2024.

Phonological Processes of Hindi Loanwords into the Indonesian Language

According to (Aprillianti, 2019) the adaptation of Hindi loanwords into the Indonesian language involves various phonological processes that operate on both vowels and consonants. The vowel-related processes are typically classified into three main categories: shortening, weakening, and lowering. In contrast, consonantal changes include a range of processes such as velarization, alveolarization, consonant deletion, de-affrication, desaspiration, and epenthesis, all of which contribute to the modification of loanword pronunciation within the target language. To make this topic more understandable, she formulated phonological guidelines (which can be found in Appendix 2) and compiled a list of Hindi loanwords that have been incorporated into the Indonesian language.

In contrast to structural phonology, which focuses on the classification and distribution of sounds, generative phonology emphasizes the rule-governed processes that produce actual phonetic outputs in context. It views phonological forms as dynamic results of interactions among linguistic components such as morphology, syntax, and semantics. Therefore, this framework is particularly relevant for examining cross-linguistic sound adaptation, including the integration of loanwords.

Phonology, as a core branch of linguistics, is concerned with identifying sound patterns, distributions, and the principles governing them within a language system. One key concept is the minimal pair, which is used to determine phonemic distinctions when a change in a single sound leads to a difference in meaning (Mariani et al., 2019). This concept is essential for understanding how phonological contrasts are maintained or altered in borrowing processes.

The central focus of this study is on phonological processes, defined as systematic sound changes that occur when lexical items transition between languages. In generative phonology, these processes are formulated as rule-based transformations influenced by phonological environments (Barke et al., 2019). Previous studies categorize phonological processes into four main types: assimilation, syllable structure processes, weakening and strengthening, and neutralization (Adnania Nugra & Subiyanto, 2023).

Assimilation refers to the process by which a sound becomes more similar to adjacent sounds, often to facilitate articulation. This process is common in loanword adaptation as borrowed forms adjust to the phonological system of the recipient language. Syllable structure processes involve modifications such as insertion, deletion, or reordering of segments to conform to the phonotactic constraints of the target language. Meanwhile, weakening and strengthening relate to positional changes in sound quality, and neutralization refers to the loss of phonemic contrast in specific environments.

The relevance of generative phonology to this study lies in its ability to systematically explain how Hindi loanwords undergo phonological adaptation in Indonesian. Rather than merely describing sound changes, this framework provides a structured explanation based on underlying rules, allowing for a deeper and more comprehensive understanding of phonological patterns in language contact.

Research Method

This study employed a qualitative descriptive approach to analyze phonological processes in Hindi loanwords adapted into Indonesian. The data consisted of Hindi-derived loanwords collected from (Aprillianti, 2019).Data were collected through observation and note-taking techniques, focusing on

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phonetic transcription. The words were converted from orthographic to phonetic forms to identify sound changes and phonological patterns. Data analysis applied the Agih and Padan methods. The Agih method was used to examine internal linguistic structures, while the Padan method analyzed external aspects such as phonetic articulation and cross-linguistic comparison. The analysis included data selection, classification based on phonological changes, and interpretation of patterns. Data validity was ensured through triangulation by rechecking sources and transcription accuracy.

Result and Discussion

This chapter contains and discusses matters related to findings and discussions. The results section contains phonological processes of Hindi loanwords in the Indonesian Language. Meanwhile, the discussion section examines the phonological process of Hindi loanwords in the Indonesian language from a theoretical perspective.

Results

This section presents the research findings based on the analysis of phonological processes in Hindi loanwords as they appear in the Indonesian language. The findings highlight two major dimensions of phonological adaptation. First, vowel-related processes in Hindi loanwords undergo modifications such as lowering, weakening, and shortening. Second, consonantal processes include phenomena such as epenthesis, de-affrication, de-aspiration, consonant deletion, alveolarization, and the velarization of nasal sounds.

Phonological Processes of Vowels in Hindi loanwords

Phonological processes affecting vowels in Hindi loanwords include lowering, weakening, and shortening.

Lowering Process

The lowering process in loanwords of Hindi occurred when the vowel [ɔ] changed into the vowel [a]. The data related to this process can be seen in the data:

Hindi: ([gɔpuɽa]), **Indonesian**: ([g**a**pura]), and **Meaning**: (*gate*).

Based on the data above, it is evident that the vowel [ɔ] has changed into the vowel [a]. Thus, this process can be formulated as follows.

[ɔ] →[a] /#[C]____$

$$\begin{bmatrix} +\text{syl} \\ -\text{cons} \\ -\text{high} \\ -\text{low} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{syl} \\ -\text{cons} \\ -\text{high} \\ +\text{Low} \end{bmatrix} / \# \begin{bmatrix} + \text{cons} \\ - \text{syl} \end{bmatrix} __ \$$$

The rule demonstrates that the vowel [ɔ], characterized by the [-low] feature, undergoes a shift to [a], marked by the [+low] feature, when it occurs in the initial syllable of a word preceding a consonant. This rule applies specifically when [ɔ] is situated in an open syllable; however, if the vowel appears in a closed syllable, no phonological change takes place.

Weakening Process

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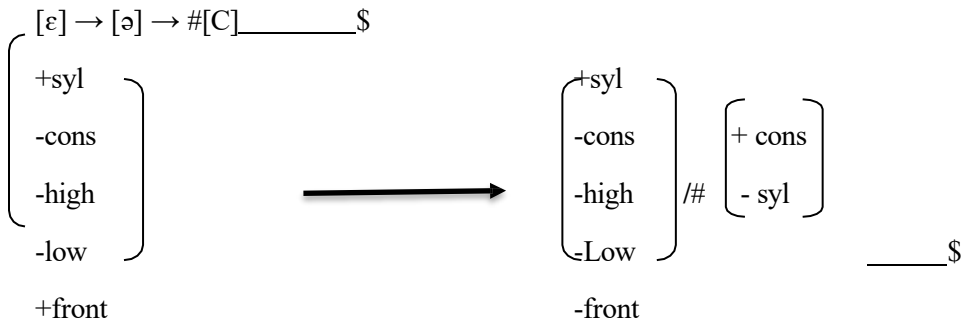
A weakening process was found in the data of Hindi loanwords, which showed that the sound of the vowel [ɛ] changed to the sound of the vowel [ə]. It can be seen in the data below:

Hindi: ([ʧɛmki:], [vɛl*a*jti:], [kɛr*a*:ni:]), **Indonesian**: [cəməki], [bəlati], [kərani], and

Meaning: *spangle, dagger, Clerk.*

Based on the data above, the weakening process occurred when the non-central vowel [ɛ] changed into the central vowel [ə]. The phonological rule related to this process can be formulated as follows:



Based on the phonological rule above, it was shown that the vowel [ɛ] would change into the vowel [ə] at the first syllable of a word after consonants in an open syllable. It can be seen from the rule that vowel [ɛ] has features [+syl, -cons,-high,-low,+front] while vowel [ə] has features [+syl,-cons,-high,-low,-front]. The front vowels change into central vowels; that is why this process is categorized as weakening.

Shortening Process

In relation to the process of borrowing from Hindi into the Indonesian Language, data was found that had undergone a shortening process. In this case, the data showed that the sound changed from long vowels to short vowels. This can be seen as follows:

Hindi: ([bɑːsi:], [ʧaɳdu:], [bɑːɳdo:]), Indonesian: [basi], [candu], [bando], and Meaning: (Stale, Prepared opium, Kerchief/bandana).

The data above showed that the sound changed from long vowels to short vowels. The process of shortening vowels can be described as a phonological rule as follows:

+ syl +syl

- cons - cons

+ long -long

It showed that the rule above explained that long vowels with features [+syl, -cons, +long] would change into short vowels with features [+syl, -cons, -long] at all positions. Thus, this process occurred because the phonological system of the Indonesian language does not have vowels with a long feature.

Phonological Processes of Consonants in Hindi loanwords

Phonological processes of Hindi consonants in the Indonesian language comprise epenthesis, deaffrication, deaspiration, consonant deletion, alveolarization, and velarization of nasal sounds.

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Epenthesis

Epenthesis is a process when there is a sound is put between two consonants. Based on the data of Hindi loanwords related to the emphasis process. The data can be seen as follows:

Insertion of Vowel [a]

The following data presents the insertion of the vowel [a] in a word derived from Hindi loanwords.

Hindi: ([**bh**ɑ:sɑ:], [**bh**ana], [ra**kt**]), **Indonesian:** ([b**a**hasa], [b**a**hana], [rak**a**t]), and **Meaning**: *language, noise, dance performance.* This data presents the insertion of the vowel [a] in a word. This process can be formulated with the phonological rules below:

Ø → [a]/[b]_ [h]

$$\emptyset \rightarrow \begin{bmatrix} +syl \\ -cons \\ -high \\ +low \\ [+front] \end{bmatrix} \begin{bmatrix} +cons \\ -son \\ +ant \\ -cor \\ [+voiced] \end{bmatrix} \begin{bmatrix} -cons \\ -son \\ -ant \\ +cor \\ [-voiced] \end{bmatrix}$$

The rule above showed that the insertion of the vowel [a], which possessed features [+syl, -cons, -high, +low, +front], occurred between the consonant sounds [b] and [h]. The insertion of a vowel

[a] at the first syllable could be influenced by the vowel which was following that sound. Then, the insertion of the vowel [a] at the second syllable was adjusted to the previous vowel.

Ø → [a]/[k]_ [t]

$$\emptyset \rightarrow \begin{bmatrix} +syl \\ -cons \\ -high \\ +low \\ [+front] \end{bmatrix} \begin{bmatrix} -syl \\ +cons \\ +back \\ +high \\ -cor \\ [-voiced] \end{bmatrix} \begin{bmatrix} -syl \\ +cons \\ -cont \\ +ant \\ +cor \\ -voiced \end{bmatrix}$$

The rule above showed that there was the insertion of the sound [a] between two consonants

[k] and [t]. This process happened because there was no consonant cluster of [kt] in the Indonesian Language. Therefore, the vowel [a] needs to be inserted.

De-affrication

In relation to de-affrication within the adaptation of Hindi loanwords into the Indonesian language, a phonological process occurred in which affricate sounds were transformed into non-affricate sounds. Specifically, the data illustrate the change of the affricate [ʧ] into the non-affricate [c].

Hindi: ([ʧaɳdu:], [ʧɛmki:], [ʧoli:]), **Indonesian**:([**c**andu], [**c**əməki], [**c**oli]), and **Meaning**: (*Prepared opium, Spangle, Bodice, brassiere (pakaiandalam wanita)*)

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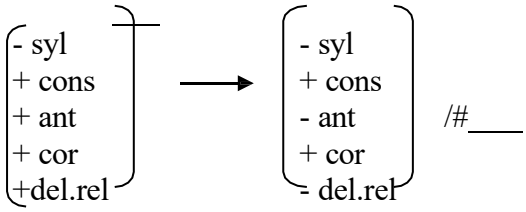
The data above shows the sound change of [ʧ] into [c]. The process of sound change can be formulated into a rule as follows:

[tf]→ [c]/#



The rule above describes how the affricate consonant sound [ʧ] changes into the consonant sound [c] at the initial position of a word. It means that consonants[ʧ] owned features [-syl,

+cons, -ant, +cor, +del.rel] while consonant sound [c] owned features [-syl,+cons, -ant,

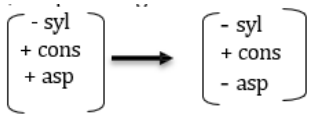
+cor, -del.rel].

De-aspiration

In correlation to de-aspiration, there are consonants with an aspirated feature in Hindi; the data can be seen as below:

Hindi: ([**b**^{h}ɑ:ɽuɑ:], [**ʧ**^{h}okrɑ:], [**g**^{ɦ}ap]), **Indonesian**: ([**b**arua], [**c**okəra], [**g**ap]), and **Meaning**: (*pimp, Servant/boy, robustious*)

The data above shows the sound change from aspirated to unaspirated sounds at all positions. Thus, the phonological rule described the process of sound change as follows:



The rule above was that the aspirated consonant sound in Hindi, such as [b^{h}], [ʧ^{h}], and [g^{h}], was changed into an unaspirated sound. The rule showed that a plosive consonant, which had the [+asp] feature, changed into [-asp] in the process of borrowing. It was caused by the distribution of consonants in the Indonesian language, which lacked aspirated sounds. Thus, the entire plosive sounds that possessed [+asp] features in Hindi became the same plosive consonant without the aspirated feature.

Consonants Deletion Process

Consonant deletion in Hindi loanwords occurs when two consonants appear consecutively within a word. The data provided illustrate instances in which consonant sounds are omitted during the borrowing process from Hindi into Indonesian.

Hindi: ([gu:**ss**ɑ:r],[ʧa**pp**al]), **Indonesian**: ([gu**s**ar], [ca**p**al]), and **Meaning**: (*worry, Sandals*). The data showed the deletion of sequential consonants that have the same features. The process of deletion can be formulated in the following rule:

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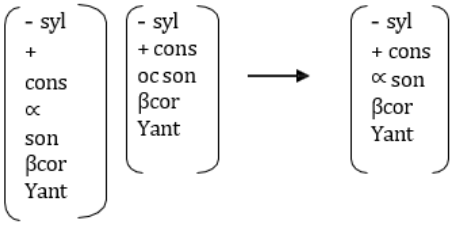


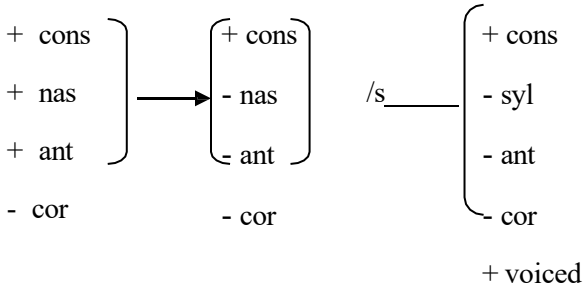
The rule showed that two similar consonants would be eliminated into one consonant. This process occurred because the phonological system of the Indonesian language does not allow similar consonants to be placed in sequence.

Alveolarization

Alveolarization in relation to Hindi loanwords involves changing a non-alveolar nasal sound into an alveolar nasal sound. This process affected the nasal sounds [ɳ] and [m], which changed into alveolar nasal [n]. The data can be seen below:

Hindi: ([ʧaɳdu:], [gɑ:**m**ɹɑ:]), **Indonesian**: ([**c**a**n**du], [ga**n**ɹa]), and **Meaning**: (*Prepared opium, Indian hemp*).

The data showed that nasal sound [m] into [n] at the first syllable of a word. Then, the nasal sound [ɳ] changed into the sound [n] at the first syllable or at the final syllable of a word. The sound change process can be formulated into the following phonological rule. [m]→ [n] /_[f]

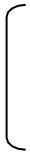


Velarization of the nasal sound

Velarization of nasal sounds is the velarization process of nasal sounds in Hindi loanwords. It happened when the nasal sound [m] changed into the nasal sound [ŋ]. The following data showed the sound change of sound [m] into sound [ŋ].

Hindi: ([bɑ:**m**si:], [bʰ a**m**sɑ:l]), **Indonesian:** ([ba**ŋ**si], [ba**ŋ**sal]), and **Meaning:** (flute, shed). The phonological rule to show the process of sound change of sound [m] into sound [ŋ] can be formulated as follows:

[m]→ [n] /_[s]



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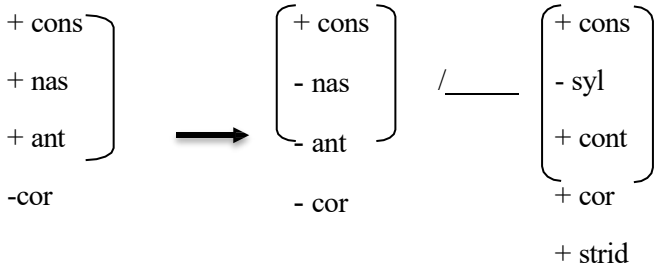

Based on the rule above, it was shown that the consonant [m] changed into the sound [ŋ] if it was followed by the consonant [s]. This change happened when the nasal sound [m] was a coda and followed by the fricative sound [s]. Thus, a coda can be said as part of a syllable that follows the nucleus or vowels.

1. **Data description (research findings)**

   This part already presents concrete evidence through Hindi–Indonesian lexical correspondences, such as *[gɔpuɽa]* → *[gapura]* and *[ʧɛmki:]* → *[cəməki]*. These examples represent the core findings, as they demonstrate observable phonological patterns in loanword adaptation.

2. **Theoretical explanation (discussion)**

   The elaboration of distinctive features (e.g., [+syl], [-cons], [+low]) and the formulation of phonological rules reflect a theoretical interpretation grounded in generative phonology. This moves beyond reporting results and attempts to explain the underlying mechanisms of sound change.

To achieve a more systematic and academically sound structure, the presentation can be reorganized as follows:

- **Results section** should include:
  - Classification of phonological processes (e.g., lowering, weakening, shortening)
  - Representative data examples
  - General patterns of change without detailed feature analysis
- **Discussion section** should include:
  - Feature-based phonological analysis
  - Rule formulation
  - Distributional conditions (e.g., open vs. closed syllables)
  - Theoretical interpretation within phonological adaptation frameworks

Discussions

This section addresses the phonological processes involved in the adaptation of Hindi loanwords into the Indonesian language. The analysis emphasizes two primary aspects. First, vowel-related processes observed in Hindi loanwords include lowering, weakening, and shortening. Second, consonantal processes involve several modifications, namely epenthesis, de-affrication, de-aspiration, consonant deletion, alveolarization, and the velarization of nasal sounds.

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Phonological Processes of Vowels in Hindi loanwords

Three matters are discussed regarding the phonological processes of vowels in Hindi loanwords: the lowering process, the weakening process, and the shortening process.

Lowering Process

In the context of phonological processes involving vowels, the term "vowel lowering" refers to the process of lowering. It is a process that involves a change in the height of vowel sounds inside the vowel space (YASEEN, 2023). Vowel lowering is a process that involves this change. When it comes to Hindi loanwords, the vowels [ɔ] are transformed into the vowel [a]. This change in sound happens because the vowel [ə] is only contained inside close syllables. Regarding this instance, the sound in question may be found in an open syllable of a Hindi loanword. Sound [a] is the one that takes the place of this sound.

Weakening Process

The process of weakening focuses on the weakening of vowels. As stated by (HICKEY, 2020), vowel weakening refers to the decreased vowels that are a form of weaker vowels. In this particular instance, the vowels /i/ and /u/ are weakened within the constraint that they be followed by the suffix /-an/ prior to the suffix /-i/. The suffix /-an/ undergoes a weakening in addition to mutating with the vowel that is present at the end of a base word, resulting in the formation of /Ƙ/. You can see how those noises have changed by looking at the data below. As the sound transitions from /i/ to /ə/, it becomes/ə/. When non-central vowels transform into central vowels, weakening processes take place. Within this particular context, the middle vowel [ə] is classified as a neutral sound. Therefore, the purpose of the sound modifications of vowel [I] and [ɛ] becoming vowel [ə] is to simplify the pronunciation of the consonant. Furthermore, it is important to note that the sounds [I] and [ɛ] can only able to be heard in close syllables. If those sounds are found in an open syllable, they will be substituted with a neutral vowel or another vowel that possesses a property that is comparable to the neutral vowel.

Shortening Processes

According to (Kent & Rountrey, 2020) the process of vowel shortening is considered to be an irregular process. In Hindi loanwords, the process of vowel shortening is influenced by the disparities in vowel distribution between the Hindi language and the Indonesian language. In the Hindi language, vowels are composed of both long and short vowels; however, in the Indonesian language, vowels consist only of short vowels. Therefore, when the borrowing processes take place, vowels from Hindi that have a plus long characteristic will convert into a minus long feature in the Indonesian language.

Phonological Processes of Consonants in Hindi loanwords

Some matters concerning the phonological processes of consonants in Hindi loanwords, including empathizing with emphasis, de-affrication, de-aspiration, consonant deletion, alveolarization, and velarization of nasal sounds.

Epenthesis

According to (Jaber et al., 2023), emphasis refers to the appearance of a new segment within a word. In loanwords borrowed from Hindi, the epenthesis process is present. There is a discrepancy in the consonant clusters of the Hindi and Indonesian languages, which causes this process to occur. The insertion of the

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vowel [a] between the consonant [b] and the consonant [h] is because the Indonesian language does not support cluster consonants [bh] and [kt]. It is for this reason that the vowel [a] is added.

Furthermore, it is worth noting that the Indonesian language incorporates the vowel [ə]. The clusters that are only put at the starting position are the ones that are responsible for the insertion of the vowel [ə] between the cluster consonants /kr/ and /gr/. When it comes to loanwords, this method is frequently used because it is designed to make pronunciation easier.

De-affrication

De-affrication comprises minimal pairs of de-affrications. Words that differ from one another in linguistics by only one phoneme and have diverse meanings are referred to as minimal pairings. The relevance of sounds in distinguishing between words can be highlighted using minimal pairings. The influence of changing affricate sounds can be demonstrated using minimal pairings, as seen in the case of deaffrication (Sayogie & Adbaka, 2022). The process of deaffrication occurs in loanwords that have been taken from Hindi. The distribution of consonants in the Indonesian language that do not have an affricate sound [ʧ] is the factor that is driving this process. It is hence the case that the affricate sound [ʧ] in loanwords adopted from Hindi and Tamil will transform into the sound [c]. This is because this sound is almost identical to the sound [ɔ] in terms of its characteristics. The delayed released feature is the sole thing that differentiates the two sounds.

De-aspiration

If it is referring to an adjective, the term "de-aspiration" is unaspirated. It is not aspirated, and more specifically, it is not pronounced with the sound of a breath or the letter 'h'. This is the meaning of the word unspirateda statement that demonstrates how to use the word "unaspirated" (Cabbage & DeVeney, 2020). De-aspiration is a process that can be found in loanwords from Hindi. Aspirated sounds are not present in the phonological system of the Indonesian language, which is the reason why this procedure takes place. As a result, all of the sounds that are aspirated in Hindi will transform into sounds that are not aspirated when the process of borrowing is carried out.

Consonants Deletion Process

According to (Treiman et al., 2023), the percentage of consonant deletion that occurs in long words (words with three or more syllables) is higher than the percentage that occurs in short words (words with one or two syllables). Because the word structure of the Indonesian language does not make use of the repetition of consonants, consonant deletion processes are observed in Hindi loanwords. That is why, if there are multiple consonants, such in the case of the word [ɬəmməʈi], one of them will be eliminated.

Alveolarization

Alveolarization is the substitution of an alveolar sound for a non-alveolar sound (Pratidina & Agus Subiyanto, 2024). Alveolarization processes occur in loanwords borrowed from Hindi. The sound changes are sound [ɖ] into sound [d], sound [ʈ] into sound [t], sound [ɽ] into sound [r], and sound [t] into sound [t]. This process of sound change occurs because all the consonants from Hindi and Tamil, such as [ɽ], [ʈ], [ɖ], and [t], did not exist in the distribution of consonants in the Indonesian Language. A sound replaces all of those sounds with similar features in the borrowing process. However, when /l/ is followed by a consonant or occurs word-finally, it is velarized, dark [ɬ]. The process also revealed changes in the phonological rules of Hindi during the borrowing process into the Indonesian language.

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Velarization of Nasal Sound

Velarization is a phonological process where a sound becomes more like a velar sound under the influence of a nearby velar sound (Oncho, 2025). The velarization process is found in loanwords borrowed from the Hindi language. Those words are [bɑːmsiː], which changed into [baŋsi] and [bʰ əmsɑːl], which changed into [baŋsal]. The sound change of sound [m] into sound [ŋ] happens because it is followed by the alveolar fricative sound [s]. The consonant series of the Indonesian Language showed that a fricative sound cannot follow the sound [m]. The Consonants series of the Indonesian Language for the consonant sound [m] are [mb], [mp], and [mpr]. So if sound [m] is followed by alveolar fricative sound [s], it will change into sound [ŋ]. It is replaced by sound [ŋ] because this sound can be followed by a consonant [s], and the consonant series of sound [ŋ] consists of [ŋg],[ŋk],[ŋs], and [ŋkr].

The discussion section remains largely descriptive and does not yet establish a critical connection between the empirical findings and relevant theoretical frameworks, resulting in limited analytical depth. The vowel processes identifiedlowering, weakening, and shorteningare presented primarily as definitions rather than being interpreted within broader perspectives of loanword phonology. For instance, the shift from [ɔ] to [a] should be examined in relation to vowel system simplification and feature economy, where Indonesian tends to favor a more symmetrical and less complex vowel inventory. Similarly, the weakening process involving centralization to [ə] can be better understood through the concept of markedness reduction and articulatory efficiency, while vowel shortening reflects the elimination of phonemic length contrast due to the absence of long–short vowel distinctions in Indonesian. In terms of consonantal processes, phenomena such as epenthesis, de-affrication, and de-aspiration are not merely structural adjustments but can be interpreted as manifestations of phonotactic adaptation, where the borrowing language modifies foreign forms to conform to its preferred syllable patterns, particularly the dominance of CV structures. Furthermore, processes like alveolarization and nasal velarization should be analyzed using feature substitution principles, in which unfamiliar or absent phonemes from Hindi are systematically replaced by the closest equivalents available in Indonesian based on shared articulatory features. Another significant limitation is the lack of engagement with previous studies, as the discussion does not adequately compare these findings with earlier research on Hindi or Sanskrit loanwords in Indonesian or with broader cross-linguistic evidence on loanword adaptation. Incorporating such comparisons would clarify whether the observed patterns align with or diverge from established findings, thereby strengthening the academic contribution. Overall, the discussion requires a more theory-driven and comparative approach that not only explains how phonological changes occur but also justifies why they arise within the structural constraints of the Indonesian phonological system.

Conclusion

The findings confirm that the phonological adaptation of Hindi loanwords into Indonesian is governed by systematic processes affecting both vowels and consonants, where vowel changes include lowering, weakening, and occasional shortening, while consonant processes involve epenthesis, de-affrication, de-aspiration, deletion, as well as assimilation patterns such as alveolarization and velar nasalization, all of which reflect adjustments to Indonesian phonological and phonotactic constraints; beyond merely describing these patterns, the study provides theoretical implications by reinforcing the role of generative phonology in explaining rule-based sound transformations in language contact, while also offering practical contributions to language teaching, lexicography, and cross-linguistic analysis, and therefore future research is recommended to expand the dataset across more Indian languages, incorporate quantitative methods to measure the dominance of phonological processes, examine sociolinguistic influences such as

speaker variation and exposure, and integrate acoustic analysis to obtain more precise and empirically grounded insights into phonetic realization.

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