Phonology Fossilization Effect Among Arabic Native Speaker on the Acquisition of Malay Velar and Alveopalatal Nasal Sound

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ABSTRACT: In learning a second language, speakers usually move between their first language (L1) and the target language (L2). However, the interlanguage process is a transitional linguistic system marked by enduring and resistant errors known as language fossilization is an important stage that is frequently missed. This study examines whether Arabic Native speakers that live in Malaysia acquire novel L2 sounds, the Malay velar nasal \ŋ\ and alveopalatal nasal /ɲ/. Alveolar nasal sound /n/ is a part of both Arabic and Malay inventories while \ŋ\ and /ɲ/ sounds which consist of tautosyllabic velar and palatal nasal and glide element are not from Arabic inventory. These crosslinguistic differences present potential difficulty for Arabic speakers due to their phonetic constraints. With these crosslinguistic disparity, this study aims to identify did Arabic native speakers who live in Malaysia facing language fossilization to produce acoustically Malay \ŋ\ and /ɲ/ sound or not. Their speech was recorded and analyzed using Praat software and measured by formants, duration, and spectrograms of the following vocalic portion as acoustic indices of the Malay \ŋ\ and /ɲ/ sound. Findings show that native speakers produce an acoustically distinct Malay sounds of \ŋ\ and /ɲ/ due to phonology fossilization from their mother language sound /n/. These findings have significant implications for teaching pronunciation in Malay as a second language, particularly when it comes to dealing with foreign learners' interlanguage phenomena.

KEYWORDS: second language acquisition, phonology, fossilization, Arabic, Malay

INTRODUCTION

Malay and Arabic languages have different origins and influences. The relationship between the two languages back to history when trade and cultural exchange between the Arab world and Southeast Asia were active. For example, in Malaysia, the Malay language was significantly influenced by Arabic due to cultural and religious exchange (Pa, 2019). It is also worth noting that Arabic is considered the language of the Qur'an, giving it significant religious importance in the Islamic world while Malay is a prominent language in Malaysia.

These few years have witnessed many Arabs currently travel to Malaysia for various purposes including pursuing studies in Malaysian institutions or working in Malaysia, largely due to the political and economic instability in their home countries (Haliyana Khalid, 2021). The recent wave of Arab migration to Malaysia is closely linked to the security and relative stability Malaysia offers compared to the turbulence in many Arab countries. Alongside religious and cultural compatibility, these pull factors ensure that Malaysia remains an attractive option for Arabs in search of better prospects and safety (M.Noor, 2024).

Malay language serves as the intermediate language, the language of law, the language in religious matters, and the language of knowledge in Malaysia, among other vital roles (Hua, 2023). Therefore, they should learn the Malay language to be able to communicate with colleagues and the peoples in Malaysian society. However, learning Malay for Arabic speakers is challenging because Malay and Arabic belong to two different language families Austronesian and Semitic respectively (Amirdabbaghian, 2023, Asem, 2011). This results in differences in various linguistic aspects, including phonetics, grammar, and vocabulary especially phonology as it is the first stage in language acquisition.

The difficulty level of a sound can depend on various factors, including the presence or absence of a phonologically comparable in L1 sound, the functional importance of the L2 sound, articulatory complexity, and specific language phenomenon. Language fossilization is a language phenomenon that related to second language acquisition, describing the linguistic system that learners develop while acquiring a new language. Learners commonly give attention to L2 or target language TL without concerning on a stage that called interlanguage (Selinker & T. Lamendella., 1978) where in this process it is a crucial thing in second language acquisition where language fossilization occurred before learners completely able to speak in TL. During this process, learners are

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influenced by both their native language and the target language they are learning, leading to errors (Leon, 2024). If these errors are not properly addressed and corrected, they can become ingrained in the learner's mind and become part of their language system. This is an ongoing process toward fluency. However, learners will face challenges in mastering the correct structures and rules of the second language, which may lead to a stagnation phase known as language fossilization (Chen & Zhao, 2013). Fossilization manifested as deviant forms from target language TL and it occurs at all levels in languages stage including phonology. Phonological fossilization refers to the persistent repetition of pronunciation errors in a second language (L2), typically influenced by the learner's first language (L1). These errors arise from incorrect acquisition of L2 pronunciation, and when they occur repeatedly and become fixed over time and lead to phonological fossilization.

Malay and Arab languages each of them have different nasal sounds that contrast by place of articulation, however while the Malay nasal sounds inventory consist of four sounds (Maris, 1980) which are /m/, /n/, /ŋ/ and /ɲ/ includes a velar and an alveopalatal nasal sounds while the Arabic nasal inventory comprise just two sounds (Bishir, 2000) /m/ and /n/ (in arabic known as /م/ and /ن/) which does not have those both nasal sounds. The alveopalatal nasal /ŋ/ and the velar nasal /ɲ/ are also made by partitioning the oral cavity. In producing /ɲ/, the partition is made by pressing the tip of the tongue to the palate and for the partition /ŋ/ is made by the dorsum of the tongue at the velum. In the present study, we examine Arab native speakers' acquisition of the velar nasal /ŋ/ and alveopalatal nasal /ɲ / in Malay. This sound is a challenge for Arab native speakers for one reason which its did not exist in Arabic nasal inventory sound. The question that follows is whether this phonology fossilization can be overcome among Arabic native speakers.

LITERATURE REVIEW

Malay language as known shares many similarities with Arabic in terms of loan word due to the arrival of Islam and the Arabs in Malaysia in the 13th century (Karim, 2015) and this makes it relatively easier for native Arabic speakers to learn and pronounce Malay words, and likewise, Malays can pronounce Arabic words more easily thanks to the linguistic influence of Arabic loanwords. However, there are also five sounds in Malay that are difficult for native Arabic speakers to pronounce due to its existence only in Malay sound such as the sound /ɲ / (Hussin, Abd Rahman, & Maizah, 2018).

Language fossilization is fossilized linguistic phenomena, which include linguistic elements, rules, and subsystems (Selinker, Interlanguage, 1972). In other words, native language speakers tend to retain features of their first language (interlanguage) when transitioning to the target language, regardless of the learner's age or the amount of explanation received in the target language.The phenomenon of interlanguage fossilization in second language acquisition occurred in any languages (Wei, 2008) and in his study also he mentioned about this phenomenon specifically aiming to help Chinese learners understand it more accurately. The study categorized fossilization into five types: morphological, syntactic, semantic, pragmatic, and phonological. Although relevant to this research, the study focuses on comparisons between Chinese and English, making its context different from the current research, which examines fossilization between Malay and Arabic.

Recent research by Malaysian researchers (Ali Huddin & Sapar, 2022) investigated phonological fossilization in the pronunciation of Arabic among Malay speakers using a quantitative, library-based method, the study applied air pressure control techniques based on Warren's (1986) theory to improve articulation. The sample involved participants aged 6 to16 years old and the findings showed the technique enhanced the pronunciation of nine Arabic sounds. While it quite similar with the current research which study phonology fossilization, the focus differs, as the present study examines the fossilization of Malay pronunciation among native Arabic speakers.

A previous study from (Syed Jaafar, 2023) investigated pronunciation difficulties in Arabic sounds among Malay native speakers who are students at the Islamic University of Madinah, involving sixteen undergraduate and postgraduate participants. The students read two Arabic passages from "La Tahzan" book and selected Quranic verses comprising fifty phrases, 150 words and fifty short sentences. The findings revealed persistent issues with the articulation of several complex Arabic consonants. This study shares research similarity with the current study in its focus on analyzing pronunciation difficulties and phonological fossilization among non-native speakers. However, while the previous study analysed Arabic pronunciation issues faced by Malay speakers, the current research explores the reverse pronunciation difficulties in Malay sounds encountered by native Arabic speakers thus complementing and expanding upon the scope of the earlier work.

SIGNIFICANCE OF THE STUDY

The present study is significant. This linguistic phenomenon, mispronunciation in Malay has not been so far investigated phonetically and phonologically among Arabic native speakers in Malaysia. The researcher could not get any research examining it in related literature. Therefore, it will be informative in the sense that it will broaden other researchers' knowledge of this significant aspect of language. Moreover, the paper will motivate other linguists to further look upon pronunciation difficulties among non-native speakers in the worldwide.

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METHOD

This study was conducted by several interviews with five Arabic native speakers who are living in Malaysia and some of them had been living in Malaysia for a short period while others had lived for a long time. These individuals interacted and conversed with Malay native speakers and faced difficulties in pronouncing a few sounds that only existed in Malay inventory sounds including velar and alveopalatal nasal: /ŋ/ and /ɲ/ sounds. As for those who had been living in Malaysia for a longer period approximately about 15 years or more, they were able to pronounce the sounds easily as we heard by ear. Although some of them did not pronounce Malay sounds fluently, their performance was sufficient to analyse their pronunciation of Malay sounds.

The participants' voices were recorded and then been analysed by the physical acoustic features of the recorded sounds from the interviews using the Praat software (Boersma & Weenink, 2020). Praat means "speech" in Dutch, and the software developed by Paul Boersma and David Weenink is a free tool for analysing and processing sound waves. It allows the generation of a spectrogram of the sound wave, enabling the researcher to identify the phonetic features of Malay sounds that are unfamiliar to Arabic native speakers. measurements: s a range of acoustic measurements; however, this study focuses on the following relevant to the study objectives:

1. Spectrogram
2. Duration
3. Formant structure

Among the participants interviewed, this study has selected all ten participants for voice analysis using the Praat software. Their academic backgrounds are different with some held doctoral degrees, while others had completed only secondary school level and they also differed in their period residence in Malaysia.

Malay Velar Nasal Sound

The sound /ŋ/ is classified as a nasal consonant. It is produced through the nasal cavity like the sound /n/in terms of manner of articulation. However, it differs from /n/ in terms of its place of articulation which it was produced at the velar or velum place of articulation like the sound /g/. One of the acoustic characteristics of this sound, as observed in the Praat software, is the presence of a phenomenon known as the "velar pinch" an acoustic marker indicating the convergence or closeness of the second formant F2 and third formant F3 formant frequencies. This feature commonly occurred with velar sounds such as /k/ and /g/ and it also appears in the sound /ŋ/ due to its velar articulation. It is noteworthy that /ŋ/ does not exhibit a burst owing to its nasal nature; it is not a plosive sound. This nasal sound is also characterized by a sudden loss of overall acoustic energy as the nasal cavity is less efficient than the oral cavity in radiating sound energy outward due to damping effects around the nasal cavity. Therefore, another distinctive feature of nasal sounds is the appearance of spectral dips (low-energy regions), which indicate partial loss of sound energy because of the anti-formant effect.
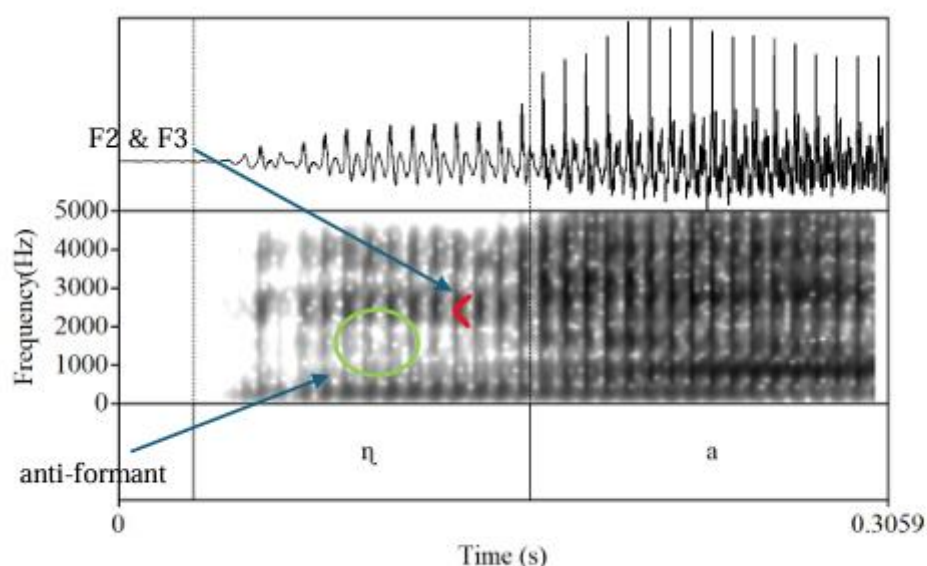

Figure 1 shows an analysis of spectrogram from a Malay native speaker

In the phonetic analysis using Praat software, the researcher found that the second formant F2 showed an upward trajectory while the third formant F3 had a downward trajectory and both were closely aligned. This phenomenon occurs due to the "velar pinch"

effect, which reflects the convergence of F2 and F3 frequencies. It indicates that both formants share a similar frequency range at the velar place of articulation.

Malay Alveopalatal Nasal

The sound /ɲ/ is classified as a palatal nasal consonant produced by raising the tongue tip toward the hard palate while allowing airflow through the nasal cavity.
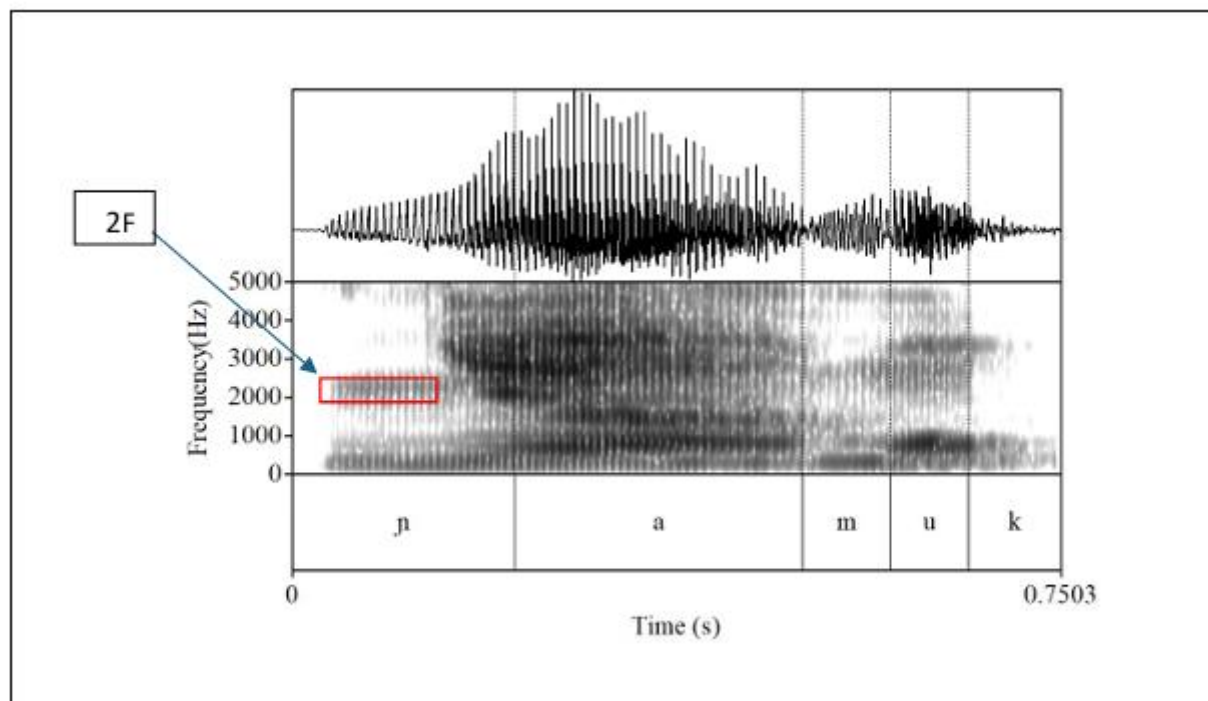

Figure 2 shows an analysis of spectrogram from a Malay native speaker

Acoustic analysis using Praat revealed that the transition from /ɲ/ to the following vowel /a/ showed minimal spectral glide with the shortest duration, typically less than 0.05 milliseconds from the alveopalatal nasal sound to the next sound. From this analysis, it can be ensured that alveopalatal sound /ɲ/ composed of aa alveolar nasal segment and a partial glide not complete glide due to the duration during the articulation. Additionally, analysis showed that the formant pattern of /i/which usually indicates vowel quality did not emerge clearly in Malay native speakers' pronunciation. This suggests that a different articulation, possibly closer to /i/, was being produced within the /ɲ/ segment itself.

Analysis

It is difficult for native Arabic speakers to pronounce the sound /ŋ/, as this nasal consonant that does not exist in Arabic language as it is their mother tongue. A few nasal sounds in Malay are unfamiliar in Arabic except for two nasal sounds: /n/ (ن) and /m/ (م). The sound /ŋ/ is like /n/ in terms of its "nasal resonance", but it differs in its place of articulation which is velar like the sound /g/. One of the notable acoustic features of /ŋ/ is the "velar pinch" phenomenon, which refers to the convergence or proximity between the second formant (F2) and third formant (F3) frequencies. Moreover, sound /ŋ/ does not exhibit a burst as it is nasal rather than plosive in nature.

It can be observed that the participants demonstrated a phonological fossilization when attempting to pronounce the sound /ŋ/ in the word "ngaum" (meaning "roar"). They tended to replace it with either /n/ or /g/, as these sounds exist in Arabic. This tendency can be further supported by the following acoustic analyses:
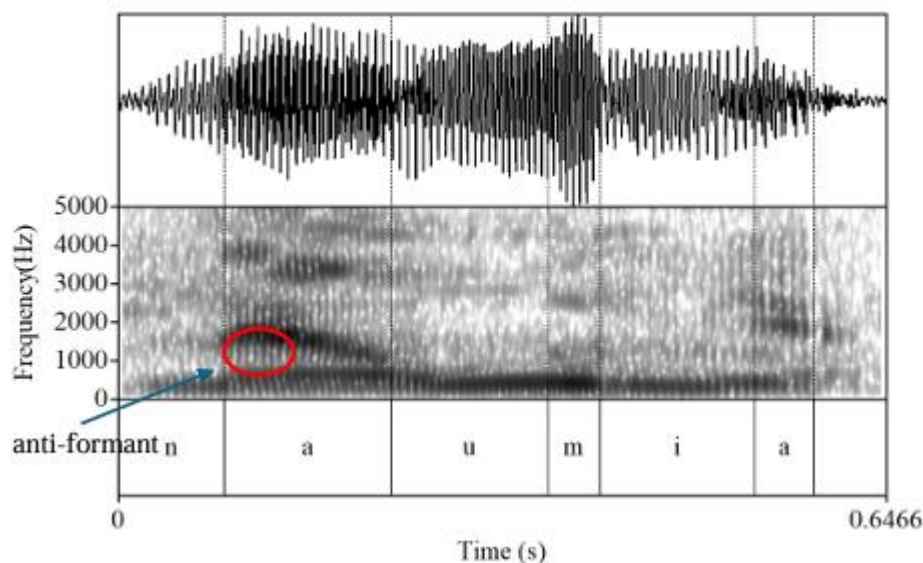
Figure 3 shows an analysis of spectrogram from 8th participant

This recorded voice from 8th participant was unable to pronounce the sound /ŋ/ accurately as it is pronounced by native Malay speakers. Spectral analysis using Praat software confirmed that the sound did not exhibit the full acoustic features typically associated with /ŋ/, including the "velar pinch" phenomenon which the convergence of the second F2 and third F3 formants. Instead, only the /n/ sound was present in the spectrogram, and the word was pronounced as /naum/ rather than the correct Malay pronunciation /ŋaum/, which means "the roar of a lion".

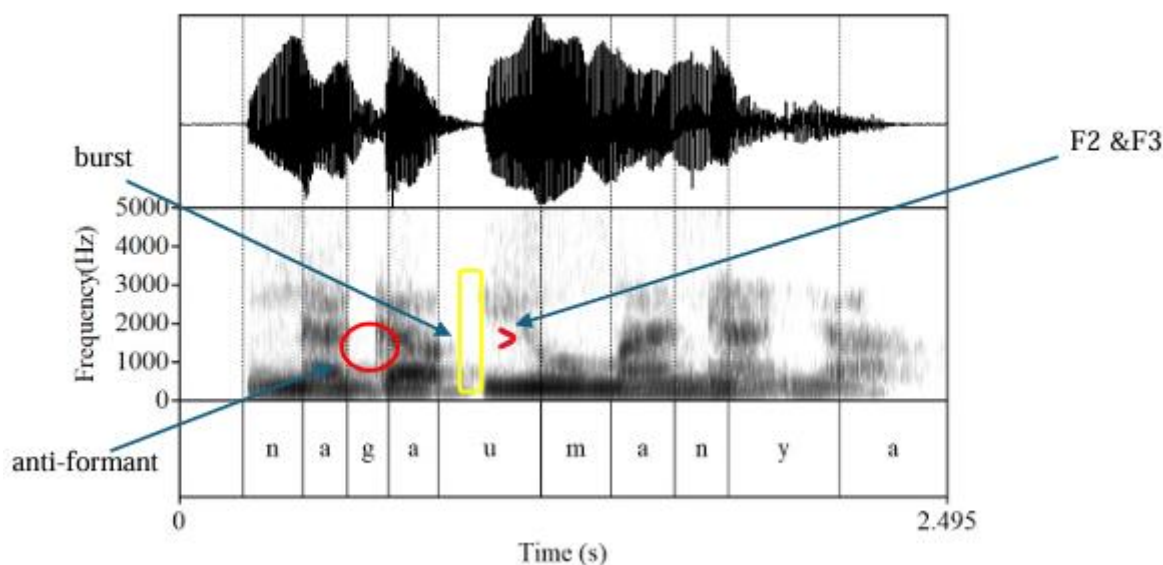**Figure 4 shows an analysis of spectrogram from 5th participant**

Figure 5 shows an analysis of spectrogram from 2nd participant

From the two previous analyses, the results exhibited a clear pattern of the convergence of the second F2 and third F3 formant frequencies commonly known as the "velar pinch" indicates that the sound originated from a velar place of articulation. However, this feature was not observed in the target sound. Instead, regions of spectral reduction appeared, which are characteristic of anti-formant effects typically associated with nasal sounds. Furthermore, the participants did not pronounce the target sound as a single unified phoneme; rather, they split it into two distinct sounds /n/ and /g/. This pronunciation pattern can be attributed to phonological fossilization, where Arabic speakers substitute the unfamiliar /ŋ/ sound with familiar phonemes from their native language, such as /n/ and /m/. As a result, they pronounce Malay words containing /ŋ/ in a way that approximates these Arabic sounds.

However, the researcher noted that 1st participant was able to approximate the correct pronunciation of /ŋ/ after multiple attempts. This suggests that although phonological fossilization initially hindered accurate production, improvement was possible with repeated effort. The spectrographic analysis of this participant's pronunciation is presented below:
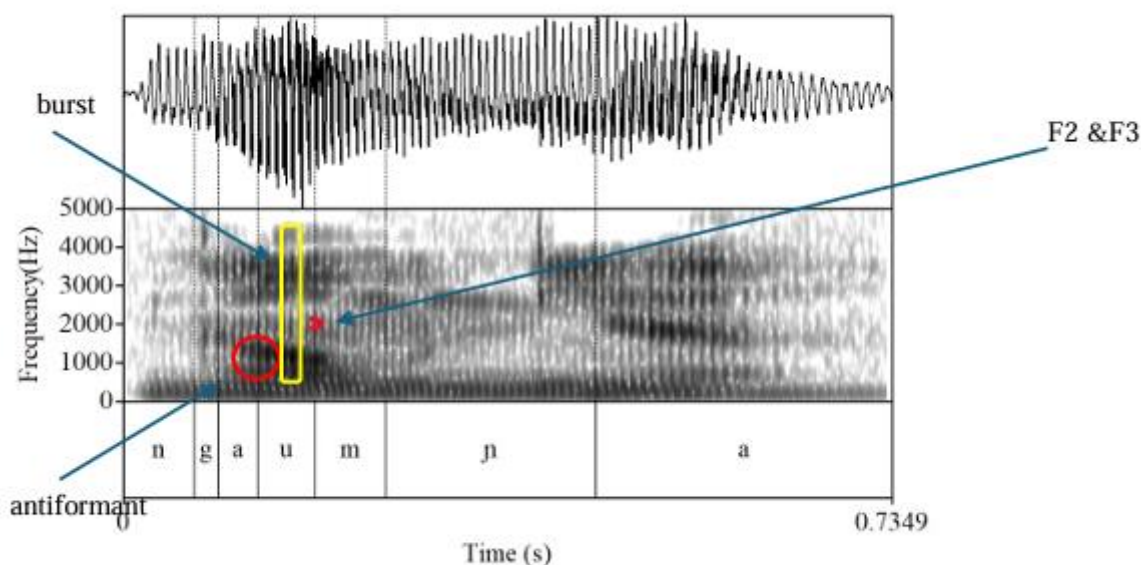

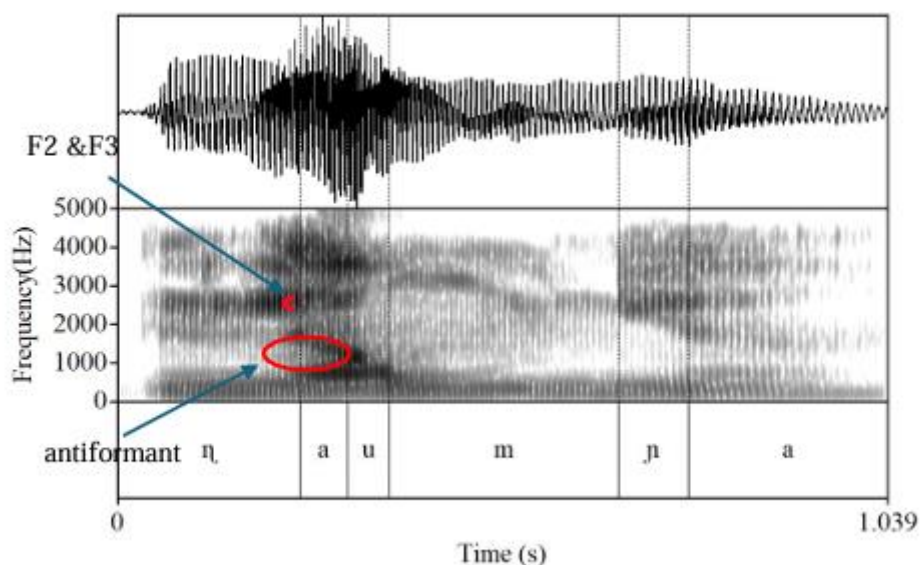**Figure 6 shows an analysis of spectrogram from 2nd participant**

Figure 7 shows an analysis of spectrogram from 2nd participant repetition

In the first analysis, the participant did not pronounce the /ŋ/ sound correctly, as a burst was observed during production. This was evident from the vertical striation in the spectrogram indicating that the sound was produced with an unintended plosive quality, despite originating from nasal articulation. However, after several attempts, the first participant eventually produced the /ŋ/ sound accurately without any burst as expected of a nasal sound. The phonological fossilization also observed in the other participants was reflected in their pronunciation of the /ŋ/ sound in the word singa, meaning "lion" as shown below:
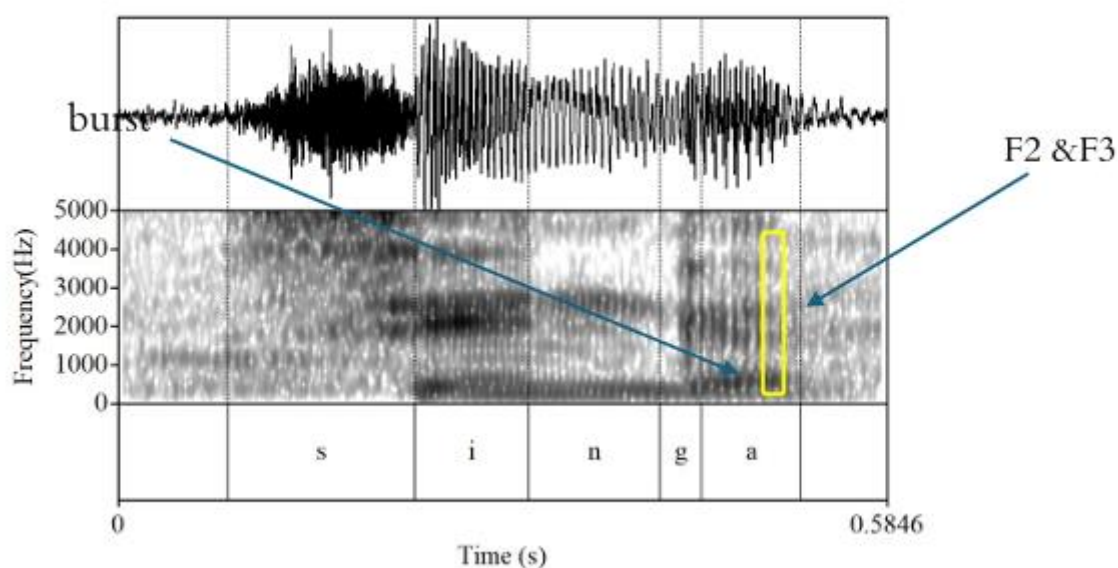

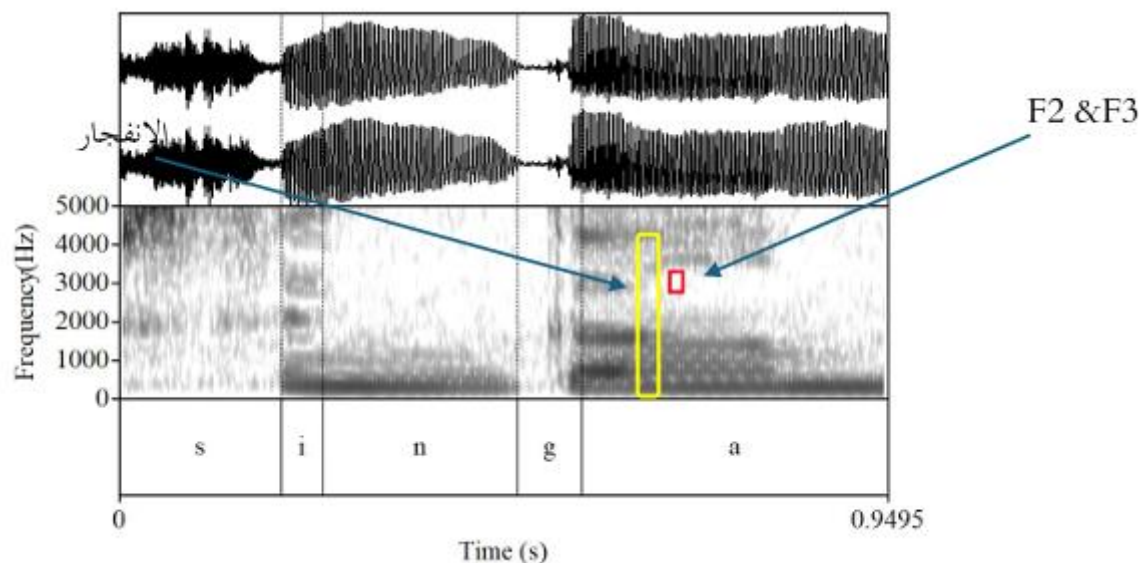**Figure 8 shows an analysis of spectrogram from 9th participant**

Figure 9 shows an analysis of spectrogram from 4th participant

The sound /ɲ/ is considered an exceptional nasal sound that articulated at the palatal (hard palate) place. Its articulation closely resembles vowel /i/ due to the similar tongue height involved in both sounds. This similarity often causes confusion in pronunciation, leading participants to pronounce /ɲ/ as a diphthong /nai/ instead. For example, the Malay word nyamuk (which means mosquito) was pronounced incorrectly as "naimuk" instead of the correct form /ɲamuk/ such as an example from Participant 2 as below:
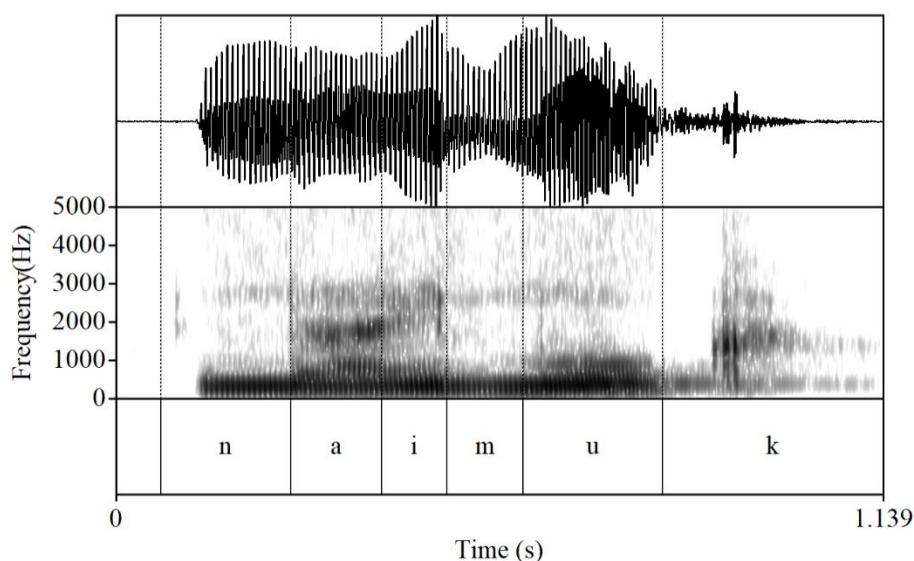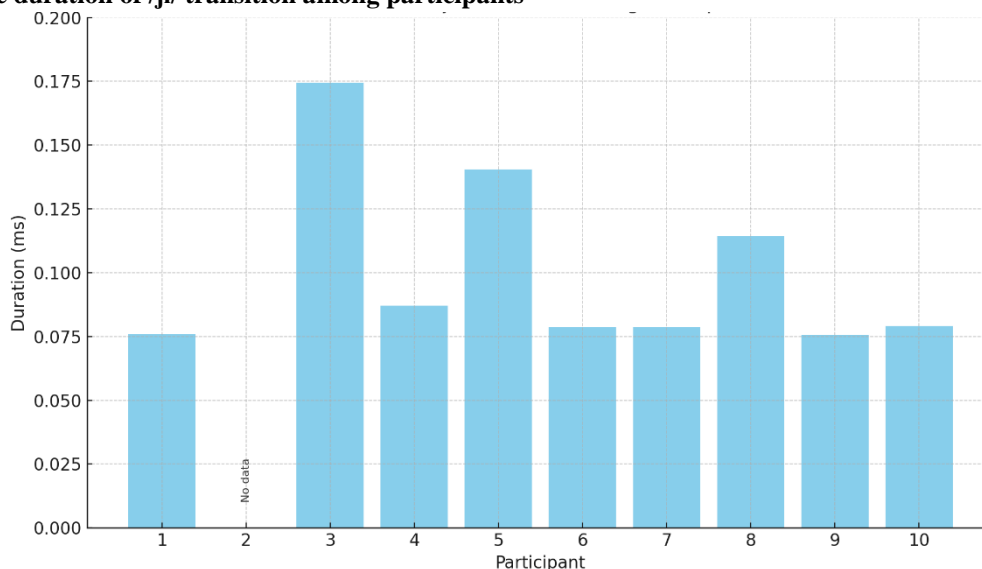

Figure 10 shows an analysis of spectrogram from 2nd participant

The phonological fossilization observed among participants occurred when they pronounced certain Malay sounds in a way that closely resembled their equivalent sounds in Arabic. Specifically, the alveopalatal sound /ɲ/ is comprised of an alveolar nasal segment and a "partial" glide element (Bongiovanni, 2019) that posited to be phonologically associated with the nasal segment and was pronounced similarly to the syllables /nia/, reflecting influence from Arabic phonology. The researcher attributes this to the duration required by some participants to produce a near correct pronunciation of this sound in Malay. This is particularly evident during the transition phase from the nasal to the following vowel /a/. The duration of this transitional segment highlights the articulatory pattern and can be presented as follows:

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Table 1 shows the duration of /ɲ/ transition among participants

Based on the findings above, the researcher observed that participants took a relatively long time to transition from the sound /ɲ/ to the following vowel /a/. This prolonged transition led to the production of the sound as /nia/, where an intrusive vowel /i/ appeared in the middle, replacing the intended /ɲ/. This indicates the presence of phonological fossilization among the Arabic-speaking participants in the study.

The fossilization was evident in the spectral analysis of the articulation point, where participants tended to articulate the sound from the alveolar region instead of the palatal region, resulting in the pronunciation shifting toward the sound /i/. This phonological interference was clearly reflected in the spectrogram through the appearance of the first and second formants (F1 and F2) that correspond to the vowel /i/.
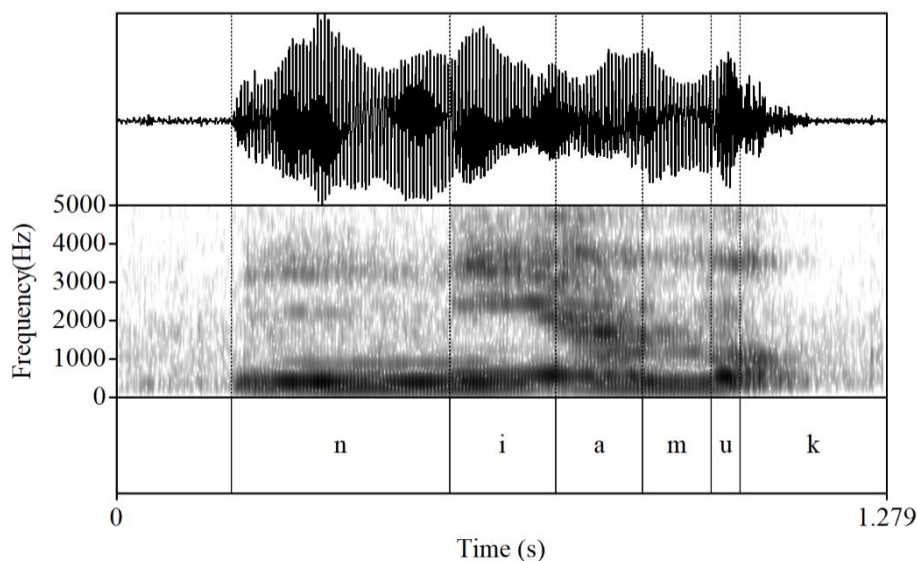

Figure 11 shows an analysis of spectrogram from 5ᵗʰ participant

CONCLUSION

This study underscores the pronounced challenges due to language fossilization faced by Arab native speakers in acquiring Malay sounds which are the nasal velar sound /ŋ/ and nasal alveopalatal sounds /ɲ/ that does not present in Arabic inventory. The frequent substitution of /ŋ/ with familiar native sounds such as /n/ and /g/ as evidenced by both perceptual assessments and acoustic analyses using the Praat demonstrates a clear pattern of phonological fossilization. Notably, key acoustic features of /ŋ/, including the absence of a burst and the characteristic velar pinch, were often missing in learners' productions.

However, the research also reveals that this fossilization is not insurmountable. While most participants struggled to produce /ŋ/ correctly. This is likely because the sound is represented by the word's ng in pronouncing /ŋ/, which may lead participants to pronounce it as two distinct sounds. Despite their persistent efforts to pronounce it correctly, they were unable to do so in the same way Malay native speakers do and luckily at least one participant showed measurable progress, ultimately achieving

a more accurate like native pronunciation after repetition practices. This finding suggests that, with sustained and targeted phonetic instruction, learners can gradually overcome persistent pronunciation errors even those rooted in the absence of the sound in their first language.

Eight of the participants took a long time to transition from pronouncing the sound /ɲ/ to the following sound. This is because they pronounced it as two separate sounds, /n/ and /i/, without noticing the distinction during articulation.

Based on the findings of this study, the researcher proposes a few recommendations that could help to improve and develop in future research. First, it is important to raise awareness among speakers about the significance of the phonetic features at the target language and to guide them against applying the phonetic characteristics of their mother tongue, as this may cause the loss or overshadowing of the target language's features. Additionally, further studies should be conducted to explore effective methods for addressing linguistic and phonological fossilization among speakers. Similar research should also be carried out on a wider scale to enhance awareness of phonological fossilization among Arabic native speakers. Finally, future researchers are encouraged to use both older and more advanced sound recording equipment to minimize any variables that could affect the accuracy of the research outcomes.

In conclusion, these results highlight the critical need for explicit attention to phonological fossilization in Malay language instruction for Arabic speakers. By incorporating specialized training for problematic sounds like /ŋ/ and /ɲ/ , educators can better support learners in achieving more authentic pronunciation and greater overall language proficiency.

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