Phonological errors in the pronunciation of Indonesian nasal consonants by native Arabic speakers

Nurul Hasana[1*], **Agus Subiyanto**[1]
[1]Universitas Diponegoro, Indonesia
*Corresponding Author. Email: hasananurul331@gmail.com

Abstract

This descriptive qualitative study investigates pronunciation errors in Indonesian nasal consonants made by native Arabic speakers. Using a reading elicitation technique, data were collected focusing on the pronunciation of the nasal consonants /ŋ/ and /ɲ/, which were then transcribed using International Phonetic Alphabet (IPA) symbols. The analysis involved identifying distinctive features of sounds within the nasal segment when errors occurred. The results revealed a consistent pattern of assimilation, with changes notably influenced by surrounding sounds. Velar nasals underwent assimilation influenced by both vowels and consonants, resulting in substitutions such as /ʔ/, /ɢ/, and /n/. In contrast, palatal nasals showed assimilation primarily influenced by adjacent vowels, leading to alterations represented by /ʔ/ and /ɲj/. These findings highlight the systematic nature of phonological errors in the pronunciation of nasal consonants by Arabic speakers learning Indonesian and offer valuable insights for language instructors and researchers in the field of second language acquisition.

INTRODUCTION

Phonology is a fundamental aspect of linguistic studies to understanding how sounds are mentally represented by speakers and the rules governing their use in the production and interpretation of speech (Odden, 2005). It deals with the specifics of addressing phonological systems in acquiring new languages. Its influence extends to important aspects such as word recognition, listening comprehension, speaking skills, and above all, pronunciation. Even seemingly small changes, such as changing "*sarang*" [saraŋ] to "*saran''* [saran] (changing just the sound /ŋ/ to /n/), can have significant effects. This minor alteration in pronunciation has the potential to create diverse meanings and ambiguity for Indonesian language learners, emphasizing the intricate nature of phonology's role in communication.

Pronunciation changes that occur in speech can be influenced by differences in the phonological systems between languages. In this study, two related phonetic systems are considered: the Arabic phonetic system, as the data source originates from native Arabic speakers, and the Indonesian phonetic system, the focus of the research, representing the pronunciation of the Indonesian language itself. Arabic recognizes a greater number of phonetic sounds or symbols compared to Indonesian. Salameh (2021) and Yeaqub (2018) noted in their research that Arabic has 28 phonetic consonants, consistent with The Oxford Handbook of Arabic Linguistics (Owens, 2013). This count is significantly higher than the 21 consonant phonetics found in Indonesian.

Nurman (2021) emphasized that the ability to pronounce sounds is inseparable from phonological knowledge. While Arabic has a broader range of vowels than Indonesian, there are still

less common consonants, indicating subtle differences between their phonetic systems. Some sounds may pose challenges for speakers from diverse linguistic backgrounds due to variations in phonetic elements and phonological rules. To highlight the complexity of the phonological challenge, it's crucial to acknowledge that this study involved two experienced Arabic native speakers learning Indonesian for over two years. While this can be problematic and lead to mispronunciation, it is important to remember that these phonological errors do not occur in every phoneme. Instead, they are often found in particular environments and frequency bands of sound.

Researchers analyzed the pronunciation of Indonesian words, phrases, and sentences by native Arabic speakers and discovered a range of incorrect sounds and phonetic errors. In the native language, these errors affect changes to sounds that are more familiar and include both consonant and vowel domains, with a particular focus on nasal consonants.

The participants in this study were two male native Arabic speakers from Egypt, both over the age of 25, who had lived in Indonesia for approximately two years. During their stay, they were immersed in an Islamic school environment where Arabic was prioritized. Although they did not receive formal instruction in Indonesian, they acquired basic communicative skills through daily interactions with Indonesian speakers. Their exposure to the language was therefore informal and limited, making them suitable subjects for examining the initial pronunciation difficulties faced by native Arabic speakers when producing Indonesian sounds.

The Oxford Handbook of Arabic Linguistics mentions that Arabic phonetics includes only two nasal consonants, whereas the phonetic landscape of Indonesia features four nasal consonants, two of which are uncommon in Arabic. It turns out that this palatal nasal /ɲ/, which is predominant in languages such as Indonesian and English, is rare and absent in Arabic. In the same way, the velar nasal /ŋ/, which is present in Indonesian but not in Arabic, leads to phonological errors and requires careful examination. This study delves into phonological challenges encountered by native Arabic speakers learning Indonesian, with a particular focus on nasal consonants. The study aims to explore the complexities surrounding the absence of these nasal consonants in the Arabic phonetic system and to build on the main research on the occurrence and distribution of errors in the pronunciation of Indonesian nasal consonants by Arabic native speakers.

Phonological errors that appear in pronunciation by Indonesian language learners do not indicate and cannot be concluded as they fail to learn the language perfectly. There can be a new point for developing materials and teaching methods for foreign speakers, especially native Arabic speakers, in learning Indonesian. Related to the statement, the purpose of this research is to rigorously document and analyze phonological errors in one specific manner of articulation, nasal consonants by native Arabic speakers who have learned Indonesian.

Previous research (He, 2022; Mahmood et al., 2023; Nawari, 2019; Rafkahanun, 2021) has explored phonological errors among learners of Indonesian from various linguistic backgrounds, highlighting mispronunciations primarily in vowels and plosive consonants. In Nawari's study (2019), he discussed the mispronunciation of Indonesian words by presenting the result along with Indonesian words, the error forms, and changed phonemes made by Arabic speakers. A study with the same focus was also discussed by Rafkahanun (2021) in his work, the subjects were specifically learning Indonesian (BIPA's students in Egypt). He identified phonological errors as half-open vowels /ə/ and [ɛ], bilabial plosive consonants [p], alveolar nasal consonants /n/, consonant sounds velar nasal /ŋ/ and semivowel [w]. These phonological errors explained the changing of one phoneme to another and showed why these phonological errors occur.

Another study on phonological errors focusing on nasal was written by Liu He (2022). He analyzed the nasal error pronunciation produced by Chinese learners of English. The findings showed that Chinese learners pronounce the alveolar nasal [n] and velar nasal [ŋ] in English as [n] and the omitted alveolar nasal [n] in the coda position. The more recent study on nasal was conducted by Mahmood et al. (2023) discussing the pronunciation of English velar nasal by Pakistani University students. This research found that the mispronounces by Pakistanis occurred when they inserted the /g/ after /ŋ/ sound in the medial position, such as /swɪŋɪŋ/ changed to /swɪŋgɪŋ/. While He and Mahmood focused on nasal, Jahara's analysis (2021) mentioned the difficulties of Arab undergraduate EFL learners. He found some participants faced nasals that were problematic to be

pronounced. Some of them were confused about pronouncing the voiced alveolar nasal /n/ and some omitted the voiced velar nasal /ŋ/. The insertions of other sounds in error nasal pronunciation by Arabic speakers were also found in Rehman's analysis (2022). The velar plosive consonants changed the sound of velar nasal since they are more familiar than velar nasal in the Arabic phonetics system. However, Jahara and Rehman skipped over the information about the specific words pronounced and how the participants ended up pronouncing them.

Further insight into phonological errors in Indonesian pronunciation came from the study of Lathifah et al. (2021) and Safitri et al. (2020). Latifa's study drew attention to phonological errors observed in videos of native French speakers attempting to pronounce Indonesian words. This study reveals examples of subtraction, addition, and substitution, highlighting the phonological challenges that foreign speakers face when learning Indonesian pronunciation. Similarly, Safitri's work specifically examined the use of Indonesian by foreign speakers in the Indonesian television series, investigated phonological errors in pronunciation, and clarified subtraction, substitution, also addition.

While these studies provide valuable insights into phonological errors in nasal pronunciation and the pronunciation of Indonesian among foreign speakers, establishing a comprehensive relationship between correct and misaligned phonemes remains elusive. This study addresses this gap by adopting a generative approach to phonology, leveraging distinctiveness theory. Utilizing a generative phonology approach, grounded in distinctive feature theory (Khasanah, 2020; Aprilianti, 2019), this research seeks to uncover systematic patterns in the pronunciation errors of nasal consonants among Arabic speakers learning Indonesian. A previous study by Khasanah analyzed the nasalization changes in the Makassar language and revealed distinctive features of sounds preceding or following alveolar nasal sounds were expounded upon, contributing to a better understanding of nasal sound changes. Meanwhile, Aprilianti analyzed the borrowing of a foreign language in Javanese and aided readers in comprehending the alterations and features that influence changes in nasal sounds from one nasal to another.

One of the seminal contributions of distinctive feature theory is its application to the explanation of phonological processes and linguistic universals. The theory is structured to account for variation and assimilation by decomposing speech into a set of binary features, such as [+/- voiced], [+/- nasal], [+/- continuous], etc. providing a cross-linguistically applicable framework. In nasal sounds, the related features other than [+/- nasal] are [+/- coronal] and [+/- anterior].

The use of this theory can result in a theoretical framework that allows for the analysis of both common and divergent features in the phonological structure of languages, leading to broader insights into the intricate mechanisms involved in language formation.

This study employs a well-established framework to examine the pronunciation of nasal consonants among Arabic speakers learning Indonesian. It addresses the challenges stemming from phonological differences between these languages. The objective is to gain a deeper understanding of specific patterns and systematic errors in this domain. By examining whether Arabic speakers transfer nasal phonological patterns from their native language to Indonesian, the research sheds light on the factors influencing these errors. Through detailed analysis of nasal consonant features, the study aims to identify consistent areas of error occurrence, providing a detailed examination of both the presence and nature of these deviations in pronunciation.

This approach not only acknowledges the existence of errors but also delves into their underlying nature and patterns, thereby contributing to a more comprehensive understanding of second language acquisition dynamics.

RESEARCH METHOD

This research adopted a qualitative descriptive approach, falling within the purview of descriptive research. The qualitative nature of the study was deemed appropriate due to its focus on spoken words, phrases, and sentences, necessitating a nuanced exploration of pronunciation nuances.

The research commenced with meticulous data collection employing an elicitation technique, specifically an initiating question designed to solicit verbal responses (Sinclair in Yenti D, 2022). The researcher employed a reading elicitation technique, wherein participants read a series

of sentences aloud in Indonesian. This method served as a valuable means to scrutinize pronunciation accuracy and phonetic features. The controlled setting of reading elicitation provided insights into how individuals articulate sounds, particularly within the context of learning a second language.

Following initial observations from the first participant, the sentence sets were refined to target specific phonological patterns where consistent errors occurred. These included sequences such as [ŋ] meeting [k], [s/l/r] clusters, and between [ə] and [a], and the nasal [ɲ] meeting [a], [ə-ə]. Although not all pairs were minimal in the strictest phonological sense, the sentences were deliberately constructed to elicit challenging Indonesian phonemes commonly mispronounced by Arabic speakers.

Following the data collection stage, the researcher listened to the recorded readings and undertook phonetic transcription using the International Phonetic Alphabet (IPA). The choice of IPA was motivated by its standardized and universally recognized symbols for representing speech sounds, ensuring consistency and comparability across diverse studies and linguistic contexts.

The transcription process was primarily carried out by the researcher, who listened to the recordings multiple times and manually transcribed the data. To ensure the accuracy and consistency of the transcriptions, the researcher consulted with a fellow researcher based in Egypt who is fluent in both Arabic and Indonesian. This collaborator cross-checked selected transcriptions to validate whether the recorded pronunciation aligned with what the researcher had perceived.

Each participant completed three recording takes, and recurring phonological errors across these takes were used as the basis for analysis. The transcriptions focused on Indonesian nasal consonants as specified in the research objective and were analyzed for phonological errors using distinctive feature theory. Identified errors—including substitutions, omissions, additions, or other deviations—were thoroughly examined. The analysis culminated in detailed phonological descriptions and rule-based explanations, highlighting the sources and distribution patterns of the errors observed. This comprehensive approach aimed to deepen the understanding of the phonological challenges faced by native Arabic speakers learning Indonesian.

FINDINGS AND DISCUSSION

Based on the results of research and analysis of Indonesian pronunciation by native Arabic speakers, it is found that there are significant phonological errors apparent across various sounds in Indonesian. These errors prominently manifest in the realm of nasal consonants, highlighting a distinct disparity between the phonological systems of Arabic and Indonesian. Arabic phonetics include two nasal consonants, /m/ and /n/, which correspond directly with those in Indonesian. Consequently, native Arabic speakers generally pronounce /m/ and /n/ accurately in Indonesian contexts. However, the presence of two additional nasal consonants in Indonesian, namely /ŋ/ and /ɲ/, which are absent in Arabic, poses notable challenges. This discrepancy triggers phonological errors where these sounds are substituted or altered during pronunciation by native Arabic speakers.

The sounds /ŋ/ and /ɲ/ often undergo transformations into other sounds due to the unfamiliarity of their articulation in Arabic phonology. These transformations frequently involve phonological processes such as plosivization, fronting, and palatalization. Plosivization, as observed in other phonological studies such as Kim (1977) on Korean Phonology, entails the conversion of a non-plosive consonant into a plosive one. Fronting, a phenomenon commonly noted in language acquisition and documented in studies like Yang (2007) on Mandarin, occurs when a posterior sound shifts forward within the mouth's articulatory space. Meanwhile, palatalization, as confirmed by Sokhey (2021) in Cairene Arabic, occurs when the tongue articulates a consonant closer to the hard palate, particularly preceding vowels like /iː/ in certain linguistic contexts. These processes illustrate the adaptive strategies employed by native Arabic speakers to reconcile the unfamiliar nasal sounds in Indonesian with their native phonological framework.

Velar Nasal Consonant /ŋ/

To produce a velar nasal consonant, like the sound represented by the letter "ng" in the English word "sing" or in the Indonesian "yang", position the back of the tongue against the soft part of the palate (the velum) while allowing air to pass through the nose. A velar nasal consonant can be challenging

for native Arabic speakers. The articulation involves a specific placement of the tongue that is not required for any nasal sounds in Arabic. This difference in articulatory demands underscores the phonological gap Arabic speakers must bridge when learning Indonesian. The absence of this velar nasal consonant in their mother tongue caused the unfamiliarity of their speech mechanism. It turned out that the participants did plosivization and fronting to this absent nasal consonant. Here are some changes that occur when native Arabic speakers pronounce the velar nasal.

Plosivization of consonant /ŋ/ becomes /ʔ/

In Arabic, the glottal stop /ʔ/ is a common feature. Native Arabic speakers may unconsciously transfer this articulatory habit to the /ŋ/ sound in Indonesian, especially when it precedes the /k/ sound and is placed in the middle of the words, as shown in the table below.

Table 1. Words' Phonetics Transcription with [ŋ] Followed by [k]

Words	Correct Transcription	Native Arabic Speakers' Transcription	
		Speaker 1	**Speaker 2**
berangkat	[bəˈraŋkat]	/baraʔkat/	/bɑraʔkat/
meningkat	[məˈniŋkat]	/məniʔkat/	/məniʔkat/
diangkat	[diˈaŋkat]	/diaʔkat/	/dyaʔkat/
menghubungkan	[məŋhuˈbuŋkan]	/məŋhubuʔkan/	/mɑnhabuʔkan/
pangkat	[paŋkat]	/paʔkat/	/baŋkat/

In the process of plosivization, the velar nasal /ŋ/ might assimilate to the place of articulation of the following voiceless velar plosive /k/. The plosivization process arises related to the pronunciation system. Native Arabic speakers do not recognize velar with the manner of articulation in the nasal. Additionally, the habitual use of the glottal stop in Arabic phonology might lead speakers to replace the velar nasal with a glottal stop, facilitating smoother transitions between sounds in rapid speech. This habitual transfer illustrates how ingrained phonological patterns in a speaker's first language can influence their production of sounds in a second language.
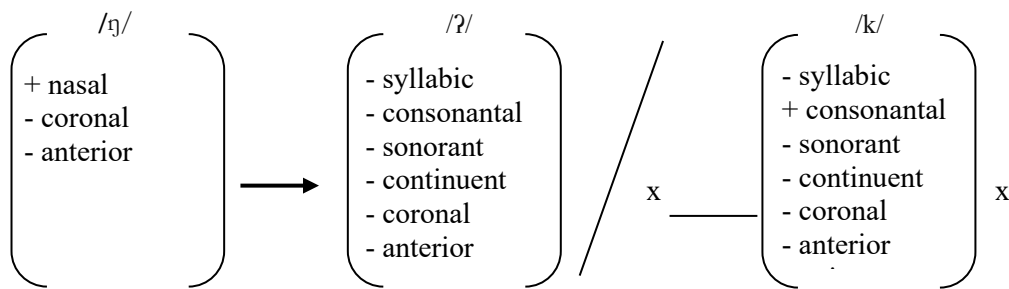
Figure 1. Phonological Rules of Velar Nasal into Plosive Glottal

Velar nasal is a nasal sound, involving the flow of air through the nasal cavity. The glottal stop, on the other hand, is a complete closure of the glottis. The substitution of a glottal stop for the velar nasal before a voiceless velar plosive may be influenced by the unconscious desire to maintain a similar manner of articulation for both sounds in the sequence. The glottal stop and the voiceless velar plosive share the feature of being stops, involving a momentary closure of the vocal tract. Look at the distinctive features of /k/ and /ʔ/, the difference only occurs in the consonantal feature.

In this process, native Arabic speakers may simplify the sequence [ŋk] by changing the velar nasal /ŋ/ to a glottal stop /ʔ/ to make the transition between the two sounds more seamless and easier

to articulate. This adaptation is based on the shared distinctive features of place and manner of articulation between /k/ and /ʔ/. Moreover, this phonological substitution may be reinforced by the difficulty Arabic speakers have in sustaining the nasal airflow required for /ŋ/ while preparing for the subsequent /k/ sound. This complexity can lead to a more convenient glottal stop articulation.

Fronting of consonant /ŋ/ becomes /n/
Alveolar nasal /n/ is a familiar sound for native Arabic speakers since it is included in the phonetic system of the Arabic language. It is found in phonological error that native Arabic speakers tend to pronounce /ŋ/ at the end of the word (coda) into /n/ sound.

Table 2. Words' Phonetics Transcription with [ŋ] Preceded by [s,l,r]

Words	Correct Transcription	Native Arabic Speakers' Transcription	
		Speaker 1	Speaker 2
Jomblang	[dʒomblaŋ]	[dʒombelan]	[dʒombilan]
sering	[səˈriŋ]	[sərin]	[sɑrin]
pasang	[pasaŋ]	[pasan]	[basan]
Malang	[malaŋ]	[malan]	[malan]
murung	[murʊŋ]	[murun]	[murʊn]

This second form of phonological error adopts the process of fronting nasal. In this case, the velar nasal is assimilating to the place of articulation of the following alveolar consonant. When the velar nasal is preceded by alveolar consonants [s l r] with vowels, the influence of the alveolar consonants causes the velar nasal to adapt its place of articulation, resulting in an alveolar nasal sound /n/ instead of velar nasal sound /ŋ/. This finding aligns with Rafkahanun (2021), who also found that Arabic native speakers often replace the dorsovelar nasal /ŋ/ with the alveolar nasal /n/, particularly in words such as *lapangan* and *mengapa*. The fronting process may reflect articulatory preferences or a phonological transfer from the speakers' first language. The tendency to front the nasal sound can also be attributed to the proximity of the alveolar place of articulation in the speakers' primary language, making it a more comfortable and automatic choice. Additionally, the frequent occurrence of alveolar nasals in Arabic likely reinforces this substitution, leading to a more consistent application of this phonological rule among speakers.
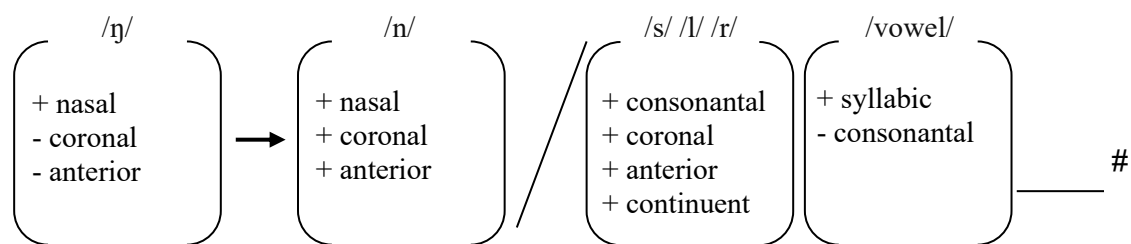
Figure 2. Phonological Rules of Velar Nasal into Alveolar Nasal

Based on its distinctive features, it can be seen that there is a change in place of articulation. The features [-coronal] and [-anterior] in velar nasal change into positive when it is preceded by a consonant that has positive coronal and anterior features, those are [s l r]. This phonological process occurs in an effort to pronounce unfamiliar sounds into sounds that are similar and known to the

speech mechanism of native Arabic speakers. It also minimizes the effort required to transition between different sounds with distinct places of articulation. Moreover, the fronting process simplifies the speech production mechanism, especially in rapid or casual speech, helping speakers maintain fluency by using more familiar articulatory settings.

Plosivization of consonant /ŋ/ becomes /ɢ/

The next error occurs when native Arabic speakers pronounce a velar nasal when this consonant takes place in the between vowels /ə/ and /a/ also in the middle of the words. It causes assimilation, specifically plosivization to occur. The plosivization happens by changing the /ŋ/ change into /ɢ/.

Table 3. Words' Phonetics Transcription with [ŋ] Between [ə-a]

Words	Correct Transcription	Native Arabic Speakers' Transcription	
		Speaker 1	Speaker 2
mengalir	[məˈŋalɪr]	/məɢalɪr/	/miɢalɪr/
mengambil	[məˈŋambɪl]	/məɢambɪl/	/məɢambɪl/
dengan	[dəˈŋan]	/dənan/	/dəɢan/
mengangkat	[məˈŋaŋkat]	/maɢaʔkat/	/manaʔkat/
lengan	[ləˈŋan]	/ləɢan/	/ləɢan/

The third form of phonological error adopts a phonological process influenced by vowels, which are vocal-consonant assimilation and cause the plosivization arise. In this case, the velar nasal is assimilating to the place of articulation of the preceding and following vowels. It happens unconsciously as the result of unfamiliar velar nasal for native Arabic speakers. The schwa sound /ə/ is a central, mid-central vowel produced with the tongue in a neutral or central position. It works the same for the sound /a/ which is an open front vowel. The central positioning of these vowels might exert a rearward influence on the velar nasal, nudging its place of articulation towards the uvular region. Additionally, the uvular plosive /ɢ/ shares similar aerodynamic properties with the velar nasal, allowing for a smoother and more comfortable transition. This transformation reflects an adaptation to maintain phonological consistency within the syllable structure. Interestingly, while the shift to a uvular plosive /ɢ/ is not explicitly noted in prior studies, it echoes Rafkahanun's (2021) findings on the substitution of /ŋ/ with /g/. Though the outputs differ slightly, both reflect a shift from nasal to plosive within the dorsovelar area, suggesting similar articulatory challenges faced by Arabic-speaking learners. A similar tendency is seen in Mahmood et al. (2023), where Pakistani English speakers inserted /g/ after /ŋ/ in medial positions. Despite the different language contexts, both cases indicate that velar nasals pose cross-linguistic challenges that often lead to plosive substitution.
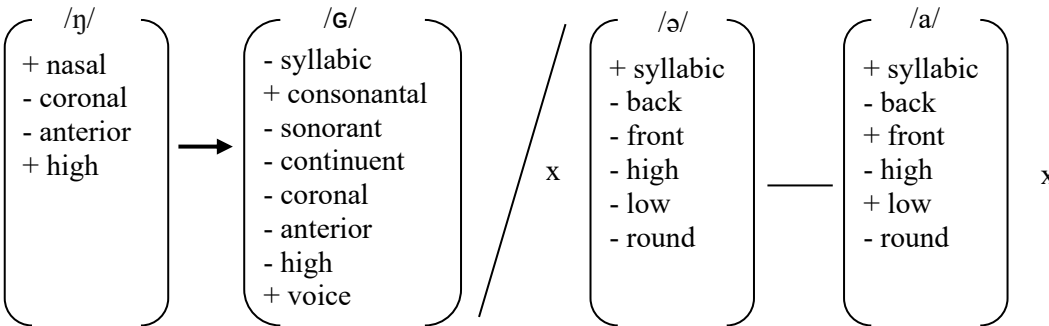
Figure 3. Phonological Rules of Velar Nasal into Voiced Uvular Plosive

This rule states that the segment /ŋ/ is between two vowels, namely /ə/ with the [+syl., -back, -front, -high, -low, -round] feature and /a/ with the [+syl., -back, +front, -high, +low, -round] feature, which is pronounced as /ɢ/ with the [-syl., +cons., -son., -cont., -cor., -ant., -high, -voice] feature. Meanwhile, the surrounding sounds adapt to the existing syllable pattern. The plosivization process that occurs with the /ŋ/ segment is that it leaves the [+high] and [+nasal] features and maintains two of its features, namely [- anterior, - coronal], and takes on the characteristics of the place of articulation that /ə/ and /a/ which is [- high]. The change in the [high] feature influences the appearance of the uvular sound, as the uvular sound is dominated by [-high]. Moreover, the velar nasal /ŋ/ has a velar place of articulation, which is slightly more forward than the uvular region. The coarticulatory influence of the schwa and open front sound might lead to a more rearward articulation, aligning with the uvular place. Furthermore, the uvular place of articulation provides a more stable acoustic transition between the central and open vowels, leading to a clearer and more distinguishable plosive sound.

The results of velar nasal consonant /ŋ/ pronunciation among native Arabic speakers reveal significant insights into cross-linguistic phonological processes specific to this consonant. The absence of the velar nasal in Arabic phonetic system leads speakers to substitute it with more familiar sounds, such as the glottal stop /ʔ/, the alveolar nasal /n/, or the uvular plosive /ɢ/ as the explained findings. These substitutions highlight the interplay between phonetic familiarity and ease of articulation. Plosivization, fronting, and vocal-consonant assimilation emerge as key strategies that Arabic speakers use to navigate the unfamiliar phonetic territory presented by the Indonesian language.

In the first instance, native Arabic speakers replace the velar nasal /ŋ/ with the glottal stop /ʔ/, particularly when it precedes the voiceless velar plosive /k/. This adaptation likely arises from the need to simplify the pronunciation process, aligning more closely with their native phonological rules. Secondly, the fronting of /ŋ/ to /n/ demonstrates an influence from the alveolar consonants present in Arabic, making the pronunciation more natural for the speakers. Lastly, the shift of /ŋ/ to the voiced uvular plosive /ɢ/ between certain vowels reflects a complex interaction of vocal-consonant assimilation driven by the surrounding vowel sounds.

Palatal Nasal Consonant /ɲ/
A palatal nasal is a type of nasal consonant that is produced with the tongue against the hard palate of the mouth. The most common example of /ɲ/ (written 'ny') sound in English is "ca**ny**on" or in Indonesian, which is more common, sound in words like "*nyamuk*" and "*banyak*". While it is not common in English, the /ɲ/ sound is not present in Arabic (Yoviyani & Mulyati, 2023). This unfamiliarity requires Arabic speakers to adapt their pronunciation techniques significantly. The absence of the palatal nasal in Arabic phonetics means that native speakers must develop entirely new articulatory skills to accurately produce this sound. This absence caused the native Arabic speakers to face similar difficulties as they pronounce the velar nasal consonant. Here are some changes that occur when native Arabic speakers pronounce the palatal nasal in Indonesian words.

Palatalization of consonant /ɲ/ becomes /ɲʲ/
The first error that occurs when native Arabic speakers pronounce a palatal nasal is related to the vowel that follows it and causes the assimilation to occur. The assimilation here is called palatalization, a phonological process where a sound becomes palatal or acquires a palatal quality. This often involves raising the tongue toward the hard palate during the articulation of a consonant.
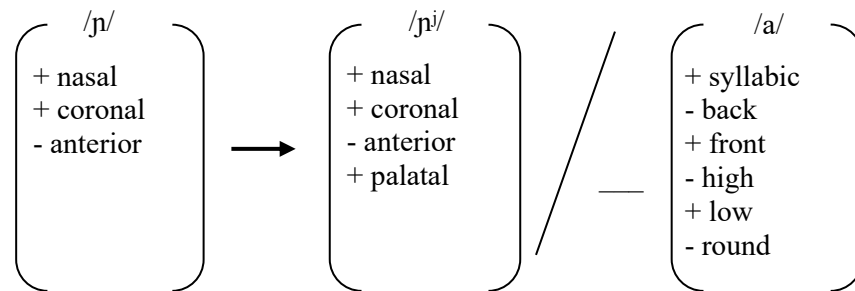
When native Arabic speakers encounter the palatal nasal /ɲ/ followed by a vowel like /a/, their articulation tends to adopt a more palatal quality. This adaptation leads to a pronunciation where /ɲ/ becomes /ɲʲ/, a palatalized version of the original sound. This change is consistent regardless of the word position, indicating a systematic pattern in their speech. The influence of Arabic, which has the palatal sound /j/, contributes significantly to this phonological adaptation.

Table 4. Words' Phonetics Transcription With [ɲ] Followed by [a]

Words	Correct Transcription	Native Arabic Speakers' Transcription	
		Speaker 1	**Speaker 2**
nyamuk	[ɲamʊʔ]	/ɲʲamʊk/	/ɲʲamʊk/
menyanyikan	[məɲaˈɲikan]	/məɲʲaˈɲikan/	/miɲʲaˈnikan/
lucunya	[luˈtʃuɲa]	/lutuɲʲa/	/lutuna/
nyata	[ɲata]	/ɲʲata/	/ɲʲata/
Fanya	[faɲa]	/faɲʲa/	/faɲʲa/

In accordance to the data, the appearance of palatalized palatal nasals occurs at the beginning, in the middle, and at the end of words or it can be stated that the distribution is elsewhere. This shows a regular distribution of phonological errors in consonant-vowel assimilation. This phenomenon refers to a specific type of nasal, palatal nasal sound that involves both palatalization and a palatal place of articulation. It belongs to the type of consonant-vowel assimilation that involves the sounds /ɲ/ and /a/ and produces a palatalized sound. The distinctive features related to this phenomenon are provided below.

$$
\begin{bmatrix} /ɲ/ \\ +\text{ nasal} \\ +\text{ coronal} \\ -\text{ anterior} \end{bmatrix} \rightarrow \begin{bmatrix} /ɲʲ/ \\ +\text{ nasal} \\ +\text{ coronal} \\ -\text{ anterior} \\ +\text{ palatal} \end{bmatrix} / \underline{\quad} \begin{bmatrix} /a/ \\ +\text{ syllabic} \\ -\text{ back} \\ +\text{ front} \\ -\text{ high} \\ +\text{ low} \\ -\text{ round} \end{bmatrix}
$$

Figure 4. Phonological Rules of Palatalized Palatal Nasal

This rule states that the segment /ɲ/ followed by /a/ sound with the [+syl., -back, +front, -high, +low, -round] feature is pronounced as /ɲʲ/ with the feature added is [+palatal] feature. Based on the distinctive feature of /a/ sound, it can be known that /a/, a low and open vowel, is produced with a relatively low tongue position. The tongue position of the /a/ vowel influences the tongue position of the preceding /ɲ/ consonant, causing it to become palatalized. Palatalization involves raising the front part of the tongue toward the hard palate. Another reason the /ɲ/ is palatalized is the influence of the mother tongue of native Arabic speakers. The palatal sound in Arabic is the /j/ sound represented by the alphabet "ي". This only palatal sound affects the pronunciation of /ɲ/ and turns it into /ɲʲ/ unconsciously. The palatalization process that occurs with the /ɲʲ/ segment is that it adopts the [-back] and [-round] features of /a/ sound. The same place of articulation between /a/ and /j/makes the native Arabic speakers pronounce /ɲ/ easier with the influence of /ʲ/ when it is followed by /a/.

Plosivization of consonant /ɲ/ becomes /ʔ/
The second error is found when native Arabic speakers pronounce a palatal nasal when it is in the middle of a vowel and also in the middle of the words. The same phonological process, plosivization causes the distribution of palatal nasal replaced by glottal plosive, which is an absolutely, more familiar sound for native Arabic speakers.

Plosivization occurs due to the lack of familiarity with the palatal nasal /ɲ/ and the preference for more familiar sounds from their native language. When /ɲ/ is situated between vowels like /ə/, Arabic speakers often substitute it with a glottal stop /ʔ/. This substitution simplifies articulation and

aligns with the phonological patterns they are accustomed to. This process is particularly evident in words where /ɲ/ appears between schwa vowels, leading to a consistent plosivization pattern.

Table 5. Words' Phonetics Transcription With [ɲ] Between [ə-ə]

Words	Correct Transcription	Native Arabic Speakers' Transcription	
		Speaker 1	Speaker 2
menyebabkan	[məɲəˈbapkan]	/məʔəbabkan/	/məʔəbabkan/
menyerah	[məɲəˈrah]	/məɲʲarah/	/məʔərɑh/
menyebar	[məɲəˈbar]	/məʔəbar/	/minəbar/
penyedia	[pəɲəˈdia]	/pəʔədya/	/pəʔədiːa/
penyerapan	[pəɲəˈrapan]	/pəʔərabɑn/	/pəʔərɑpan/

From the data above, the appearance of glottal plosive occurs in the middle of words. It is due to the place of "-enye-" sound in Indonesian itself is mostly in the middle of the words. This also shows a regular distribution of phonological errors, where this phenomenon refers to palatal nasal sounds and mid-central unrounded sounds. Below are the distinctive features related to this phenomenon to look deeper at the cause of the plosivization process.
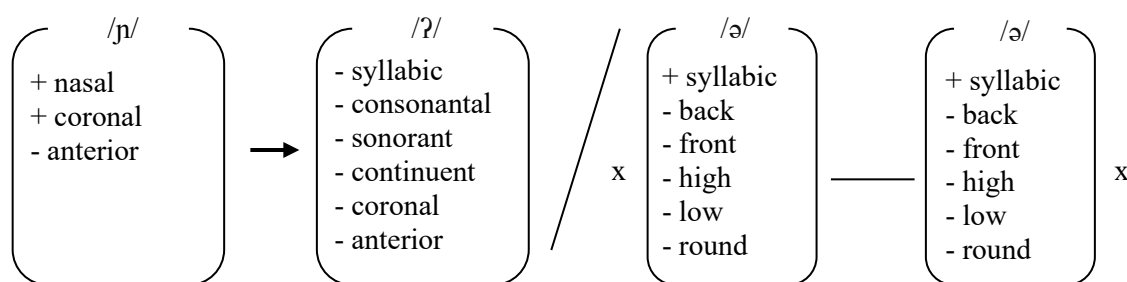
Figure 5. Phonological Rules of Palatal Nasal into Glottal Plosive

The surrounding sounds, central vowel /ə/, influence the pronunciation of the palatal nasal. In this phenomenon, assimilation based on the occurrence of /ə/ sounds leads to the adaptation of /ɲ/ to a glottal plosive /ʔ/ for smoother articulation since both /ɲ/ and /ə/ are uncommon in Arabic phonetics. As stated in the rule that the segment /ɲ/ in the middle of the /ə/ sound with the [+syl., -back, -front, -high, -low, -round] feature is pronounced as /ʔ/ with the feature adopt from palatal nasal [-anterior] and change the [coronal] feature. Based on the distinctive feature of /ə/ sound, it can be known that the schwa sound is produced by putting the tongue in the middle and the centre of the mouth. It can be seen that the feature [-back, -high] is the shared feature between the indeed existing and the emerging sound.

The analysis of palatal nasal consonant /ɲ/ pronunciation by native Arabic speakers highlights distinct phonological adaptations. Palatalization and plosivization are the primary processes observed. In the case of palatalization, the influence of the vowel /a/ following the palatal nasal leads to the introduction of a palatal quality, resulting in the production of /ɲʲ/. This adaptation reflects an unconscious effort to align with familiar articulatory patterns from Arabic, particularly the palatal sound /j/.

On the other hand, plosivization of /ɲ/ to the glottal stop /ʔ/ occurs primarily when /ɲ/ is surrounded by schwa vowels in the middle of words. This substitution is driven by the absence of /ɲ/ in Arabic and the presence of the glottal stop as a more common phoneme, providing a simpler articulation pathway for native speakers. The regularity of these adaptations underscores the significant impact of native phonological systems on the acquisition of new sounds in a second language.

CONCLUSION

According to the evidence presented in the previous chapter, it is clear that the phonological errors in the pronunciation of Indonesian by Arabic native speakers are due to the effect of the absence of corresponding consonants in the Arabic phonetics where the situation creates a sense of "confusion" to the pronunciation system of these speakers within this language. This linguistic phenomenon can be attributed to the specific assimilation processes, those are plosivization, fronting, and palatalization. The assimilation process is a widespread phonological phenomenon in which sounds gradually acquire similar properties to neighboring sounds, and in this case occurs particularly within the soft palate and palatine nasal categories. Importantly, the change of manner of articulation occurs unconsciously, as these speakers naturally produce sounds that blend more seamlessly with phonetic influences before and after the associated sounds.

A deeper understanding of these assimilation processes reveals the nuanced ways in which native Arabic speakers adapt their pronunciation. For example, plosivization involves the transformation of the velar nasal /ŋ/ into a more familiar glottal stop /ʔ/, a sound that is prevalent in Arabic phonology. This adaptation is often observed in environments where the velar nasal is followed by a vowel, highlighting the influence of vowel context on the assimilation process. Similarly, fronting occurs when the velar nasal /ŋ/ is pronounced as the alveolar nasal /n/, particularly in contexts where the subsequent sound exerts a fronting influence. This shift underscores the role of adjacent phonetic elements in shaping pronunciation adjustments.

The depth of the phonological errors associated with these nasal sounds can be fully comprehended through a subtle examination of their characteristics. These errors are not a conscious choice on the part of the speaker, but rather an unconscious incorporation into the pronunciation system of native Arabic speakers, as they happened to select sounds that share characteristics with the sounds before and after the palatal and velar nasal sounds. This finding will be invaluable to Indonesian language teachers as it provides insight into the unique challenges that Arabic speakers face in addressing nasal pronunciations that are missing from their native phonetic catalogs.

By examining the characteristics of phonological errors, it is possible to observe that the pronunciation of most velar nasals is affected by both the next consonant and the adjacent vowel. In contrast, native Arabic speakers experience changes in velar-nasal pronunciation that are primarily influenced by vowels. This distinction is closely related to the structural characteristics of these two nasal sounds in Indonesian. When a velar nasal is followed by a consonant and vowels, the velar nasal is restricted to configurations after the vowel. Moreover, it is worth mentioning that the same vowels, namely /a/ and /ə/ impact both velar-nasal and even palatal-nasal phonological mistakes, intensifying the difficulty of pronouncing Arabic by native speakers. This further contributes to our understanding of the intricate dynamics at play in the pronunciation challenges faced by native Arabic speakers learning Indonesian.

This study is limited by its short data collection period and small number of participants. It focused only on nasal consonant errors, which narrows the scope of the findings. Future research could involve more participants and explore whether longer exposure to Indonesian affects the accuracy of non-native phoneme production. Further studies may also examine other phonemes and consider the influence of participants' learning environments.

REFERENCES

He, L. (2022). An analysis of nasal production of Chinese learners of English in Wu Chinese dialect area. In *Proceedings of the 2022 8th International Conference on Humanities and Social Science Research (ICHSSR 2022)* (pp. 2510–2513).

Jahara, S. F., & Abdelrady, A. H. (2021). Pronunciation problems encountered by EFL learners: An empirical study. *Arab World English Journal, 12*(4), 194–212. https://doi.org/10.24093/awej/vol12no4.14

Kim, C.-W. (1977). Rule ordering in Korean phonology (Vol. 1). *Korean Studies.* https://about.jstor.org/terms

Lathifah, N. R., Anggita, F. D., & Rosianingsih, S. (2021). Analisis kesalahan berbahasa dalam tataran fonologi pada kanal YouTube "Mas Bas-Bule Prancis." *Lingua Rima: Jurnal Pendidikan Bahasa dan Sastra Indonesia, 10*(1), 91. https://doi.org/10.31000/lgrm.v10i1.4094

Mahmood, A., Irfan, H., Alfares, N. S., & Yasmeen, S. (2023). Pronunciation of English velar nasal (angma) by undergraduate students in Pakistani universities. *Studies in English Language and Education, 10*(3), 1167–1180. https://doi.org/10.24815/siele.v10i3.31073

Nawari, A. (2019). Analisis pelafalan bunyi bahasa Indonesia oleh penutur bahasa Arab di Universitas Sousse, Tunisia. *Balai Bahasa Riau.*

Nurman, M. (2021). The correlation between phonological knowledge and pronunciation ability. *Journal of English Education and Teaching (JEET), 5*(2), 290–302.

Owens, J. (2013). *The Oxford handbook of Arabic linguistics* (J. Owens, Ed.). https://doi.org/10.1093/oxfordhb/9780199764136.013.0001

Rafkahanun, R. (2021). Analisis kesalahan fonologis dalam keterampilan berbicara pembelajar BIPA di Pusat Studi Indonesia Ismailia Mesir. *Madah: Jurnal Bahasa dan Sastra, 12*(1), 78–87. https://doi.org/10.31503/madah.v12i1.380

Rehman, I., Silpachai, A., Levis, J., Zhao, G., & Gutierrez-Osuna, R. (2022). The English pronunciation of Arabic speakers: A data-driven approach to segmental error identification. *Language Teaching Research, 26*(6), 1055–1081. https://doi.org/10.1177/1362168820931888

Safitri, I., Putri, A. P. H., & Nur Sahadati, D. M. (2020). Analisis kesalahan berbahasa dalam tataran fonologi pada kanal YouTube "Net Drama." *Cakrawala Indonesia, 5*(2), 25–34. https://doi.org/10.55678/jci.v5i2.447

Salameh, M. Y. A. B. (2021). Phonemic consonant sounds in Modern Standard Arabic. *Linguistics and Culture Review, 5*(S2), 1643–1658. https://doi.org/10.21744/lingcure.v5ns2.2257

Sokhey, N. (2021). Auditory and acoustic evidence for palatalization of the nasal consonant in Cairene Arabic. *Languages, 6*(4). https://doi.org/10.3390/languages6040190

Yang, J. H. (2007). The role of sound change in the speech recognition system: A phonetic analysis of the final nasal shift in Mandarin. *ROCLING/IJCLCLP.*

Yeaqub, M. (2018). Similarities and dissimilarities of English and Arabic alphabets in phonetic and phonology: A comparative study. *Al-Arabi: Jurnal Bahasa Arab dan Pengajarannya, 2*(2), 94–105. https://doi.org/10.17977/um056v2i2p94-105

Yenti, D., & Rofiq, I. R. R. (2022). Elicitation techniques in turn-taking practices in EFL classroom interaction. *International Journal of Pedagogical Novelty, 1*(1), 25–29.

Yoviyani, S. H., & Mulyati, Y. (2023). Menyibak sistem fonetik bahasa Indonesia dan bahasa Arab serta implikasinya dalam pembelajaran BIPA. *Jurnal Onoma: Pendidikan, Bahasa, dan Sastra, 9*(2), 1012–1022. https://doi.org/10.30605/onoma.v9i2.2838