The Vowels of Qassimi Dialect

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Abstract

This paper describes the vowels of the Qassimi dialect and explores the characteristic features of those vowels. To achieve this goal, the researcher has compiled a list of Qassimi words. Each word represents a major allophone of each vowel phoneme. These words were then repeated by Qassimi female speakers from Buraidah and recorded by the researcher. The data was subjected to acoustic analysis, and the results were compared to the acoustic results of English vowels. The analysis showed many similarities in the characteristics of both Qassimi and English vowels. However, it also showed some significant differences that distinguish the vowel system of Qassimi from the English vowel system as well as other Saudi dialects. This study sheds light on those differences, however it is left to future studies to investigate further and possibly compare other aspects of these dialects. This study contributes to the theoretical description of Saudi dialects, an area that needs many more contributions. In addition, this paper could be a part of the contrastive studies of Arabic and English, second language acquisition studies, or various other applied studies.

Keywords: acoustic analysis, Qassimi dialect, vowels

1. Introduction

Much attention in linguistic research has been given to variation studies. It is known that variation occurs among languages as well as among dialects. It is also clear that variation could appear in different linguistic levels, like in the syntactic level, the morphological level, as well as in the phonological level. The main focus of this study will be on sounds, and more specifically, on the vowels of one dialect spoken in Saudi Arabia.

This is a descriptive study of the Qassimi dialect, but it does not cover all aspects of this dialect; nevertheless, this study presents a description of its vowels. The study is concerned with the major vowel allophones of the Qassimi dialect. It will also shed light on some major similarities and differences between the Qassimi dialect and other dialects and languages. This study explores areas of both phonology and phonetics. Regarding the former, it describes the Qassimi vowel system, and which sounds it contains, and regarding the latter, it addresses the acoustics of these sounds.

The present study is a phonological study of the dialect of Al-Qassim, an area located in north-central Saudi Arabia in the heart of the Arabian Peninsula. It is an attempt to provide a description of the vowel system of this regional dialect. Furthermore, part of this study will deal with the acoustics of these vowels as they will be measured by a spectrogram to evidence the vowels' characteristic features.

1.1 Significance of the Study

This study is important as it will contribute to the theoretical description of Saudi dialects, an area that needs more attention, and it is a contribution to the field of linguistics in general. In addition, this study could be a useful tool in developing other more focused studies. The importance of this study is also clear when we look at it as an attempt toward an atlas of the Saudi dialects or, more generally, an atlas of Arabic dialects.

The present study is motivated by the lack of studies on the dialects of Saudi Arabia. It draws attention to the need of more research that will reflect the relationship between standard Arabic and the local varieties of dialects spoken around the Arab world. It could provide great stimulation for others to pursue further research on different Saudi dialects. However, what distinguishes this paper from other work on vowels in general is the use of acoustic evidence in showing the major features of the chosen vowels.

Studies done on the vowels of peninsular Arabic indicated that there is great variation in the vowel system

among the different Arabic dialects. As a qualitative study, this study will only focus on the major allophones of the vowel phonemes and the characteristic features for each one. No attention will be given to how frequent these vowels are used.

1.2 Research Questions

The current research answers the following questions:

1) How is the Qassimi Vowel system different from the English vowel system?

2) How is the Qassimi vowel system different from other Saudi and Arabic dialects?

3) Are the Qassimi vowels found in this study phonemes or allophones?

2. Literature Review

There have been a number of studies describing the different aspects and dialects of Arabic in general. Of course, not all of these studies are directly related to the main objective of the current study, but as we know, vowels are an essential part of any study that aims to provide a proper description of a language or dialect. Therefore, this section will show how the Arabic vowel inventories have been described in different studies.

2.1 Modern Standard Arabic

Modern Standard Arabic (MSA) vowel inventory consists of six vowel phonemes: three "short" and three "long": / i:/, /i/, /u:/, /u/, /a:/ and /a/. The difference in length is in the time that the vowel is held and is not a difference in the vowel quality. Therefore, the long vowels are held approximately double the time of the short vowels (Ryding, 2005). These are the basic Arabic vowels; however, Alotaibi and Hussain (2010) have stated that they may vary across different dialects. For example, the Egyptian dialect is said to have extra vowels.

Heintz (2010) discussed the differences in phonology between MSA and Levantine Conversational Arabic (LCA) in both their vowel inventories and the use of some consonants. He stated that LCA exhibits a greater variety of short and long vowels, adding /e/ and /o/ to MSA's /a/, /i/ and /u/. He also clarified that LCA is a dialect that is mainly spoken and not written, and it has no standard alphabet. Therefore, those who want to write in the colloquial form often use the MSA script.

Alghamdi (1998) carried out a spectrographic analysis of Arabic vowels based on a cross-dialect study. He stated that (MSA) possesses only six vowels: /a/, /a:/, /i/, /i:/, /u/ and /u:/. He described Arabic as a quantitative language where the sound duration is phonemic. In addition, he investigated whether Arabic vowels are the same at the phonetic level when spoken by speakers of different Arabic dialects, namely Saudi, Sudanese and Egyptian dialects. The researcher found that the phonetic implementation of the standard Arabic vowel system differs according to dialects.

Watson (2002) investigated the phonology of Arabic. She described Classical Arabic as a language with a very rich consonantal system and a relatively impoverished vocalic system with three short vowel phonemes: two close vowels, /i/ and /u/, and one open vowel, /a/. Watson stated that the three long vowels: /i:/, /u:/ and /a:/ are an essential part of almost all modern dialects of Arabic.

2.2 Arabic Dialects Other than Saudi

Alameri (2009), in her study of the phonology of Emirati Arabic, stated that not all of the Arabic vowels have clear representation when it comes to the written form. Only long vowels are transcribed in Arabic orthography. On the other hand, short vowels cannot usually be seen in written forms as they are diacritics that are added to the words. She stated that the Emirati vowel system consists of eleven vowels: /i/, /i:/, /u/, /u:/, /a/, /a:/, /e/, /e:/, /o/, /o:/ and /ə/.

Al-aghbari (2001), in his study on Omani Arabic (OA), stated that in addition to the three fundamental vowels of Arabic (/a/, /u/ and /i/), Omani Arabic has long mid phonemic vowels, such as /e:/ and /o:/. Therefore, the phonemic vowel inventory of Omani Arabic consists of eight vowels, and the phonemic short vowels in OA contrast for length.

Al-Sughayer (1990) described Jordanian Arabic (JA) as similar to MSA in its vowel inventory. Jordanian Arabic has three long and three short vowels: /i/, /i:/, /a/, /a:/, /u/ and /u:/. In addition to the vowels of MSA, JA has two long mid vowels: /o:/ and /e:/. Vowel length is contrastive in JA, and long and short vowels share the same vowel quality and differ only in duration.

Abdul-Karim (1980) investigated the differences between Lebanese Arabic (LA) and other Arabic dialects. One of the major areas of difference is in the vowel inventory of these dialects. He stated that in the Lebanese dialect, the inventory of short vowels has three basic elements: /a/, /i/ and /u/. Among the long vowels, five elements

appear in the Lebanese speech: /a:/, /i:/, /u:/, /e:/ and /o:/.

Another study of Lebanese Arabic was done by Haddad (1984). He reduced the phonemic vowel inventory of LA into five vowels: /i/, /i:/, /a/, /a:/ and /u:/. He believes that /u/ is actually derived from /i/ by rule.

2.3 Saudi Dialects

One of the dialects spoken in Saudi Arabia is the Hijazi dialect, which is spoken in the west and southwest of Medina. It has three short vowels: /i/, /a/ and /u/. In addition, Al-mozainy (1981) provided different examples on the clear contrast in the relationship between the /i/ and the /u/.

Another Saudi dialect also spoken in the west of Saudi Arabia is the Makkan dialect. The Makkan vowel inventory includes five long vowels and three short vowels (/a:/, /i:/, /u:/, /e:/, /o:/, /a/, /i/ and /u/). The /e:/ and /o:/ do not have corresponding short vowels. In Makkan Arabic, there are many words that can be used as examples showing contrastive vowel length, such as: /ʔaktubi/ and /ʔaktubi:/, meaning "you (f.) write" and "you (f.) write it (m.)" respectively (Kabrah, 2004).

Al-shahrani (1988) described the Arabic spoken by the Shahran tribe in southwestern Saudi Arabia. This dialect consists of eight vowels: three short vowels, /i/, /a/ and /u/, and five long vowels, /u:/, /i:/, /e:/, /a:/ and /o:/.

Al-Feneekh (1983), Johnstone (1967) and Prochazka (1988; as cited in Al-Qadhi, 2008) each discussed the vowel inventory of Najdi Arabic. According to them, this form of Arabic consists of eight vowel phonemes, and these phonemes are presented in the following table:

Table 1. The vowel inventory of Najdi Arabic

	Front	Back
High	i: / i	u: / u
Mid	e:	o:
Low	a: / a	

Ingham (1994), in his book on Najdi Arabic, discussed different aspects of the inventory of the Najdi system. He stated that the Najdi vowel inventory consists of eight vowel phonemes. These vowels are /a/, /a:/, /u/, /u:/, /i/, /i:/, /e:/ and /o:/.

2.4 Studies on English Vowels

Peterson and Barney (1952) conduced a detailed investigation of American English vowels. They presented the acoustic measurements of fundamental frequency (F0) and the first three formant frequencies (F1−F3). In addition, they conducted an experiment where listeners were asked to identify words, so they tested both the production and the perception of vowels.

Through the classic study of American English vowels by Peterson and Barney (1952), we learn that most English vowels can be identified acoustically by the frequencies of their first two formants. A recent replication of the study by Peterson and Barney was a study by Hillenbrand, Getty, Clark and Weeler (1995). In their study, Hillenbrand et al. (1995) do not completely agree with the average values that Peterson and Barney found. This disagreement may be due to differences in measurement methods or because vowels have shifted slightly in the last 40 years, or perhaps other factors are involved.

The F1 and F2 values of the English vowels presented in both studies will be used in the current study to compare with the F1 and F2 values of the Qassimi vowels. Through this comparison, significant similarities and differences between the Qassimi and English vowels will be highlighted.

3. Methodology

3.1 Participants

This study is confined to Qassimi female speakers from Buraidah, the regional capital of Al-Qassim province. It is gender-oriented because of the research convenience and to reach a level of consistency in the results. The participants of the study are twenty female speakers, and their age range is between 20 to 28 years old. The age mean of the participants is 23.6 and the standard deviation is 2.32. All speakers volunteered to participate in the recording sessions, which lasted between 15 and 30 minutes. None of the subjects claimed to be limited by visual or hearing impairment. The study investigates only the major allophones of the vowel phonemes of this dialect.

3.2 Sampling Procedures

The study used simple random sampling. In this sampling technique there is an equal chance to everyone in the community to be included in the sample (Taherdoost, 2016).

3.3 Data Elicitation

The data were elicited and recorded by using a SENNHEISER 151 PC headset and an Hp laptop. The recording took place in the researcher's house. The software used for recording was ProRec, Prompt & Record Version 1.2 by Mark Huckvale of University College London.

The speech material was composed of words. These words were presented visually to each speaker on paper cards one word at a time. Each word was written using the appropriate Arabic script, so there was no ambiguity as to how each word should be read by the speakers. Speakers were asked to read the target words naturally in their normal speaking rate. Each speaker repeated the words up to four times when it appeared on the card.

3.4 Data Analysis

Generally, when defining vowels, we have to consider three important properties: tongue height, tongue backness and lip roundness (Odden, 2005). It is assumed that Njdi Arabic and its varieties share the same phonemic vowel system which consists of five long vowels and three short vowels (Ingham, 1994). However, this study aims to test whether the Qassimi dialect has a similar vowel system as the Najdi.

The initial stage of analysis involved listening to the sound files to eliminate any invalid material due to excessive noise or any clipped sound waves. Then, working with Windows 10, the material was analyzed using version 6.1.42 of PRAAT, a free scientific software program for the analysis of speech in phonetics and one of the most widely used tools for acoustic analysis. The sampling rate for the analyzed data was 11kHz with 16 bits quantization rate.

4. Results and Discussion

In this section, the results of the present study will be discussed with respect to the research questions and previous literature.

This study shows some of the significant differences between Qassimi and English vowel inventories. The discussion of the English vowel system is based on two major studies. The first is the study by Peterson and Barney (1952), the most widely cited experiment on the acoustics and perception of vowels. The other reference is a study by Hillenbrand et al. (1995), which is a recent replication of Peterson and Barney's study.

4.1 The Characteristics of Qassimi Vowels

By analyzing the Qassimi vowels, the researcher found that they can be divided to three groups, a group of vowels that are shared by almost all dialects and languages, and these are the basic peripheral vowels /a/, /a:/, /i/, /i:/, /u/ and /u:/. In addition, the Qassimi dialect has some vowels, such as /o:/ and /e:/, which distinguish the dialect from other Saudi dialects. For example, the words /go:h/ "let's go,", /tfo:h/ "please," and /ne:m/ "he's asleep," are specific to the Qassimi dialect, and they are not used in any other Saudi dialect (not even in Najdi). The final vowel is /ə/ as in /ʃiggəh/ "an apartment", is an addition to the eight vowels of the Najdi dialect, and it is not a common vowel in other Saudi dialects. So, the analysis of the Qassimi dialect resulted in nine vowel phonemes (Figure 1).
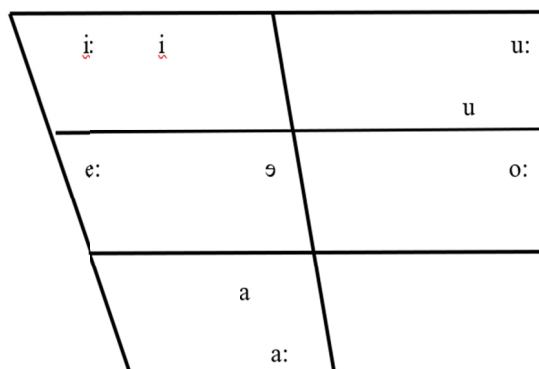

Figure 1. A diagram of Qassimi vowels

These Qassimi vowels are the major allophones of the nine vowel phonemes. Each vowel had to be tested to determine whether it represents different allophones of the same phoneme or separate phonemes. The perfect test is to find minimal pairs. A minimal pair is a pair of words that differ by only one phone. For example, the words *tip* and *dip* show that in English, [t] and [d] are different phonemes.

The researcher collected six minimal pairs, which represent evidence that those vowels are phonemes and not allophones.

Table 2. Minimal pairs showing the major vowel phonemes in Qassimi

/ʃiggɔh/ (an apartment)	/ʃiggah/ (tear it(f.) up)
/zat/ (he pushed)	/ze:t/ (oil)
/ba:tsir/ (tomorrow)	/batsir/ (come early (m.))
/di:ts/ (a rooster)	/du:ts/ (take this(f.))
/dafo:h/ (they pushed him)	/dafa:h/ (he made it warm(f.))
/tsibi:r/ (big)	/tsibir/ (he grew up)

As we know, vowels are described in terms of two phonetic parameters: vowel quality and vowel quantity. Quality refers to differences in the place of articulation of the vowel, including the position of the tongue in the vocal tract, the shape of the lips and whether the vowel is nasalized or not. On the other hand, vowel quantity refers to the duration of the vowel. Simply put, the vowels are described as short versus long (Saddah, 2011).

English and Arabic are languages with phonological contrasts based on vowel quality and quantity. English is a 12-vowel system that contrasts tense long vowels and lax short vowels; whereas Arabic is a 6-vowel system that contrasts long and short vowels. Therefore, English and Arabic, in general, are not only differentiated in terms of the size of their vowel systems, but also in the phonetic qualities of their vowels (Saddah, 2011).

4.2 Vowel Duration

The vowels of English and Qassimi can be divided into two major groups on the basis of their phonological behaviors, which largely correspond with phonetically short (and lax) versus long (and tense) vowels. In both English and Qassimi, examples of pairs of short and long vowels show that vowel duration plays an important role in marking the contrast next to vowel quality differences. Words like "heed" /hid/, "hid" /hɪd/, "hood" /hUd/ and "who'd" /hud/ are great examples of vowel contrasts in English as presented by Peterson and Barney (1952).

Vowel duration is also contrastive in the Qassimi dialect. For example, the words /ba:tsir/ "tomorrow," /batsir/ "come early," /tsibi:r/ "big," and /tsibir/ "he grew up" prove that contrast in the Qassimi dialect can be marked by vowel length.

4.3 Tense and Lax Vowels

Hongyan (2007) represented the state of the tongue and lips in regard to muscular tension as an element considered by some to be of importance in determining vowel quality. Those who consider that vowels may be differentiated by degrees of muscular tension distinguish two classes: tense vowels and lax vowels. Tense vowels are supposed to require considerable muscular tension on the part of the tongue; in lax vowels, the tongue is supposed to be held loosely. For example, the difference in quality between the English vowels *seat* and *sit* is described as a difference in tenseness: the vowel sound in *seat* is considered tense while the vowel sound in *sit* is lax.

Comparing the locations of the common vowels across English and Qassimi, namely the main peripheral high vowels /i/, /i:/, /u/ and /u:/, results in many similarities and some significant differences. In the case of the high back rounded vowels /u:/ and /u/, the range of the average values of F1 and F2 is very close for both English and Qassimi vowels (Figure 2). In both cases, the long vowels have less F1 value than their short counterpart, which makes /u:/ higher in quality and appear more peripherally in the vowel space.
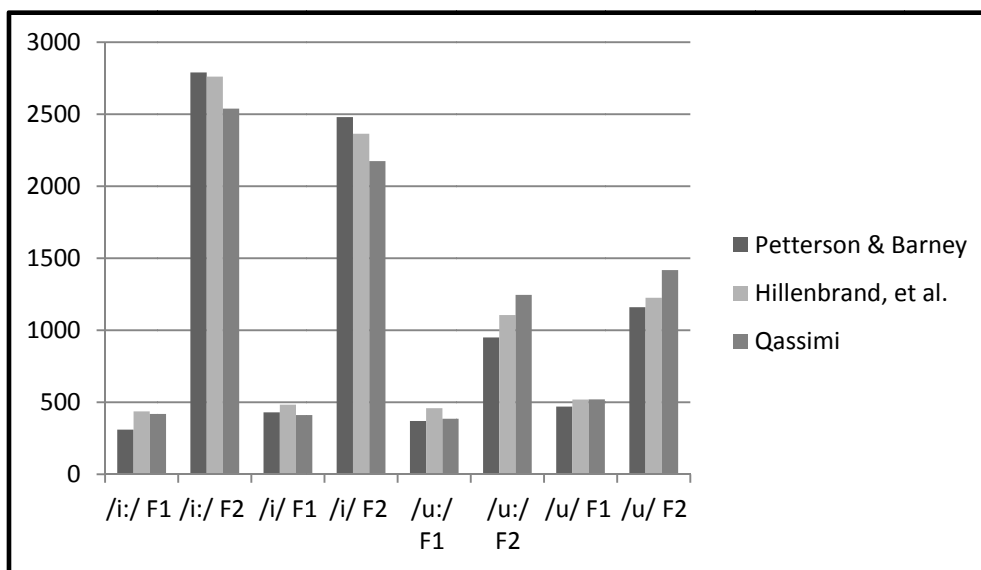
Figure 2. A chart of the average of F1 and F2 values of high vowels

However, in the case of /i:/ and /i/, we find a general downward shift in the F1 dimension of the Qassimi short vowel /i/ relative to the English vowel. In this case, we may say that the Qassimi dialect has two high front vowels, one is short and one is long, and they are both tense vowels, which is unlike many other dialects and languages, including English (Figures 3, 4, and 5).
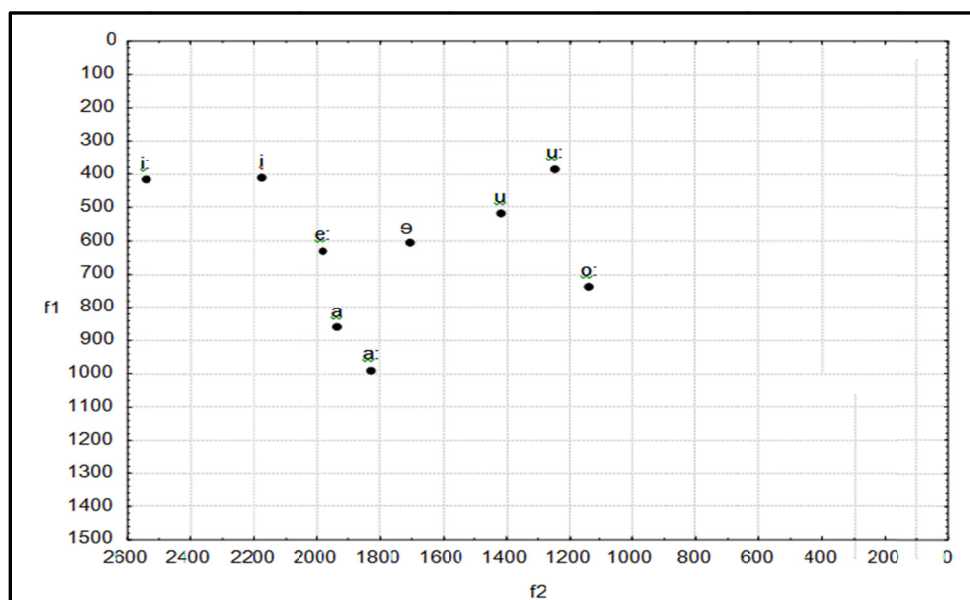

Figure 3. Average values of F1 and F2 of 9 Qassimi vowels by female speakers
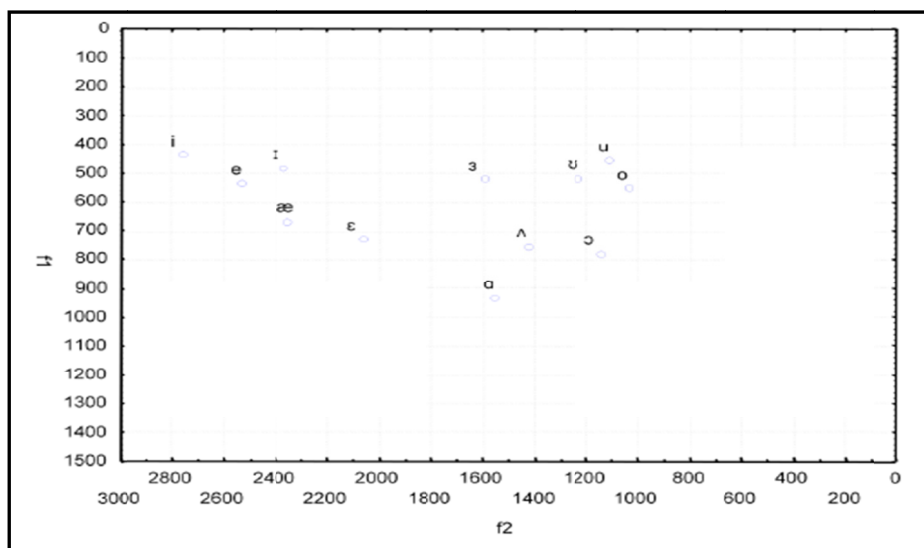
Figure 4. Average values of F1 and F2 for 12 English vowels by female speakers (Hillenbrand et al., 1995)
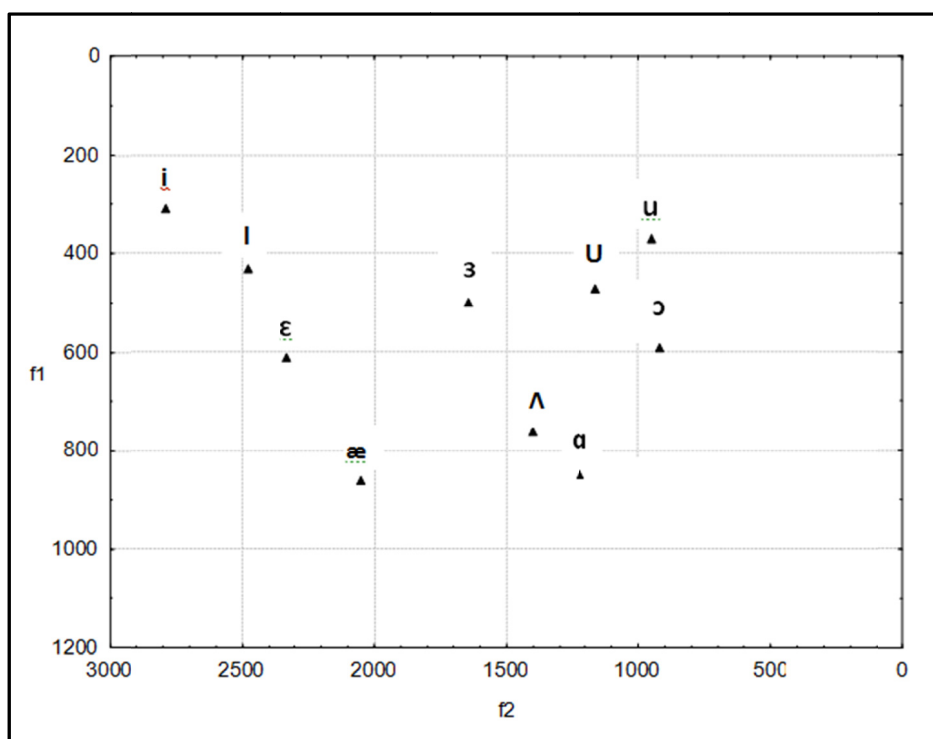
Figure 5. Average values of F1 and F2 for women speakers for 10 English vowels (Peterson & Barney, 1951)

Furthermore, looking at the difference in F2 value between the English and Qassimi vowels, we noticed that the English front vowels, namely /i:/ and /e:/, are located more peripherally in the acoustic space than the Qassimi front vowels. As it appears in the acoustic space, Qassimi /e:/ seems to be more retracted or centralized than English /e/ as the average F2 value for /e:/ was 1976 Hz, and for English /e/, it was 2530 Hz. In the case of /i:/, the average F2 value for the English vowel was 2790 Hz according to Peterson and Barney (1951), and 2761 Hz as stated by Hillenbrand et al. (1995). The average F2 value of the Qassimi /i:/ is 2539 Hz, approximately 200 Hz less than its English counterpart (Table 3). When phonemes are retracted or centralized in any dialect, the result is shrinkage of the overall vowel space. Therefore, as the Qassimi vowels are lower in number in general and more centralized, we assume that the Qassimi vowel space is narrower than the English vowel space.

Table 3. The averages of F1 and F2 values for English and Qassimi vowels

	Peterson and Barney		Hillenbrand			Qassimi	
	F1	F2	F1	F2		F1	F2
i	310	2790	437	2761	i:	419	2539
I	430	2480	483	2365	I	411	2174
u	370	950	459	1105	u:	385	1246
U	470	1160	519	1225	U	520	1418
æ	860	2050	669	2349	a:	991	1826
ɑ	850	1220	936	1551	A	861	1934
e			536	2530	e:	631	1976
ʌ	760	1400	753	1426	ə	607	1705
O			555	1035	o:	739	1140
ɜ	500	1640	523	1588			
ɛ	610	2330	731	2058			
ɔ	590	920	781	1136			

5. Conclusion

The phonological description of the vowel system of any language or dialect is a very wide area of study. This study took a more direct and basic approach, which was to determine the vowel sounds found in the Qassimi dialect, and to spot some of the general differences between the Qassimi and English vowels. The Qassimi vowel system consists of nine vowel phonemes and comparing it to other systems may give us a proof of language variation. For example, the Emirati is said to have eleven vowels, the Omani dialect has eight vowels, and the Jordanian Arabic has only six vowels. In addition to number of vowel phonemes in each dialect, the Qassimi dialect has the mid vowel /ə/ which is not found in other dialects. So, the results of this analysis not only highlighted the differences between Arabic and English, but also showed great variation within Arabic.

The analysis of the Qassimi and English vowels in this paper showed how the state of phonemes could affect the overall vowel space of a language or a dialect. For example, the Qassimi vowels are lower in number and more centralized than the English vowels, and this led to the assumption that the Qassimi vowel space is narrower than the English vowel space.

The study of vowels is one of the most complex areas of study. This study aimed to shed light on some of the major aspects of the Qassimi dialect and, more specifically, the Qassimi vowel system. It is not meant to provide any conclusive results or provide definite rules of how the Qassimi vowel system works. However, this study contributes to the studies of Arabic in general and paves the way for more detailed studies.

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Notes

Note 1. Kilohertz is used to measure frequency, or cycles per second. Since one hertz represents one cycle per second, one kilohertz is equal to 1,000 cycles per second.

Note 2. First formant frequency (f1), a formant is one of four highest peaks in a spectrum sample, the first formant (F1) is dependent on whether a vowel sound is more open or closed.

Note 3. Second formant frequency (f2), is one of four highest peaks in a spectrum sample, and it varies depending on whether a sound is made in the front or the back of the vocal cavity.

Appendix A
List of Qassimi words

	Qassimi Word	Meaning
1	/zat/	'he pushed'
2	/ba:tsir/	'tomorrow'
3	/ziduh/	'add to it (m.)'
4	/du:ts/	'take it (f.)'
5	/ʔi:t/	'come (m.)'
6	/diriʃĩh/	'a window'
7	/tfo:h/	'please'
8	/ʔwe:lah/	'please'
9	/lambəh/	'a lamp'

Appendix B

Spectrograms of different Qassimi words
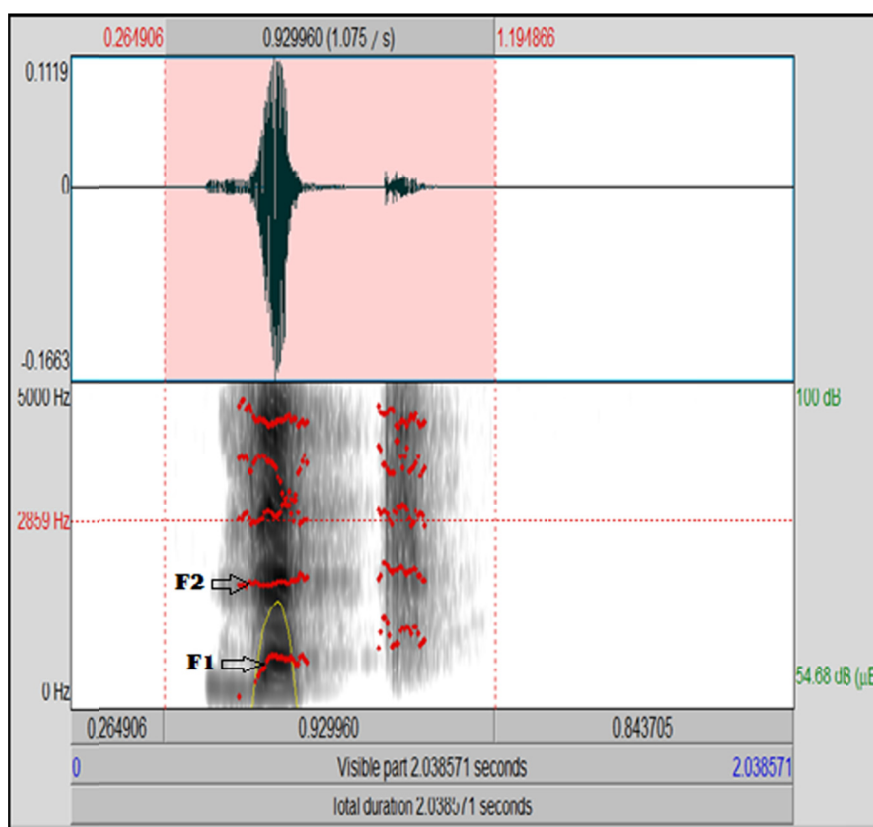
Figure 6. A spectrogram of the word /zat/ from a Qassimi speaker
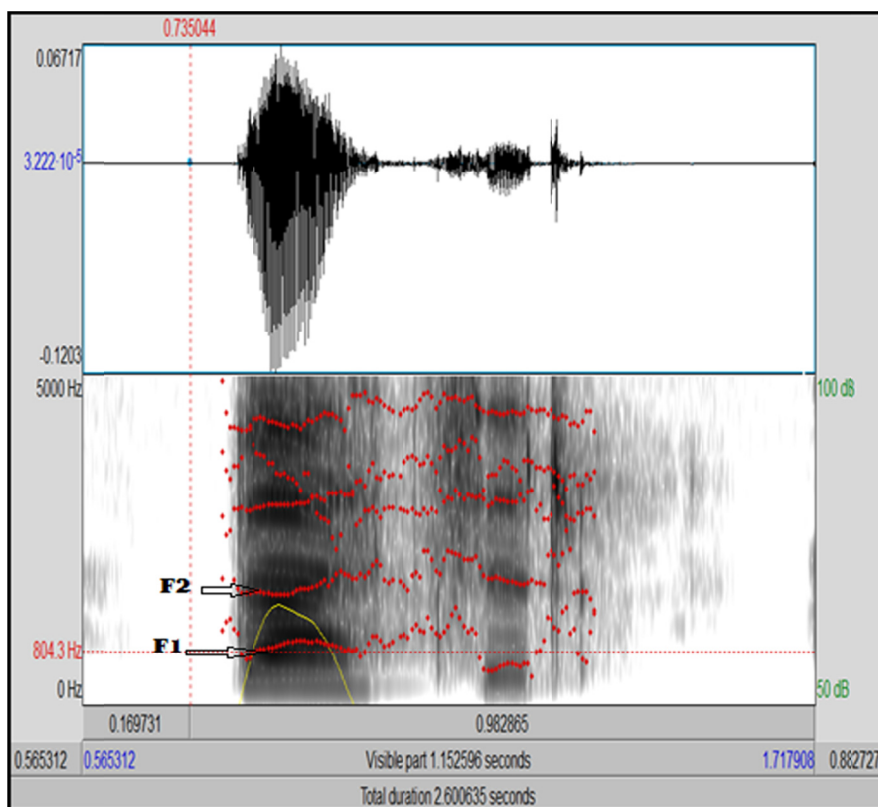
Figure 7. A spectrogram of the word /ba:tsir/ from a Qassimi speaker
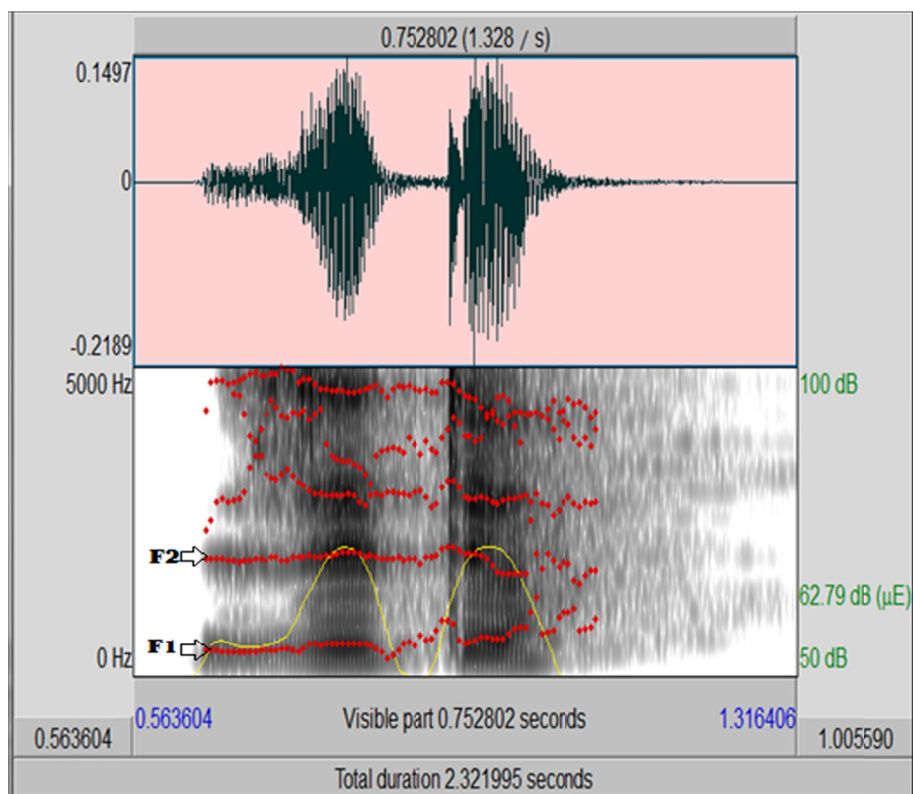
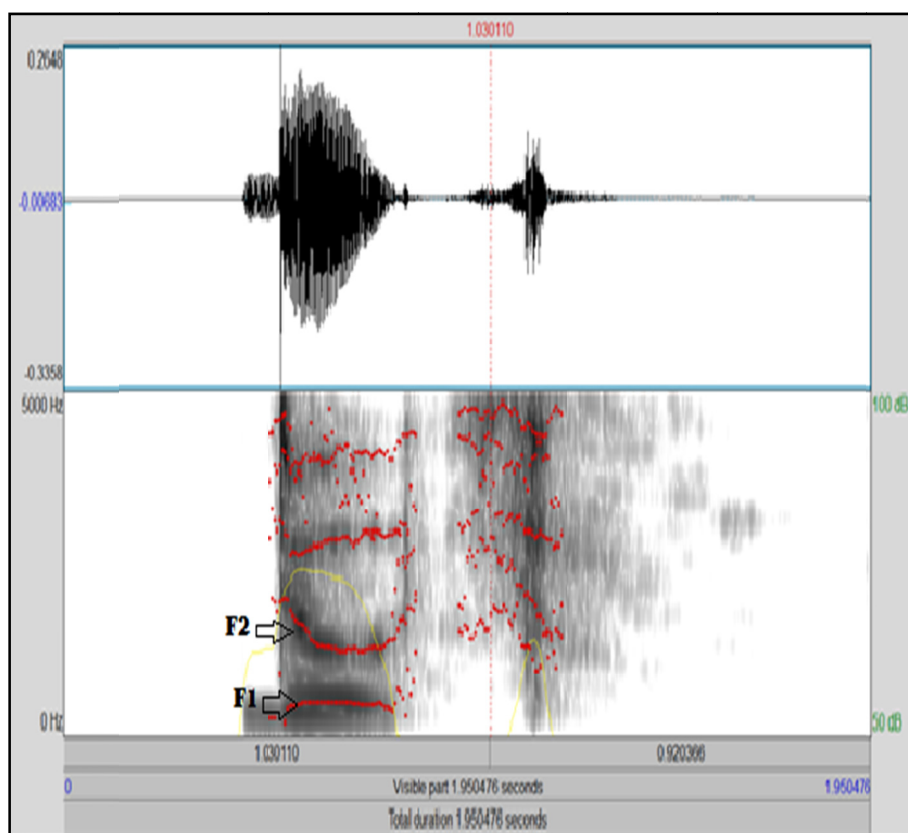Figure 8. A spectrogram of the word /ziduh/ from a Qassimi speaker

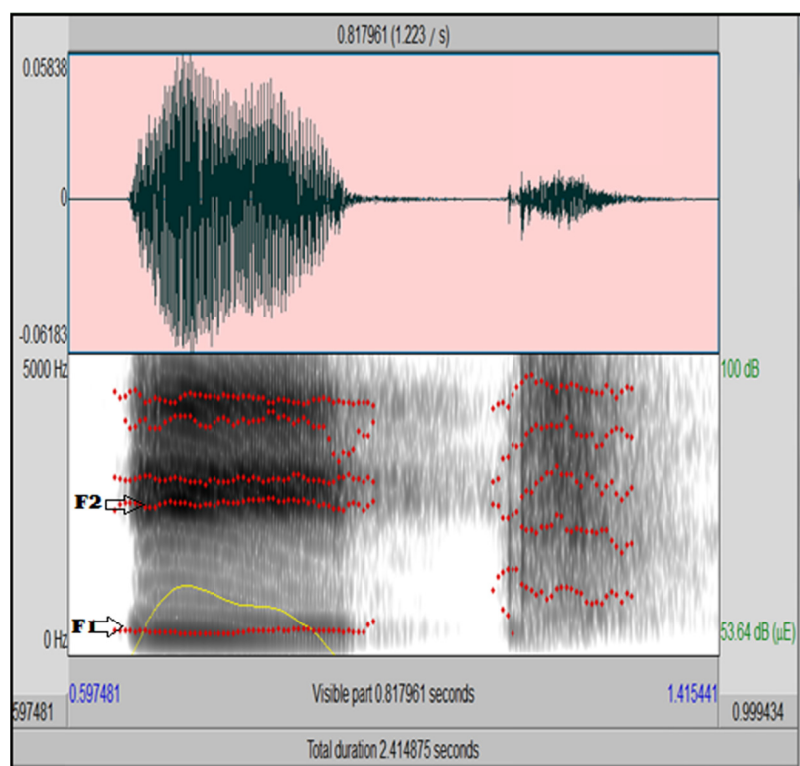Figure 9. A spectrogram of the word /duːts/ from a Qassimi speaker

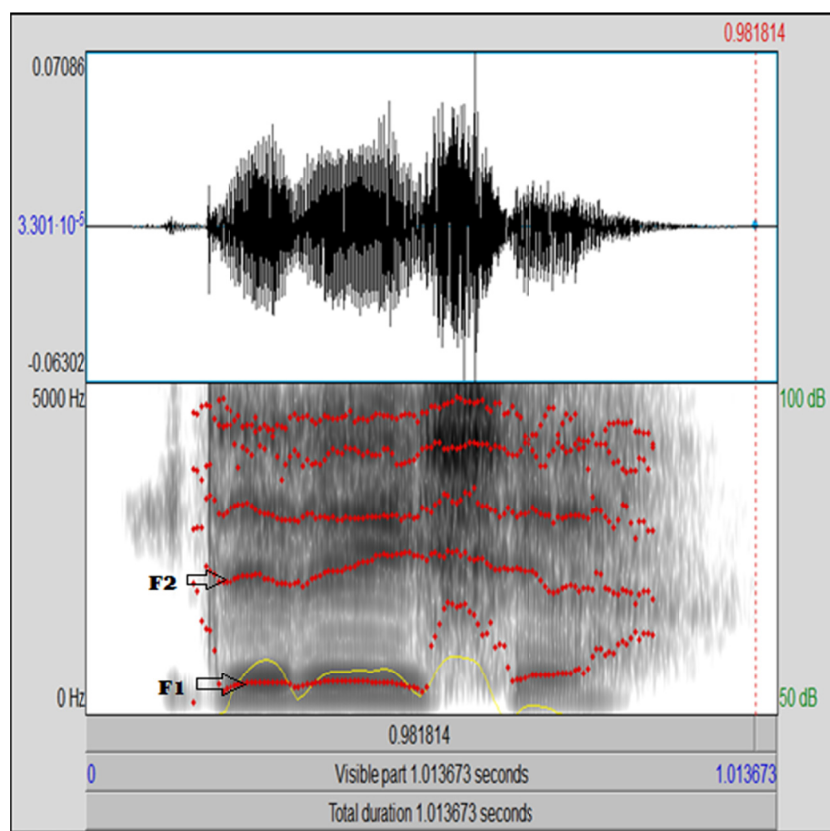Figure 10. A spectrogram of the word /ʔiːt/ from a Qassimi speaker

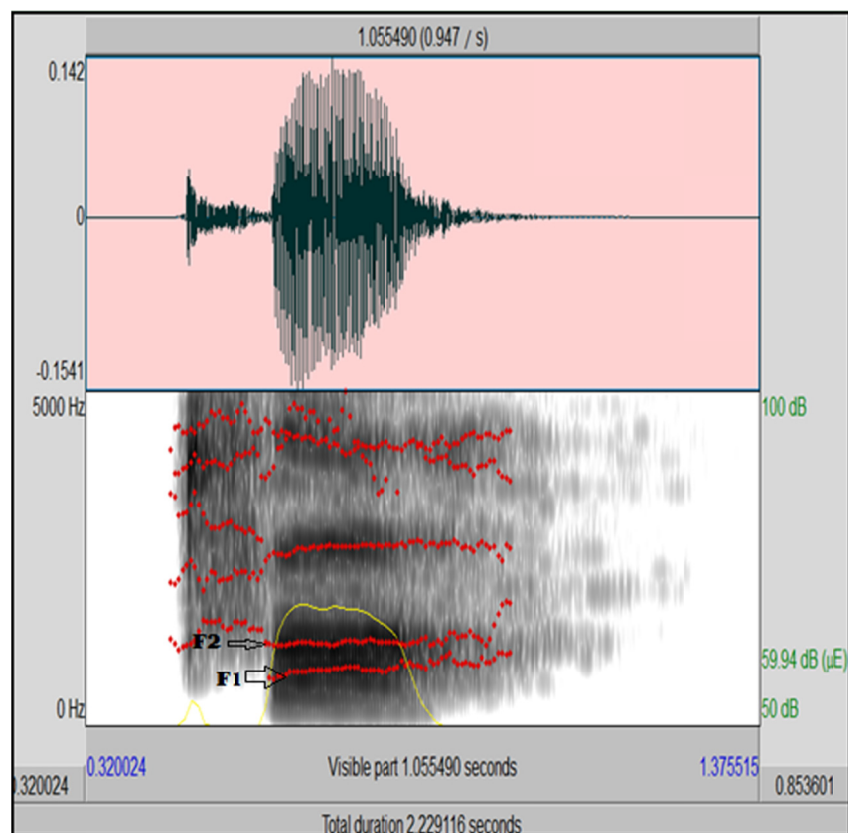Figure 11. A spectrogram of the word /diriʃih/ from a Qassimi speaker

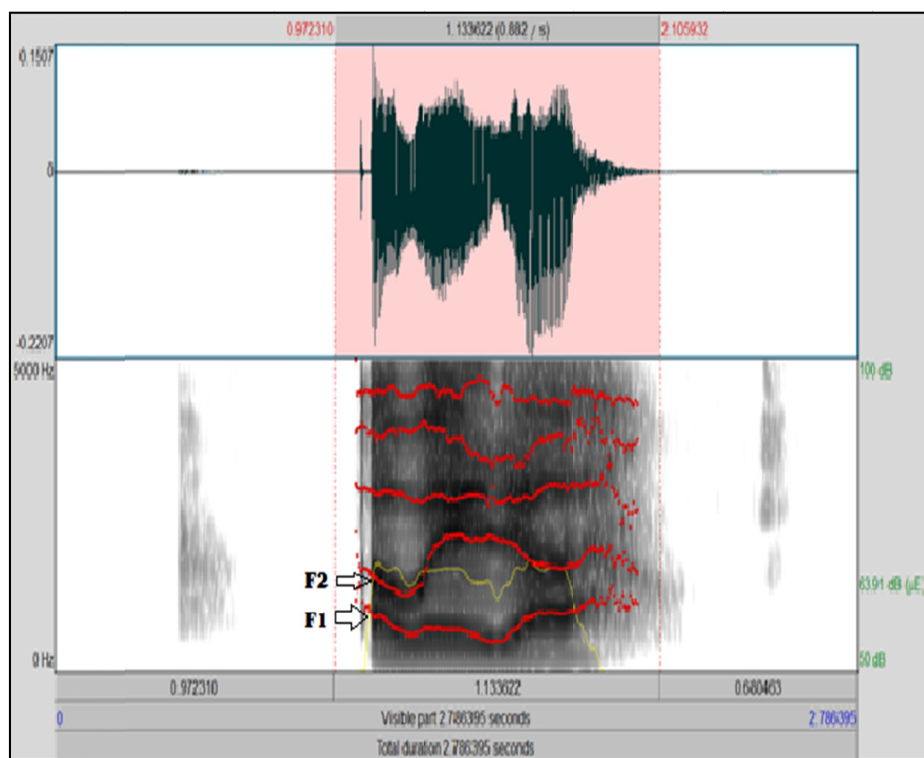Figure 12. A spectrogram of the word /tfo:h/ from a Qassimi speaker

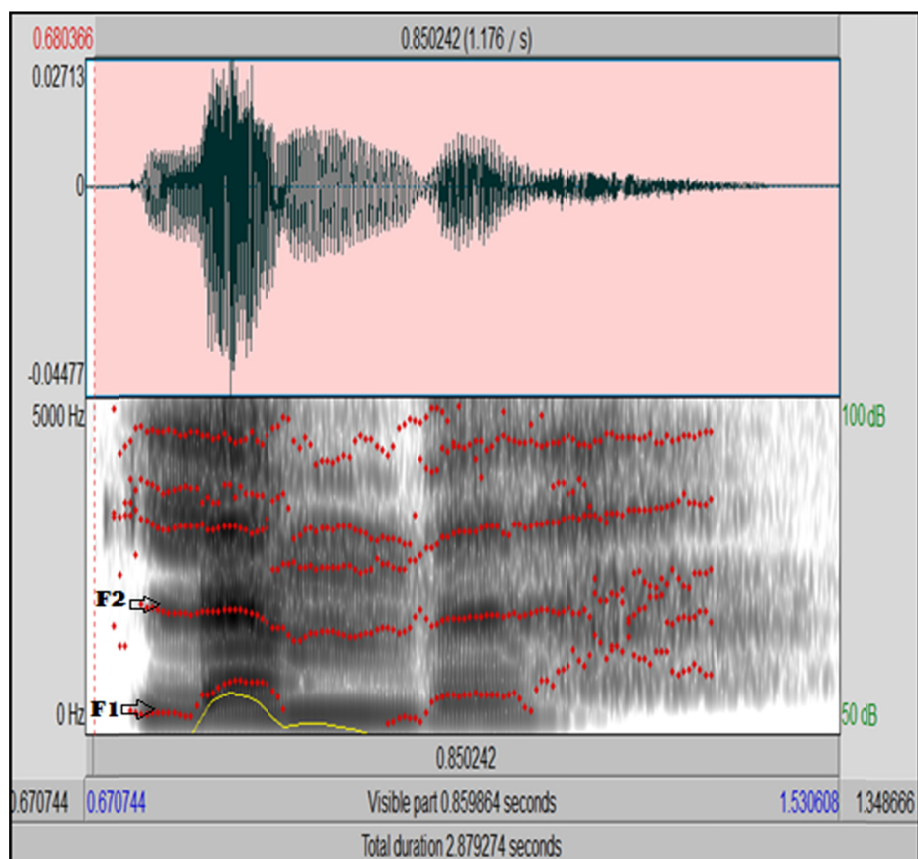Figure 13. A spectrogram of the word /ʔwe:lah/ from a Qassimi speaker

Figure 14. A spectrogram of the word /lambəh/ from a Qassimi speaker