

Identifying Pronunciation Errors of the Phoneme Qaf in Al-Qur'an reading by Non-Native Speakers: A Spectrographic Analysis

Mengenal Kesalahan Pengucapan Fonem Qaf dalam Bacaan Al-Qur'an oleh Penutur Non-Arab: Analisis Spektografi

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Abstract

The accuracy of pronouncing Hijazi letters is crucial for reading the Qur'an effectively. Incorrect pronunciation not only disrupts the flow of reading but can also change the meaning of words and verses, thus deviating from the intended message. This study aims to identify and analyze the mispronunciation of the [q] phoneme by non-Arabic speakers using spectrography analysis. Spectrography analysis helps visualize the frequency, duration, and intensity of the sound produced when participants pronounce the [q] phoneme. The research utilized Praat Voice Analysis software version 6.3.17 to process voice recordings and identify differences in the pronunciation of the [q] phoneme. The research employed a comparative descriptive qualitative approach with a content analysis design. Data collection involved various techniques, including recording, listening, and transcription. Voice recordings of two 12-year-old participants and an Arabic native speaker were collected to compare the pronunciation of Surah Al-Falaq verses 1-3. The results indicated that common errors in this study included sound changes and the omission of the characteristic [q] phoneme. For instance, students often replaced the [q] phoneme with [k] due to the similarity in the articulation location of these two phonemes. Additionally, participants tended to read too quickly, not allowing sufficient time for accurate pronunciation. The study also revealed a significant difference in the articulation of Hijazi letters between male and female speaker. female speaker demonstrated more consistent pronunciation patterns, while male speaker may require further intervention to address articulation and phonological errors.

Key words: *Phoneme Errors; Qaf; Spectrogram; Voiced*

Abstrak

Keakuratan pengucapan huruf-huruf Hijazi sangat penting untuk membaca Al-Qur'an secara efektif. Pelafalan yang salah tidak hanya mengganggu alur bacaan tetapi juga dapat mengubah makna kata dan ayat, sehingga menyimpang dari pesan yang dimaksud. Penelitian ini bertujuan mengidentifikasi dan menganalisis kesalahan pengucapan fonem [q] oleh penutur non-Arab dengan menggunakan analisis spektrografi. Analisis spektrografi membantu memvisualisasikan frekuensi, durasi, dan intensitas suara yang dihasilkan ketika partisipan mengucapkan fonem [q]. Penelitian ini menggunakan perangkat lunak Praat Voice Analysis versi 6.3.17 untuk memproses rekaman suara dan mengidentifikasi perbedaan pengucapan fonem [q]. Penelitian ini menggunakan pendekatan kualitatif deskriptif komparatif dengan desain analisis isi. Pengumpulan data menggunakan berbagai teknik, termasuk perekaman, penyimakan, dan transkripsi. Rekaman suara dari dua partisipan berusia 12 tahun dan seorang penutur asli bahasa Arab dikumpulkan untuk membandingkan pengucapan Surat Al-Falaq ayat 1-3. Hasilnya menunjukkan bahwa kesalahan umum dalam penelitian ini termasuk perubahan suara dan penghilangan fonem [q] yang khas. Misalnya, siswa sering mengganti fonem [q] dengan [k] karena kesamaan lokasi artikulasi kedua fonem tersebut. Selain itu, para peserta cenderung membaca terlalu cepat, sehingga tidak memberikan waktu yang cukup untuk pengucapan yang akurat. Penelitian ini juga mengungkapkan perbedaan yang signifikan dalam artikulasi huruf Hijazi antara penutur laki-laki dan perempuan. Penutur perempuan menunjukkan pola pengucapan yang lebih konsisten, sementara penutur laki-laki mungkin memerlukan intervensi lebih lanjut untuk mengatasi kesalahan artikulasi dan fonologi.

Kata kunci: *Kesalahan Fonem; Qaf; Spektogram; Bersuara*

INTRODUCTION

For Muslims, studying the Qur'an is an obligation that must be done, including understanding how to read the Qur'an correctly in accordance with the pronunciation rules taught in Islam (Syaifullah et al. 2022). A proper understanding of how to read the Qur'an can be started from an early age, given that the Qur'an is a holy book that is considered noble as a guide and foundation for people who believe in Allah (Maharani and Izzati 2020). Learning Hijaiyah letters from an early age will provide a strong foundation for children to learn the Qur'an (Afrianingsih, Putri, and Munir 2019).

Recognizing hijaiyah letters well is necessary to achieve correct understanding in reading the Qur'an (Palufi and Syahid, 2020). However, one of the challenges in reading the Qur'an is errors in the pronunciation of hijaiyah letters. Errors in the pronunciation of hijaiyah letter sounds are a possible part of the learning process. This type of error can arise in various aspects, such as in writing, pronunciation, and hearing (Dila 2023). (Amrulloh and Hasanah 2019) explained that pronunciation errors occurred in reading Arabic texts by Madrasah Tsanawiyah students in South Lampung. Sound errors that often occur include incorrect pronunciation of letters due to articulation factors and aspects of the way of articulation. (Wulandari 2020) mentioned that common phonological errors include errors in the pronunciation of similar letters. In addition, errors are also found in the form of words and phrases which are divided into substitutions, additions, and omissions.

In line with the previous explanation, that the text reading errors that occur at MAN 1 Buton are classified based on makharijul letters, namely from *al-jauf* (oral cavity), *al-halq* (throat), *al-lisan* (tongue), *ashshfatayn* (lips), and *al-khaisyum* (bridge of the nose). The factors causing these phonological errors are divided into two: intralingual errors, which occur due to oversimplification in pronouncing the hijaiyah letters, and interlingual errors, which are caused by the influence of students' first language (Rahmatia, Darwis, and Lukman 2021). This finding is supported by research conducted by Amrullah et al., (2022) that there are still errors in the pronunciation of *hijaiyah* letters made by some students at PPAS Hidayatullah Ponorogo, the pronunciation of *makharijul* letters by informants is not perfect, namely with errors especially in the form of inaccurate *makharijul* letters in their reading. Another more specific study showed the existence of phonological interference in the pronunciation of the phoneme [q] by Sundanese and Javanese speakers compared to Arabic speakers. This shows that Sundanese and Javanese students tend to pronounce the phoneme [q] differently when reading the Qur'an compared to native Arabic speakers (Fitria and Al Farisi 2023).

Mastery of *makharijul* letters is the key to pronouncing hijaiyah letters correctly in Arabic; this shows that each pronunciation of hijaiyah letters has a different point of articulation (Musthofa, Nasiruddin, and Rojudin 2024). By understanding and mastering *makharijul* letters, a learner can avoid mistakes in pronunciation because the slightest difference can change the meaning to be conveyed (Lathifah, Syihabuddin, and Al Farisi 2017). The accuracy of the pronunciation of hijaiyah letters becomes very important in the context of reading religious texts such as the Qur'an, where each word has a deep meaning and high spiritual value (Fikri, Prihandoyo, and Misbah 2024). Accuracy of pronunciation not only maintains the sanctity of the recitation but also opens the door to a broader understanding of the meaning of the verses, so it is important to pay close attention when reading the Qur'an.

A search using Publish or Perish software yielded 342 articles relevant to the keywords phoneme, uvular, phonology, voiceless, and consonants within the last ten years (2014-2024).

Figure 1. Network Visualization of Arabic Phonology Maps

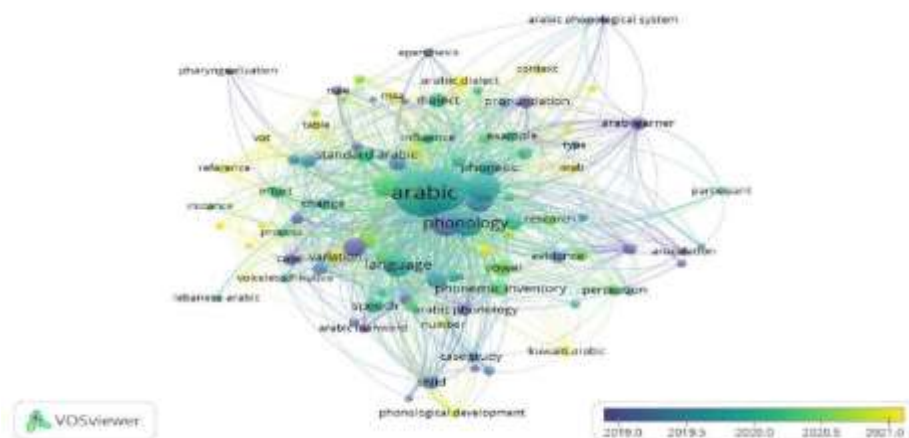


Figure 1 shows the relationship between keywords based on the frequency of cooccurrence in various studies. The main keywords that appear most often are Arabic and phonology, which is indicated by the larger circle size. In the research shown in Figure 1, there are no studies that specifically discuss the *makhraj* of hijaiyah letters, especially the phoneme [q]. So, this topic is interesting to research further because it can examine how the *makhraj* of phoneme [q] affects its pronunciation and meaning.

Lack of understanding of the place of articulation is often an obstacle in the pronunciation of the phoneme [q]. As such, the pronunciation of the phoneme [q] is often pronounced incorrectly by non-Arabic speakers (Rizky, Wahab, and Beddu Malla 2022). For example, the word كَان (to be) turns into قَان (to flatten), the word قَلَق (dawn time) turns into قَلْكَ (orbit), the word قُبَّة (dome) turns into كُبَّة (group of horses) (Asih, Miftahuddin, and Elmubarok 2020). Inaccuracies in pronunciation not only change the literal meaning but also lead to misinterpretation and misunderstanding of the text being read. Although differences in pronunciation seem minor, they can change the connotation of a word or sentence. In Arabic language learning, especially for non-Arabic speakers are often faced with the challenge of pronouncing the phoneme [q]. A learning approach that incorporates visual aids such as spectrograms and voice recordings can be an effective solution. By seeing and hearing the difference between correct and incorrect pronunciation, learners can gradually correct their mistakes and achieve a better level of fluency. Thus, increased awareness of the place of articulation and the use of technological aids can significantly reduce the mispronunciation of the phoneme [q] and improve accuracy in Arabic language learning so that the message and meaning contained in the religious text can be conveyed correctly and understood well by readers and listeners.

METHODS

The approach used by this research is a comparative descriptive qualitative method with a content analysis design. The data collection method was carried out using several techniques, namely recording, listening, and note-taking (Manshur and Zaidatul 2021). The recording technique was carried out using a Sony ICD-PX240 recorder. Through listening techniques, researchers observed pronunciation when students read the Qur'an by paying attention to aspects of pronunciation, intonation, and errors that occurred. The recording technique was used to record the writing of transliteration letters in accordance with the IPA (International Phonetic Alphabet) of Surah Al-Falaq.

This study involved two 12-year-old elementary school students, each male and female, and one native speaker (NS), namely the reciter 'Usman Al-Haddad' as a comparison in terms of the ability to read the phoneme [q]. The selection of participant characteristics is based on the fact that the age of 12 is an important period in psychological development and learning process. At this age, the cells in the child's body grow and develop very rapidly, including the brain which experiences extraordinary development, as well as significant physical growth (Rahmi 2021).

Furthermore, this study was conducted to identify the differences in the ability to read phonemes [q] between male participants (P-1) and female participants (P-2). The data analyzed were taken from surah Al-Falaq verses 1-3, with particular emphasis on phoneme pronunciation [q].

Table 1. Category of Makharijul Letters by Position and Harakat in Surah Al-Falaq

Surah/verse	Analyzed words	Phoneme position [q]	Vocal
Al-Falaq/1	قُلْ	Initial	[u]
Al-Falaq/3	وَقَبْ	Middle	[a]
Al-Falaq/3	غَاسِقِ	End	[i]

The results of data collection were then analyzed regarding Arabic phonological errors using Praat Voice Analysis software version 6.3.17. This software helps the researcher to see the spectrogram generated from the voice recording. With the spectrogram, researchers can observe the details of frequency, duration, and intensity of the sound, as well as distinguish between vowel and consonant sounds (Embong, Yasin, and Azmi 2023). The first step in using the praat application is to record the audio and transfer it to a recorder program on a laptop that has a sound analyzer (Wirdyanthi 2022). To download audio files from other sources into Praat, file types other than those listed on the

website must be converted to WAV or MP3 format using a converter (Osatananda and Thinchana 2021).

Next, parts of each word or sentence that appear as waveforms should be clipped for analysis. Once the waveforms of the words are found using the constraints in Praat, the pitch and formant values can be accurately analyzed. Users can also directly use sound data in wav format in this program without the need to extract or convert files. The fundamental frequencies of vowel and consonant sounds can be identified automatically using Praat by blocking certain parts of the sound spectrum to determine their frequencies (Ridwan and Amanah 2019). Duration is the time taken to realize a segment and is measured in milliseconds (Malayu and Muliadi 2020). In speech signals, the intensity of speech is indicated by the size of the amplitude of the sound wave (Malayu and Muliadi 2020). The larger the amplitude, the higher the intensity of the sound.

FINDING AND DISCUSSION

Pronunciation errors often lead to inaccurate pronunciation, which can change the meaning of the reading (Mulizar and Awaluddin 2022). One of the phonological errors found is in the form of a mismatch of *makharijul* letters and the inability to distinguish *hijaiah* letters, resulting in the replacement of one letter with another letter (Wulandari 2020). The similarity in the location of articulation between phonemes [q] and [k] causes non-Arabic speakers to often replace phoneme [q] with phoneme [k]. Non-Arabic speakers find it easier to pronounce phoneme [k]; the similarity of pronunciation is also caused by the location of the articulation of the two letters that are close together. Because the pronunciation of phoneme [k] is lighter than phoneme [q] (Amrulloh and Hasanah 2019).

In the discussion, we will analyze the participant's sound spectrogram in the form of visualization to identify the participant's mispronunciation of phoneme [q] and compare it with the correct pronunciation model. By using spectrograms, we can see a visual representation of the spoken sound, which will help us understand how pronunciation errors occur and how they affect the meaning of the reading. The use of spectrograms to analyze and compare the pronunciation between P-1 and P-2 with NS. The observation results will be presented in the form of spectrograms to visualize the differences in pronunciation as well as the most common types of errors.

Pronunciation of Phoneme ق [q] by 12-Year-Old Children

The phoneme [q] is a voiceless uvular consonant (Firdaus 2022). The pronunciation involves the tip of the tongue touching the soft palate and pharynx. Air from the lungs is blocked at the point of pronunciation. Then, the tip of the tongue is released from the point of touch so that the air comes out, followed by open and non-vibrating vocal cords (Amalia and Asbarin 2022). The phoneme [q] has five distinctive properties (Hidayat 2022). First, the obstructed nature, where the breath is held in the mouth. Second, the nature of restraint, with a restrained and robust sound. Third is the raised nature, where the base of the tongue is raised to the palate so that the sound is thick. Fourth, the open nature, there is an open space between the tongue and the upper palate. Fifth, the cautious nature requires careful pronunciation and needs to be more fluent. Finally, *kalkalah*, where the sound bounces or vibrates when the phoneme [q] is dead or stopped (*sukun*), producing a clear and resonant sound (Haris et al. 2019)

Based on the division of sound wave types, phoneme [q] can be classified as a pop consonant because of its nature, which produces a pop sound when pronounced. In the sound wave category, the phoneme [q] belongs to the transient sound wave. Transient sound waves are known for their concise duration, making them challenging to identify regularly (Sholihin 2020).

Figure 2.
Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [u] in the Word قُل [qul] by NS

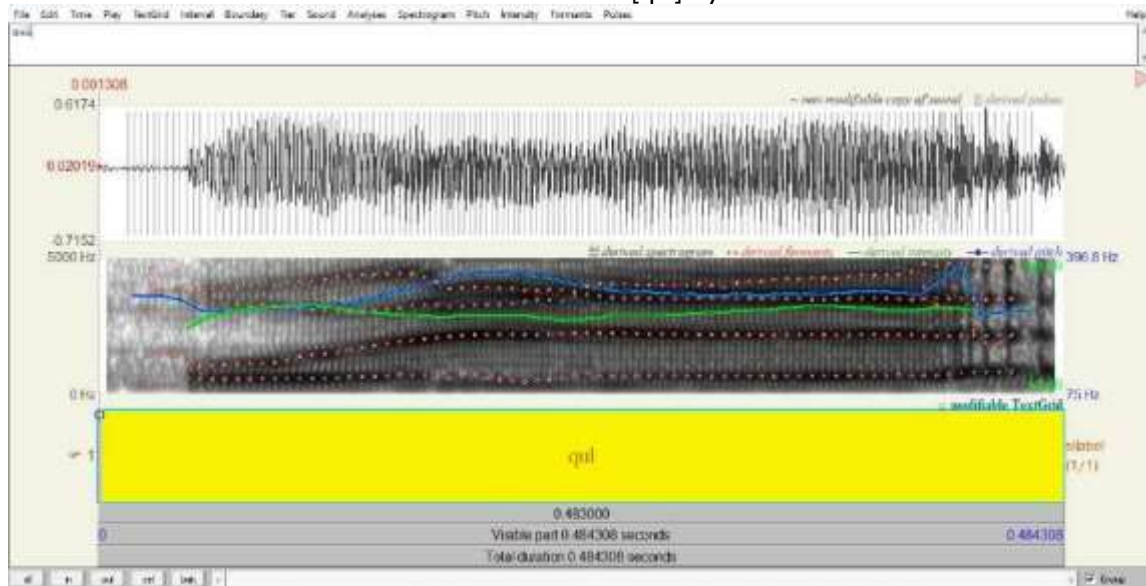


Figure 2 shows that NS pronounces the Phoneme [q] with a thick sound when followed by the Vowel [u]. The Phoneme [q] sound should be pronounced thick when followed by the Vowel [u] (Marlina 2019). NS's pronunciation of the Phoneme [q] sounds heavier and more robust than the pronunciation of the Phoneme [q] followed by other vowels. NS's pronunciation became a reference for respondents when pronouncing the Phoneme [q], showing the importance of observing phonetic models in learning and maintaining proper pronunciation.

Figure 3.
Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [u] in the Word [qul] by P-1

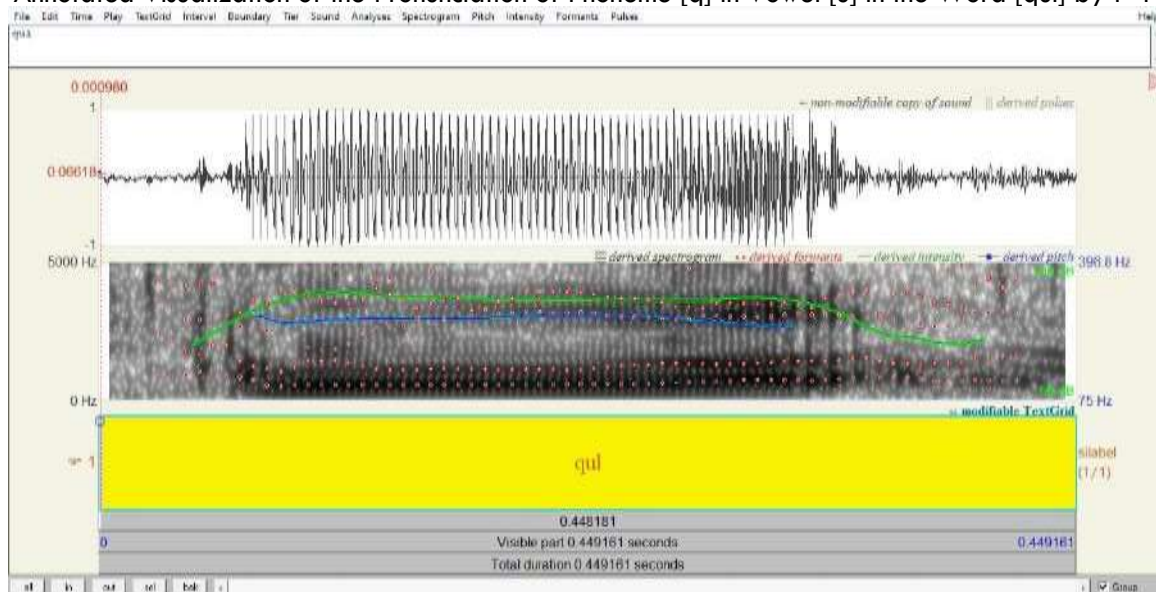


Figure 3 shows that the different pronunciation of Phoneme [q] by P-1 produces thinner and more tenuous waves. This indicates that P-1 pronounced the Phoneme [q] with less stress and resonance. Rushed pronunciation and lack of control over the point of articulation result in a sound that is not in accordance with the correct way of reading the Qur'an. The Word [qul] belongs to *kalkalah*; the pronunciation is extended with a slight vibration at the time of waqaf or stop (Marlina 2019). Pronunciation replacement errors occur due to the close articulation of letters, resulting in similar but different sounds (Amatullah and Aziza 2020). As a result, this error can cause changes in word meaning. An example is the Phoneme [k] and [q], which have different places of articulation; the letter ق [k] is in the velar, while [q] is in the uvular. Both involve the soft palate and the back of the tongue, but the starting point is different. The Phoneme [q] is pronounced more deeply, with the base of the

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tongue near the throat brought closer to the back palate, while [k], the way it is pronounced, the base of the tongue is more forward, attached to the mid-palate of the mouth, producing a lighter sound (Firdaus 2022).

Figure 4.

Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [u] in the Word [qu] by P-2

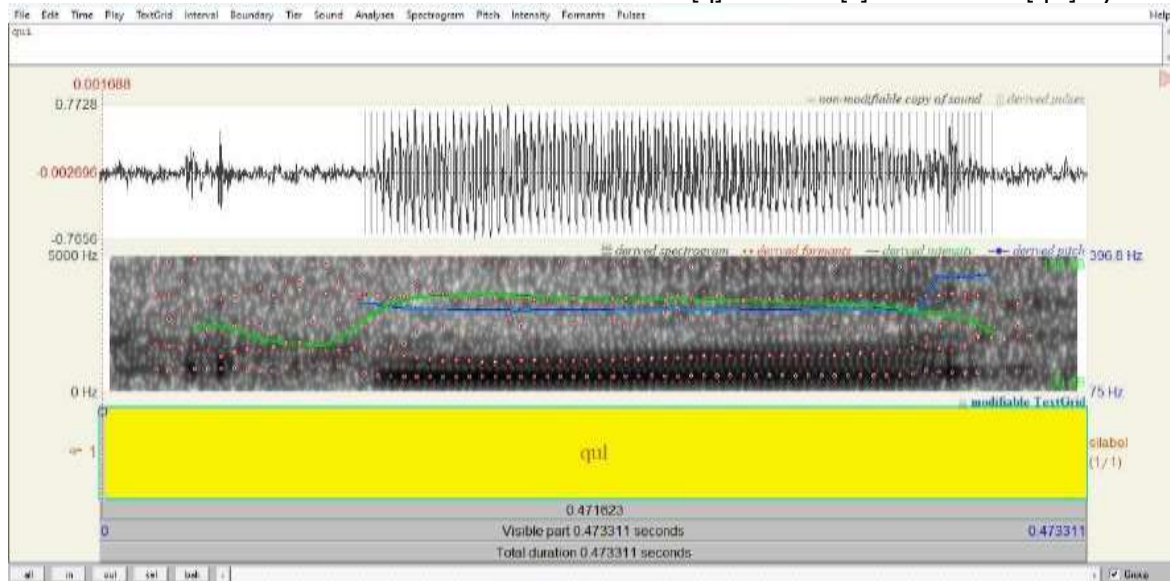


Figure 4 shows that P-2 produces spectrogram waves that look similar to P-1's pronunciation of the Phoneme [q]. However, the spectrogram waves show similarities in amplitude and frequency density with P-1. However, when P-2 pronounces [qu], there is an additional vowel [e] at the end of the Word, which can change the meaning (Wulandari 2020). If pronounced using the phoneme [k], the Word [qu] "say" can change to [ku] "eat". Both the phoneme [q] and the phoneme [k] are the same in terms of the release of letters on the tongue (Mahdali 2020).

Figure 5.

Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [a] in the Word وَقَب [wa-qa-ba] by NS

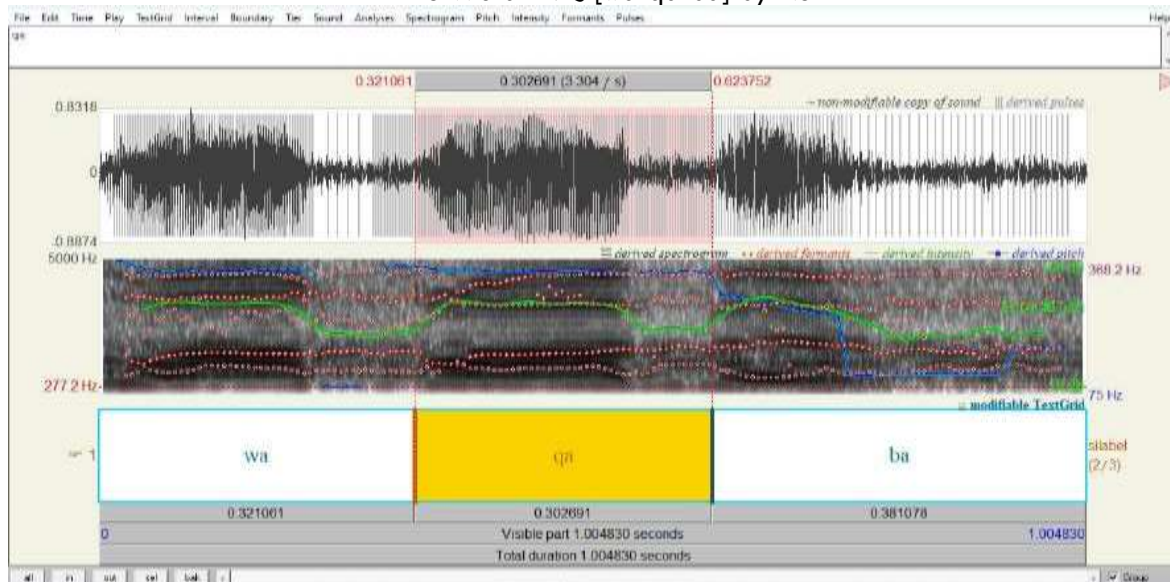


Figure 5 shows a dense and regular wave line indicating a burst of sound when saying the Word [wa-qa-ba]. The blacker the spectrum area in a speech, the greater the sound energy produced (Irawan 2017). When air from the lungs is retained by the speech organ firmly and thoroughly, a popping sound is produced (Marlina 2019). Thus, this is evidence that P-1 and P-2 pronounce sounds that are not correct and do not match the pronunciation made by NS. The sound waves that look denser also indicate that the pronunciation of P-1 and P-2 is significantly different from NS.

Figure 6.
Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [a]
in the Word وَقَب [wa-qa-ba] by P-1

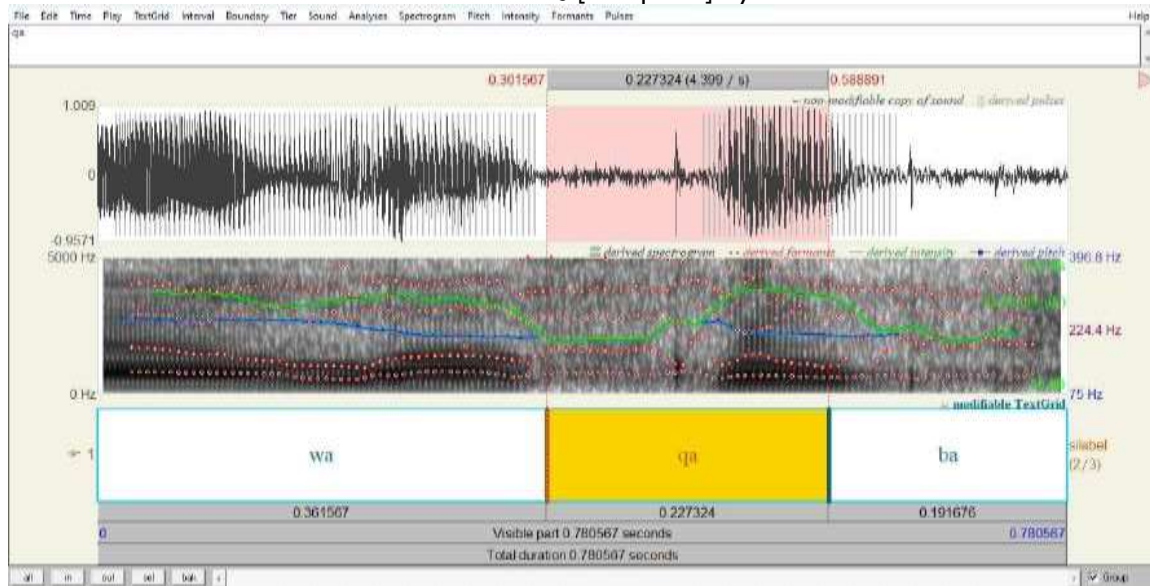


Figure 6 shows that P-1 produces a spectrogram wave that looks thin at the beginning and solid at the end. This starkly contrasts NS's pronunciation, which produces long, dense waves. The denser wave at the end indicates that P-1 might emphasize the end of the pronunciation more strongly. When the Phoneme [q] is in the middle of a word and the Vowel [u], the pronunciation should still maintain the thickness of the sound (Marlina 2019).

Figure 7.
Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [a]
in the Word وَقَب [wa-qa-ba] by P-2

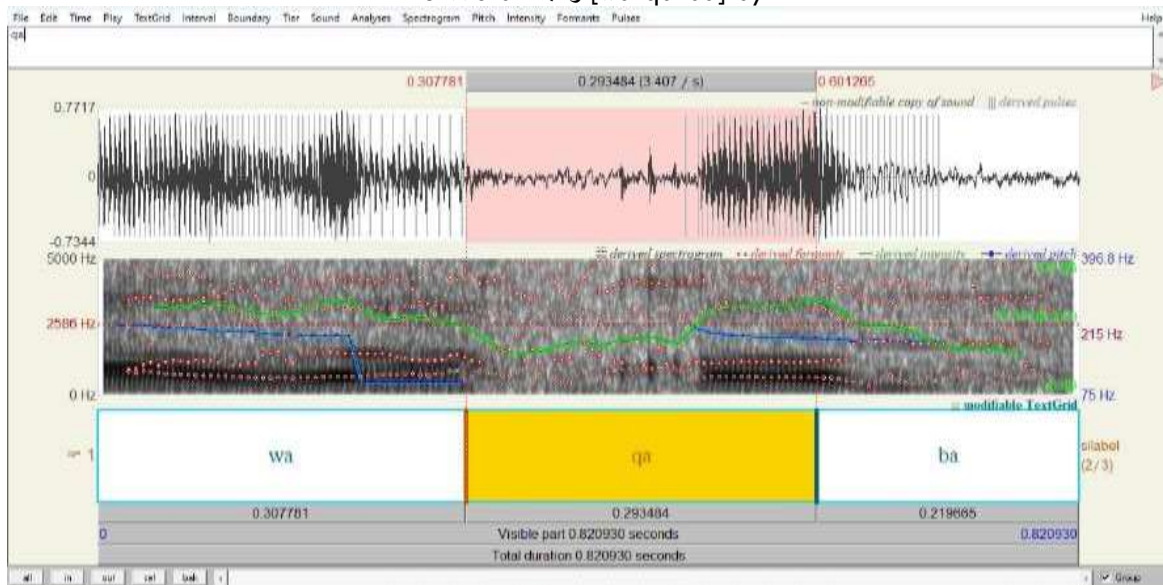


Figure 7 shows that P-2 produces spectrogram waves that look almost similar to the pronunciation of Phoneme [q] pronounced by P-1. A distance between the sound waves when pronouncing [wa-qa-ba] indicates a pause or uneven pronunciation, in contrast to the solid and consistent waves produced by NS. The Phoneme [q] is one of the letters that have the nature of talk him, which is read in bold (Kustiani, Uwes, and Tabroni 2021). So when pronouncing it, there is a distinctive thickening of the sound on the vocal cords, and it makes the Phoneme [q] have different sound characteristics compared to other phonemes that do not have tafkhim properties. The mispronunciation of P-1 and P-2 does not result in a shift in meaning, only that the Word becomes meaningless.

Figure 8.
Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [i]
in the Word غاس ق [ʔa:-si-qin] by NS

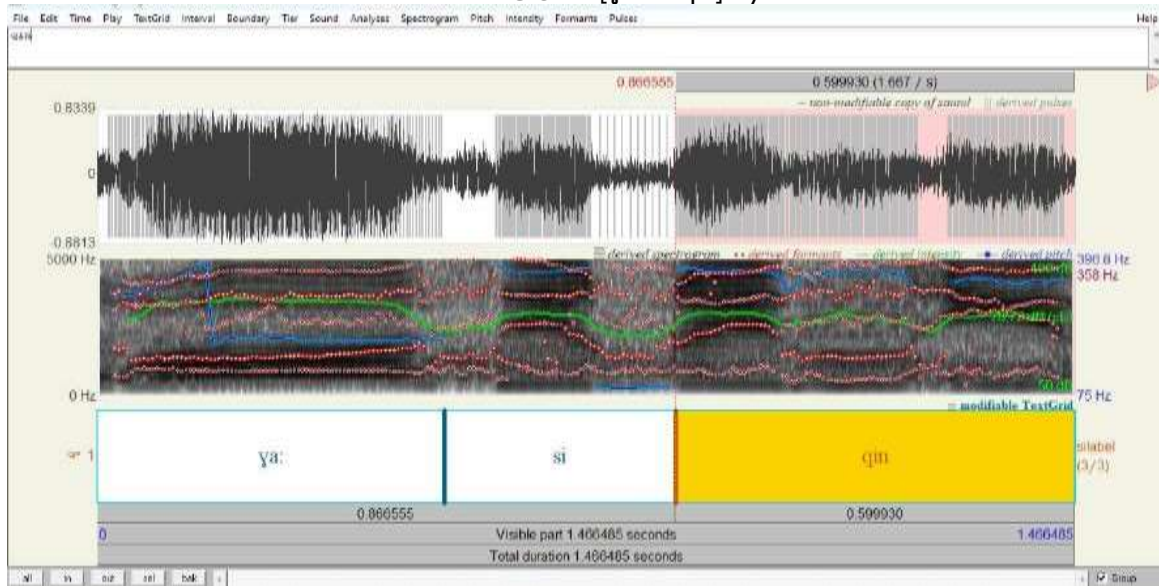


Figure 8 shows thick and tight sound waves, reflecting sufficient pressure, resonance, and clear consistency. It shows the voiced and syiddah of the phoneme [q]. The pronunciation by native speakers also shows the isti'la, the infitah, the ishmat, and the kalkalah (sound reflection) (Haris, Aziz, and Ritonga 2019).

Figure 9.
Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [i]
in the Word غاس ق [ʔa:-si-qin] by P-1

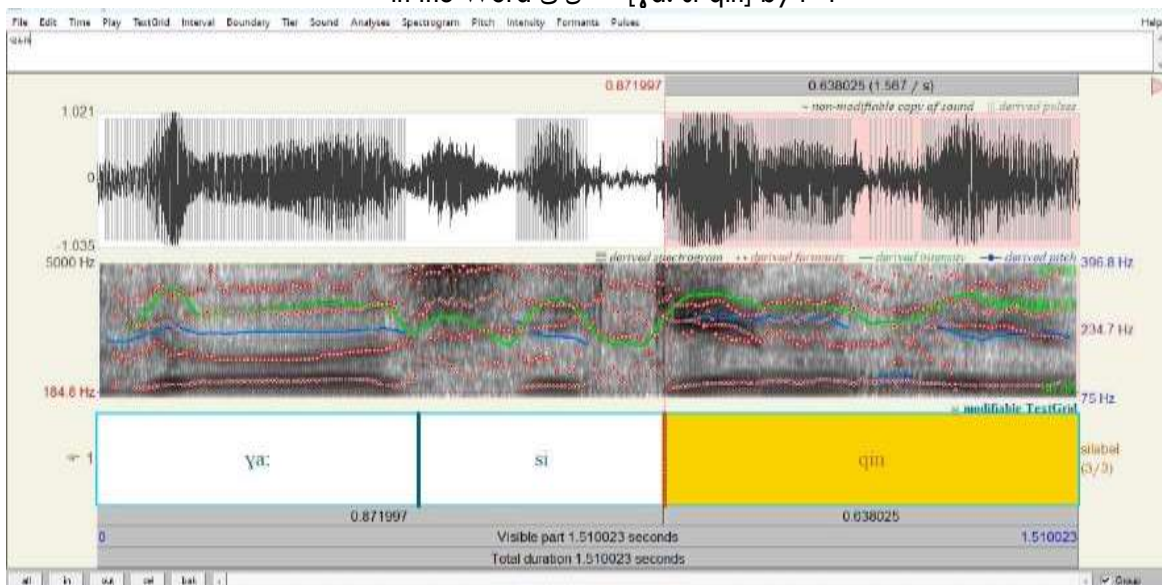


Figure 9 produces a dense sound at the beginning and end, indicating that P1 pronounces the Phoneme [q] with less pressure and resonance, resulting in less accurate pronunciation. The pronunciation by P-1 does not fully reflect the properties voiced, syiddah, with less emphasis on the nature of isti'la, infitah, ishmat, and the kalkalah. The pronunciation of the Phoneme [q] on the Vowel [i] is read thin when it is long or short, so the pop is pronounced thinly (Marlina 2019).

Figure 10.
Annotated Visualization of the Pronunciation of Phoneme [q] in Vowel [i]
in the Word غَاسِقَ [Ya:-si-qin] by P-2

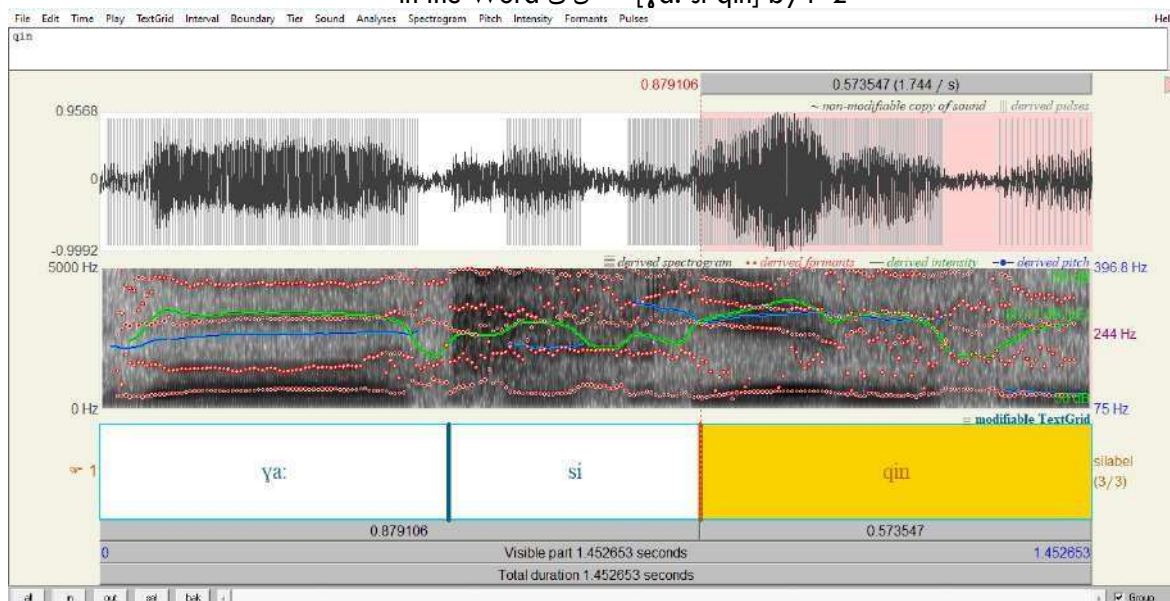


Figure 10 shows that the sound produced is slightly similar to the pronunciation by P-1, but at the end of the wave, the sound produced by P-2 does not appear as dense. The pronunciation by P-2 reflects some of the properties of voiced, syiddah, and isti'la. The Phoneme [q] at the end of the Word followed by the Vowel [i] requires consistent firmness and clarity to ensure that the resulting sound not only sounds clear but also retains the proper sound characteristics (Hidayat 2022). The mispronunciation of P-1 and P-2 does not result in a shift in meaning, only that the Word becomes meaningless.

This study shows that there are differences in the pronunciation patterns of *hijaiah* letters between male and female speaker. Female speaker tends to have more regular and slower pronunciation, closer to the rules of correct Qur'anic reading. This finding is consistent with previous research, which indicates that pronunciation errors in children, especially at the Madrasah Tsanawiyah level, are often caused by articulation and phonological factors. This suggests that there is a need for special attention to the development of articulation skills, especially in male speaker. In addition, the influence of gender was also evident in this study. Female speaker generally show higher motivation and dedication in learning the Qur'an, so they master the recitation more quickly (Panjaitan 2023). A study conducted (Fitria and Al Farisi 2023) found phonological interference in the pronunciation of phonemes [q] by Sundanese and Javanese speakers compared to Arabic speakers. Although the equivalent of the phoneme [q] exists in the participants' mother tongue, their pronunciation remains different when reading the Qur'an. This study shows that pronunciation errors are not only caused by gender factors but also influenced by mother tongue background and phonetic habits.

CONCLUSION

Based on the analysis, it was found that Participant 1 (P-1) and Participant 2 (P-2) had difficulty pronouncing the phoneme [q] correctly. Their pronunciation differs significantly from that of the native speaker (NS). Frequent errors include sound changes and loss of the characteristic features of phoneme [q], which deviates from the rules of correct Qur'anic reading and can change the meaning of words in the reading. The leading cause of errors is the lack of articulation control and proper stress when pronouncing the phoneme [q]. Both participants tend to read too fast and need to allow more time to form the sound correctly. As a result, the unique properties of phoneme [q], such as isti'la (elevation of the tongue) and ishmat (firmness of pronunciation), are lost. To correct these errors, participants need to practice reading slowly and pay attention to correct articulation techniques. By doing so, they can improve reading quality and maintain the original meaning of the Qur'anic text.

Educators should focus on teaching correct articulation techniques and emphasize the importance of slow, deliberate reading when learning Qur'anic recitation. Future research could investigate the effectiveness of specific teaching methods or interventions in improving the pronunciation of phoneme

[q] among non-Arabic speakers. Additionally, studies could explore the relationship between native language background and the acquisition of Arabic phonology in the context of Qur'anic recitation.

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