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SOUNDING OUT OBSTACLES: A SCIENTIFIC EXAMINATION OF PERCEPTION DIFFICULTIES IN ENGLISH FRICATIVES FOR KUWAITI ARABIC UNDERGRADUATE LEARNERS

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Abstract
This paper aims to investigate the perception of English labial [v] and post-alveolar [ʒ] fricatives by undergraduate students in Kuwait, who speak Kuwaiti Arabic as their native language and are studying English. The study administered perception tests including the identification and discrimination tests for phonetic and lexical phonological perception. The data obtained from 104 female native speakers of Kuwaiti Arabic studying in the College of Basic Education in Kuwait were analysed using reliable and consistent techniques. The results show that the perception of English [v] was better than [ʒ] on all word positions. Moreover, the students' perception of [ʒ] showed difficulty in different word positions. The study also provides an analysis of models for second language acquisition, including Flege's Speech Learning Model (SLM), Brown's Feature Model (FM) and Best's Perceptual Assimilation Model (PAM), and their relevance to the perception difficulties of undergraduate students of English from Kuwait. The study highlights the importance of understanding the perception-related issues of second-language acquisition and its potential challenges for Arabic learners in learning English fricatives.

Keywords: perception, fricatives, labial, post-alveolar [ʒ], Kuwaiti Arabic learners, second language acquisition, speech learning model, feature model, perceptual assimilation model, phonetic perception and lexical phonological perception.

1. Introduction

The English language has global status and significance. It is spoken all over the world and in most countries holds the status of academic language or medium of instruction. It is also the official language of many countries, taught as a subject of study, and used as a medium of instruction in the Arab world. Many studies have been conducted to determine learning difficulties of adult students who speak Arabic. However, no one has examined this topic in reference to Kuwaiti learners of English. A cursory look at consonant phonemic inventory shows that Kuwaiti Arabic (KA) shares many consonants with English, and Kuwaiti students may perceive these correctly because of interference of their L1 (see consonant phonemic inventory of KA by Aldaihani [2014] in Appendix-1). English fricatives [v] and [ʒ] are consonants that do not exist in most Arabic dialects, and Kuwaiti students find them difficult to perceive and produce while learning English. The current study was conducted to study the nature of errors in Kuwaiti English learners' perception and predict potential problems of learning English as a second language. In other words, the focus is solely on investigating the perception difficulties of English fricatives (/v/, /ʒ/) KA learners may encounter when they learn English as their second language. We will address the following research questions:

1. Can undergraduate English students who speak KA as L1 perceive English fricatives [v] and [ʒ]?
2. Are KA undergraduate students' perception of English fricatives [v] and [ʒ] the same in different word positions?
3. Can we predict correct learning of English fricatives [v] and [ʒ] by Kuwaiti learners of English?

2. Literature Review

2.1 Models of Second Language Acquisition

In this section, we briefly discuss models of second language acquisition, which will be covered later in our data analyses. In the mid-twentieth century, some researchers claimed that the similarity between L1 and L2 may facilitate learning of L2, whereas dissimilarity may cause difficulties in adult L2 acquisition (Lado, 1957). Later, phonologists and applied linguists realised that markedness plays a role in second language learning. Therefore, it became widely accepted that the more marked L2 structure was more difficult to learn than less marked structures (Eckman, 1977, 1991).

Based on empirical research conducted under this trend, the idea developed that a sound on onset position is easier than on word-medial position which is easier to acquire than on word-final position (Archibald, 1998). The reason for this was that the word-initial position is less marked and more prominent than the medial position, which is less marked than the word-final position. A hierarchy of learning was predicted based on these assertions:

Word-initial > word-medial > word-final

This directionality of learning shows how easy a particular phoneme can be on the word position. The word-initial position is treated as the easiest, the word-final position as the most difficult, and a consonant in the word-medial position is in between these two extremes. However, by the end of the twentieth century, several models of second language acquisition claimed that perception of a sound was more important in L2 learning than its production. The most prominent among these models are Speech Learning Model (SLM) by Flege (1995), Feature Model (FM) by Brown (1998, 2000), and Perceptual Assimilation Model (PAM) by Best (1995) and Tyler (2019). We will briefly illustrate the predictions of these models based on their relevance to our study.

Flege's SLM claims that L2 learning is based on phonetic perception. Unlike Lado (1957), he claims that similarity between L1 sounds and nearest L2 sounds does not lead to enhanced learning and rather the differences between two such sounds lead to successful learning. According to Flege(1995), the more difference there is between two sounds, the easier it is for a student to learn. Once learners perceive the difference between two sounds, they properly acquire the sound. SLM also predicts a correspondence between perception and production of L2 phonemes.

The FM (Brown, 1998, 2000) is based on phonological features. It predicts L2 learners' difficulty on the basis of feature geometry of L1 and L2. Brown asserted that L2 learners confuse L1 and nearest L2 sounds on the basis of relevant features. Similarly, they also differentiated between such sounds on the basis of relevant features. According to FM, a feature required for discrimination of two phonemes is active in the feature geometry of L1, and the learners will perceive two sounds as different and be able to acquire such sounds. If, however, the relevant feature is not active in the L1 feature geometry, then the pair of sounds may pose challenges for the adult learning L2. An active

feature indicates that a pair of sounds is differentiated on the basis of a particular feature. For example, English has [t] and [d] consonants, which differ based only on feature [voice]. This means feature [voice] is active in English. A major difference between SLM and FM is that the former is based on phonetic interpretation of sounds and the latter is based on phonological features.

The third relevant model is PAM by Best (1995), which she later extended to include L2 learning (Best & Tyler, 2007). According to this model, listeners put sounds into categories on the basis of correspondence between new and existing sounds. If two new L2 sounds are perceived as similar to a single L1 sound, PAM calls it a Single Category type of sound pair. For example, Arabic has only unaspirated stops, but English has aspirated and unaspirated stops (Alanazi, 2018). If a sound pair has two equally same or different sounds in the L2, such a pair of phonemes is called Two-Category type. More precisely, corresponding to English alveolar /t, d/, Arabic has dental /t, d/. There may be a scenario in which two L2 phonemes (English /f/ and /v/) are similar to one L1 phoneme (Arabic /f/). While one (English /f/) may be perceived as a good exemplar, the second (English /v/) may be considered a poor or weak exemplar of the L1 phoneme (Arabic /f/). Such a pair is called a Category-Goodness type of sound. PAM predicts the following directionality of learning for such sound pairs:

Two-Category Type > Category-Goodness Type > Single Category Type

/t, d/ > /f, v/ > /p, b/

This means Two-Category sounds are easiest to learn, Single-Category sounds are most difficult, for example, /p/ and /b/ are single-category for Kuwaiti Arabic learners of English and this pair of sounds are expected to be most difficult for them, whereas Category-Goodness types are moderate. We aim to understand, explain, and predict the learning problems of Kuwaiti undergraduate students of English.

It is worth noting that there is not much literature on problems faced by Arabic learners in learning English fricatives /v/ and /ʒ/. These consonants have not been considered in L2 literature on the perspectives of people learning other languages. Baagbah et al. (2016) studied Yemeni students' problems of learning English fricative /v/, and Mousa (2015) studied production of English fricative /ʒ/ by Saudi English learners in comparison with the production of the same sound by Broad Jamaican Creole speakers. They, however, focused only on productionrelated issues. Modern research confirms that problems of learning normally originate from an erroneous perception, which also leads to production errors. Therefore, we focus on perception-related issues of Kuwaiti undergraduate English students learning these sounds.

2.2 Feature Geometry

Kuwait Arabic dialect has 29 consonants consisting of seven plain stops (/b, t, d, k, g, q, ʔ/) one emphatic

stop (/t̪ˤ/), two nasals (/m, n/), one trill (/r/), 11 plain fricatives (/f, θ, ð, s, z, ʃ , x , ɣ, ħ, ʕ, h/), two emphatic fricatives (/ðˤ, sˤ/), two affricates (/tʃ , dʒ/), two glides (/w, j/), and one plain lateral (/l/) (see KA consonant phonemic inventory by Aldaihani (2014) in Appendix-1).

Features have an important role in analyzing sounds by treating them as being composed of smaller properties (Clements, 1985, p. 225). A limited quantity of features can be grouped in different ways to produce a huge number of sounds (Clements & Hume, 1995, p. 245). The organization of features

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is called "feature geometry", meaning features functioning as a unit in constraints are combined into constituents, which are hierarchically structured (Clements, 1985).

The following section is based on Clements and Hume's (1995) feature geometry model representing the phonological features of KA plain consonants (excluding vowels). The current study is limited to investigating consonants and their features targeted by our research questions. Irrelevant features have been excluded from the study.

The root is a single node that dominates all features and classes in the tree. The major class features [+sonorant], [-vociod], [+approximant], [nasal], laryngeal, and the oral cavity are attached directly to the root. The feature [+sonorant] distinguishes between sonorant consonants as [+sonorant] (labial glide /w/) and obstruent consonants as [-sonorant] (stops, fricatives, and affricates). The feature [+continuant] also attached to the oral cavity which distinguishes between fricatives [+continuant] and stops [-continuant], whereas affricates are [+continuant]. The laryngeal feature signifies the difference between the voiced consonant [+voice] and the voiceless consonant [-voice]. The place node comes underneath the oral cavity to differentiate between oral active articulators (labial, dorsal, and coronal). The [round] feature comes under the labial to differentiate between rounded consonants or vowels such as /w/ and unrounded ones (see feature geometry by Clements and Hume [1995] in Appendix-2).

Table 1 shows the relevant consonants and targeted features for this study.

Table 1Targeted Features

Classes	Sub-Classes	Features			
		Consonant	Sonorant	Continuant	Round
Obstruent	Stops /p, b, d, g/	+	−	−	−
	Affricates /tʃ,dʒ/	+	−	±	−
	Fricatives /f, v, ʃ, ʒ/	+	−	+	−
Sonorant	Labial Glides /w/	−	+	+	+

3. Research Methodology

A total of 104 female native speakers of KA who were studying in the College of Basic Education in Kuwait were selected for participation on the basis of convenience sampling. The age of these students ranged between 18 and 25 years. All were pursuing a Bachelor of Arts degree in English. We asked the participants how many years they had been studying English and how many hours they spoke and listened to English each day. Their responses are summarized in Table 2.

	Minimum	Maximum	Mean	Std. Deviation
Years of Study	10	20	15.95	2.41
Hours of Speaking per Day	1	20	3.48	3.32
Hours of Listening per Day	1	20	4.73	3.57

Each participant was asked to listen to the stimuli and note her response on a printed sheet of paper. The perception experiment consisted of four tests conducted in the same sitting. Stimuli for the tests were recorded in the voice of a native English speaker in a laboratory at the University of Essex in the UK. The details of the four tests are as follows:

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- Identification test for phonetic perception
- Discrimination test for phonetic perception
- Identification test for lexical phonological perception
- Discrimination test for lexical phonological perception

First, a phonetic perception test was conducted. Participants listened to the recordings in VCV sequence in the voice of a native English speaker. They were asked to write the consonant that they heard (the list of stimuli is provided in Appendix-3.) This test comprised of target sounds (e.g., [ava], [aʒa]); the closest consonants, which may be confused with the target consonants (e.g., [afa], [adʒa]); and some distracters. Each token was repeated three times. Therefore, we received 312 responses against each consonant (104*3 = 312). In scoring the results, one mark was awarded for one correct answer. Similarly, in the phonetic discrimination test, the same productions were presented in pairs like [afa–ava]. Participants were asked to determine whether they heard two different or same sounds in the pairs (the list of stimuli is given in Appendix-4.) The purpose ofthese tests was to see if students can understand English consonants correctly without lexical contexts. We conducted these tests to judge phonetic perception of the participants.

In addition, a pair of tests with lexical material in the stimuli was conducted. We organized two tests for phonetic perception and two for lexical phonological perception of the students because the previous research shows that lexical familiarity may have a positive impact on learners' perception (Flege et al., 1996). To accurately assess students' perceptions, we arranged phonological and phonetic tests. In the lexical identification test, English words containing target fricatives on word-initial, word-medial, and word-final positions were played, and students were asked to write down what English word they had heard. This list of stimuli included words containing targets and some distracters (the list of stimuli is given in Appendix-5.) Next, we conducted a lexical discrimination test with minimal pairs like "van–fan" and "version–virgin." When listening to the pairs, students were asked to determine whether they had heard the same or different words (the list of stimuli used in this test is provided in Appendix-6.) In the evaluation process, one mark was awarded for each correct response.

To determine the reliability of the data, we assessed the consistency of responses. If a respondent answered the same question similarly in a randomized sequence of stimuli including distractors, the response may be logically treated as a considered response of the participant. With this general view in mind, we calculated consistent and inconsistent responses in the phonetic identification test. If a participant gave the same response in all three tokens, it was considered a consistent response, and if she gave different responses against three repetitions of a stimulus it was treated as an inconsistent response. The results are given in Table 3.

Table 3Reliability Statistics of the Perception Test

S. No.	Sound	Inconsistent Responses	Consistent Responses	Reliability
1	/f/	6	98	94%
2	/v/	16	88	85%
3	/ʒ/	31	73	70%
4	/dʒ/	26	78	75%

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Table 3 shows that the reliability percentage of the participants was between 70% and 94%, which is considered very good. According to linguists and researchers, reliability of 60% and above is considered good in social sciences research (Ghenghesh, 2010; Larson-Hall, 2016; Scholfield, 1995). From this angle, the reliability of the data is excellent or very good. The students' performance indicates that the research methodology adopted in this study is reliable. We will discuss this in greater detail in the discussion and analysis section.

4. Results

This study consisted of four tests—two identification and two discrimination—at phonetic and lexical phonological levels. The results for each test are given in the following sections. This section answers the first research question of whether KA undergraduate English students who speak KA as L1 can perceive English fricatives [v] and [ʒ].

4.1. Phonetic Perception Tests

The phonetic perception tests had two tasks—identification of consonants produced by native speakers of English between two low vowels (e.g., /ava/, /aʒa/) and discrimination between pairs of sounds. First, we present the results of phonetic identification test.

4.1.1. Phonetic Identification

In this test, recordings of consonants in the "aCa" sequence produced by native English speakers were played. Study participants listened and replied by writing down which consonant they had heard (see Appendices). Each consonant phoneme was repeated three times. Some distractors like /asa/, /aka/, and /aza/ were included in the list of stimuli to conceal the target sounds from the participants and to test the research methods. The results given in Table 4 show that participants showed 100% accuracy in perception of /s/ and /k/ and 99.3% accuracy in /z/. This confirms that the data collection methods are reliable. If there would have been any defect in instruments or the data collection methods, the results would have indicated weak perceptions by students on non-target consonants.

In the phonetic identification test, there were three repetitions of each sound included in the stimuli list. One mark was awarded for one correct item. Therefore, we obtained 312 results in all (104*3 = 312) from 104 students. We already knew that six of the total 110 students did not participate in this test due to personal reasons. The results of the remaining students are given in Table 4.

Table 4Results of Phonetic Identification Test

	Stimuli	Responses		Accuracy
S. No.	Consonants	Accurate	Wrong	Percentage
1	/s/	312	0	100
2	/k/	312	0	100
3	/z/	310	2	99.36
4	/v/	278	34	89.1
5	/f/	308	4	98.72
6	/ʒ/	188	124	60.26
7	/dʒ/	242	70	77.56

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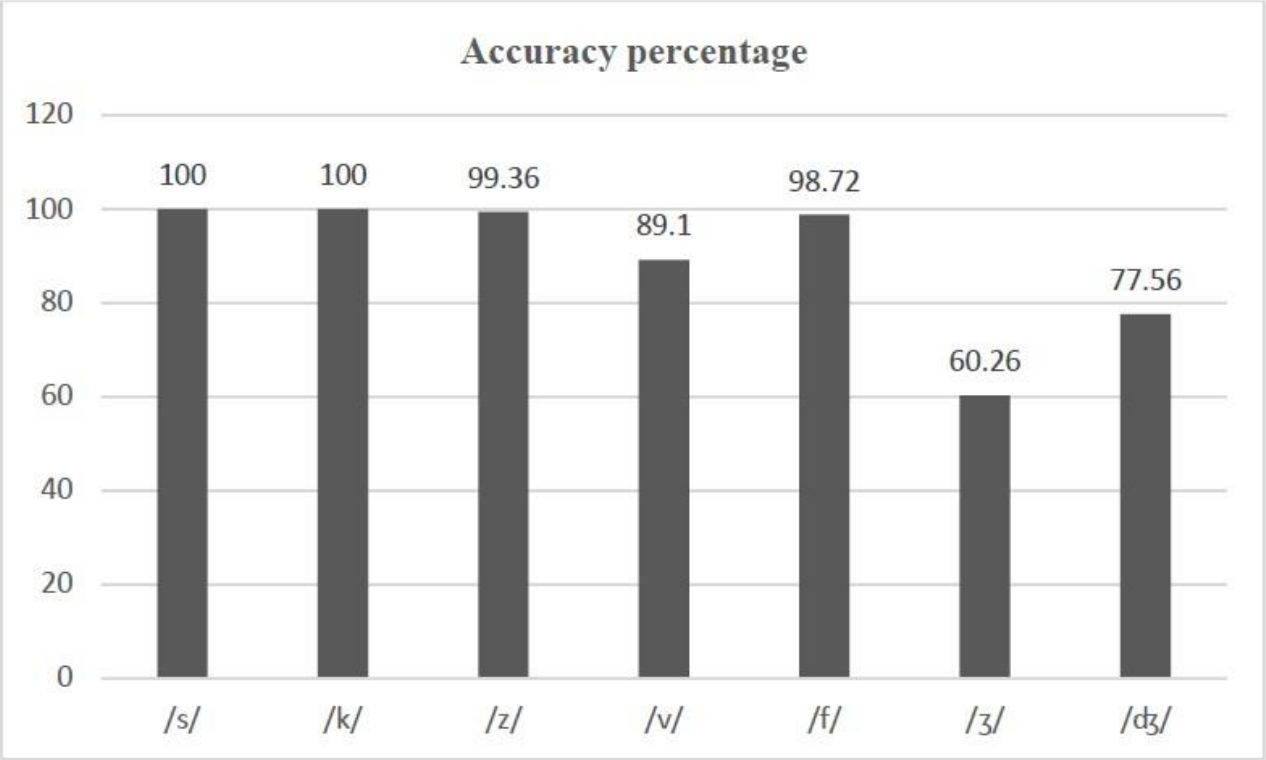
The results of the target consonants show that Kuwaiti students are better in their perceptions of /v/ than in /ʒ/. For the sounds /f/ and /dʒ/ included in the test, Kuwaiti students confused English fricative /v/ with L1 /f/ and English fricative /ʒ/ with L1 /dʒ/. Their perception of /f/ and /dʒ/ is therefore better than the new L2 sounds, i.e., /v/ and /ʒ/.
These results are visually reflected in Figure 1.
Figure 1 Phonetic identification test



4.1.2. Phonetic Discrimination Test
In the phonetic discrimination test, pairs of sounds like /ava–afa/ were played, and participants were asked if they heard two different or similar sounds. Each stimulus pair was repeated three times. Results are provided in Table 5.

S. No.	Stimuli	Correct	Incorrect	Accuracy percentage
1	/v–f/	288	24	92.31
2	/v–v/	262	50	83.97
3	/f–f/	302	10	96.79
4	/ʒ–dʒ/	290	22	92.95
5	/dʒ–dʒ/	304	8	97.44
6	/dʒ–ʒ/	302	10	96.79

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The results show that the overall performance of Kuwaiti students was excellent. These results are also reflected in Figure 2.

Figure 2Phonetic discrimination test

4.2. Phonological Perception Tests

In phonological perception tests, meaningful English words, recorded by native speakers, were played and study participants were asked to write what they heard on a piece of paper. The results of the test are given in Table 6.

4.2.1. Lexical Identification Test

In this test, a sequence of recordings produced by a native English speaker was played, and respondents were asked to write on paper which English word they heard. Misspelling in responses was not considered if the students identified the target sounds correctly. The frequency of correct and incorrect responses is given in Table 6.

Table 6Results of Lexical Identification Test

S. No.	Stimuli	Correct	Incorrect	Accuracy (%)
1	Gite	44	60	42.3
2	Genre	52	52	50
3	Jacques	34	70	32.7
4	Version	56	48	53.8
5	Pleasure	70	34	67.3
6	Measure	64	40	61.5
7	Beige	40	64	38.5
8	Rouge	62	42	59.6
9	Massage	64	40	61.5
10	Van	102	2	98.1
11	Volt	90	14	86.5
12	Veil	90	14	86.5
13	Divine	90	14	86.5
14	Saver	96	8	92.3
15	Revere	98	6	94.2
16	Leave	88	16	84.6
17	Live	94	10	90.4
18	Save	96	8	92.3

4.2.2. Lexical Discrimination Test

In the phonological discrimination test, lexical material (i.e., English words paired together) were presented to participants, and they were asked to describe whether they had heard the same or different sounds in the pairs. Pairs of same and different words were presented in random order. The results are provided in Table 7.

Table 7Results of Distractors

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S. No.	Stimuli	Correct	Incorrect	Accuracy (%)
1	Girl–Girl	102	2	98.1
2	Jail–Girl	104	0	100
3	Chair–Glass	104	0	100
4	Jolie–Jolie	102	2	98.1
5	Virgin–Virgin	86	18	82.7
6	Page–Page	98	6	94.2
7	Jeet–Jeet	102	2	98.1
8	Fault–Fault	90	14	86.5
9	Safer–Safer	98	6	94.2
10	Leaf–Leaf	98	6	94.2

This test had some target words that we expected to be difficult for Kuwaiti learners as well as distracters that typically do not pose a challenge for Kuwaiti learners (because those consonants found in the distractors exist in the KA phonemic inventory). In Table 7, we have included results of distracters that were added for test research methodology and for the sake of concealing target words.

The results are excellent and confirm that participants did not have any issue with research methodology. In Table 8, we provide the results for words with target consonants.

Table 8Results of Lexical Discrimination Test

S. No.	Stimuli	Correct	Incorrect	Accuracy (%)
1	ʒolie–ʒolie	96	8	92.3
2	ʒolie–dʒolie	76	28	73.1
3	Version–Virgin	68	34	65.4
4	Version–Version	98	6	94.2
5	Beige–Page	90	14	86.5
6	Beige–Beige	94	10	90.4
7	Gite–Gite	84	20	80.8
8	Gite–Jeet	72	32	69.2
9	Volt–Fault	72	32	69.2
10	Volt–Volt	52	52	50
11	Safer–Saver	100	4	96.2
12	Saver–Saver	98	6	94.2
13	Leave–Leaf	92	12	88.5
14	Leave–Leave	88	16	84.6

These results are discussed and analysed in the following section.

5. Analysis and Discussion

In this section, we discuss and analyse the above results in the context of existing literature and our research objectives. The generalizations are based on identification tests because such tests are considered more reliable than the discrimination tests. Respondents completed these tests based on their own understanding, whereas in discrimination tests, they typically guessed after hearing pairs of stimuli. In the above results, we noticed that KA learners of English can perceive the English fricative [v] almost accurately and that perception of [ʒ] is between 38.5% and 67.3%, as the phonetic identification test results confirm. Figures 3 and 4 reflect this result.

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Figure 3 Perception Trend for [v] Based on Results of Lexical Identification Test

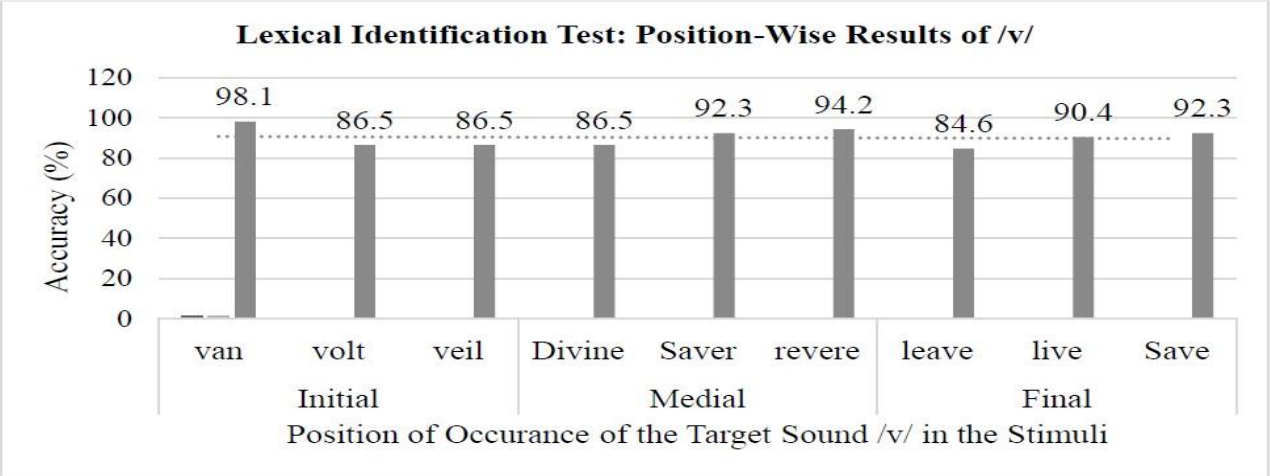
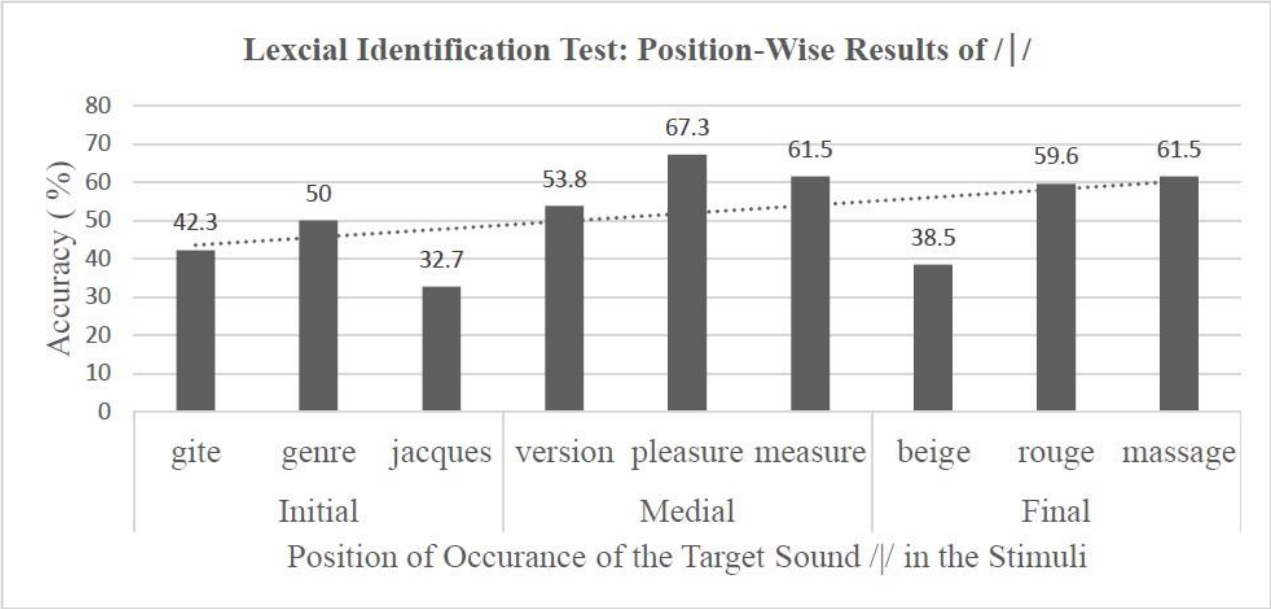


Figure 4 Perception Trend for [ʒ] Based on Results of Lexical Identification Test



The trend lines in Figures 3 and 4 show that participants' discrimination ability for /v/ is stable but /ʒ/ is not stable. This is also evident in the results given in the form of the number of frequencies in the above table. Addressing the second research question, the above analysis shows that KA undergraduate students' perception of English fricatives [v] is the same, but that of [ʒ] is different on word positions.

To depict a clearer picture of these results, we scored the identification test so one mark was awarded for each correct response. Participants' marks for the three words of the lexical identification test on all three positions were cumulative, as presented in Table 9.

Table 9 Summary of Lexical Identification Test Results

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Target consonant	Position	Minimum	Maximum	Mean	Std. Deviation
/v/	Initial	2	3	2.71	0.45
	Medial	1	3	2.73	0.53
	Final	0	3	2.65	0.65
/ʒ/	Initial	0	3	1.25	1.13
	Medial	0	3	1.83	1.19
	Final	0	3	1.6	1.05

A repeated, measured ANOVA considering place of occurrence as a variable confirmed that the performance of /v/ on word-initial, word-medial, and word-final positions was not significantly different ($p = 0.505$, $F = 0.665$).1 However, a place effect was found to be significant in the perception of [ʒ], as the listeners' average performance difference on three positions was found to be significant ($p = 0.0001$, $F = 12.006$). Participants' marks for three repetitions of the target stimuli and the closest distracter in phonetic identification test were cumulated, resulting in the data given in Table 10.

Table 10 Summary of Phonetic Identification Test Results

Consonant	Minimum	Maximum	Mean	Accuracy (%)	Std. Deviation
/f/	2	3	2.94	98.08	0.23
/v/	0	3	2.67	89.1	0.76
/ʒ/	0	3	1.8	60.26	1.15
/dʒ/	0	3	2.33	77.56	1.04

A paired sample t-test was applied on /f–v/, /ʒ–dʒ/, and /v–ʒ/pairs. The results are provided in Table 11:

Table 11. Result of t-test on Phonetic Identification Data

Consonant Pairs		t-value	Df	Sig. (2-tailed)
Pair 1	[f–v]	3.847	103	0
Pair 2	[ʒ–dʒ]	-3.64	103	0
Pair 3	[v–ʒ]	6.827	103	0

These results clearly indicate that the performance of participants in [f] is different than that in [v]. Similarly, they are different in perception of [ʒ] and [dʒ]. The results also indicate that the students differ in their perceptions of [v] and [ʒ]. As the mean values show, students' perceptions of [v] are significantly better than their perceptions of [ʒ]. These statistical analyses show that KA learners are good at perceiving [v] but weaker at perceiving [ʒ]. The results also confirm that the respondents

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have no difficulty in their perception of [v] in word-initial, word-medial, and/or word-final positions.

Now we will try to explain the nature of errors committed by the participants in identification of the target consonants. Table 12 summarizes responses of participants along with repetitions based on their perception of English fricative [v] and [ʒ] between two low vowels, i.e., /ava/ and /aʒa/.

Table 12 Nature of Errors in Perception of Kuwaiti Students

Response→ Stimuli↓	[v]	[f]	[p]	[w]	[b]	[d]	[dʒ]	[ʃ]	[g]	[tʃ]	[ʒ]
[v]	278	24	2	2	4	2	-	-	-	-	-
[ʒ]	-	-	-	2	-	-	90	14	16	2	188

These results confirm that either [v] is perceived accurately by these participants or it is confused with [f] maximally. Similarly, [ʒ] was perceived correctly or confused with [dʒ] consonant maximally. These results support our hypotheses. Perceptual assimilation of [v] with [f] is understandable on phonological grounds. Both are fricative consonants, and the only difference is feature [voice]. One is voiced, and the other is voiceless. It is widely accepted that Arabic learners of English experience difficulty in discrimination of /p/ from /b/ and confuse both with a single consonant of their L1 [b]. In the [p–b] pair, the same feature, i.e., [voice], is involved. Those few students who perceived [v] as [w] could not see the difference in features [round] and [sonorant] because [w] is [+round] and [+sonorant], whereas the English fricative [v] is [-sonorant] and [-round] in terms of the feature geometry model by Clements and Hume (1995). Similarly, some students perceived [v] as [p] or [b] because they could not differentiate between [p] and [b]. They consider both sounds the same because /p/ does not exist on the KA phonemic inventory. These students cannot differentiate between feature [-continuant] and [+continuant], and [v] is [+continuant], which is perceived as [b] [-continuant].

Based on our analysis of the nature of errors the respondents made in their perceptions of [ʒ], we assert that affricate [dʒ] may cause confusion. Most of the learners confused [ʒ] with [dʒ]. The difference between the two is that the former is fricative, and the latter is an affricate. In the framework of feature geometry (Clements, 1985;

Clements & Hume; 1995), affricates have both plus and minus gestures for the feature [continuant] such as [+ continuant], but KA learners who perceived [ʒ] as [dʒ] could not perceive this difference. They added the feature [- continuant] with this sound because [dʒ] is a complex sound that combines the stop [d] [-continuant] and the fricative [ʒ] [+continuant]. Some Kuwaiti undergraduate students also perceived [ʒ] as [ʃ]. This is understandable because both consonants are fricatives at the same place of articulation. The only difference between the two is that one is voiced and the other is not. With regards to the velar stop /g/, the Proto-Semitic and pre-Classical Arabic consonant /dʒ/ historically used to be voiced as the velar plosive /g/ (Al-Nassir, 1993, p. 44; Clark & Yallop, 1990, p. 327; and Kambuziya, 2007). In other words, it used to be fronted historically to a palato-alveolar affricate. The remaining errors are without any phonological significance and are negligible.

Finally, we answer the last research question of this study, which was whether we can predict correct learning of these English consonants by Kuwaiti students. From the perspective of second language

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acquisition, we predict possible problems in the acquisition of English fricatives [v] and [ʒ] for Kuwaiti undergraduate students. According to the PAM, learners correlate sounds of L1 with those of L2 in pairs called category types. Learners feel ease or difficulty in discrimination of phonemes in those pairs. English has [v] and [ʒ], but KA does not have these consonants in its phonemic inventory (see Kuwaiti consonants in the phonemic inventory of Kuwaiti language given in Annexure A). On the other hand, KA has [f] and [dʒ] consonants. Therefore, English [v] and [ʒ] cannot be completely merged with Arabic [f] and [dʒ]. The KA undergraduates substitute English [v] and [ʒ] with Arabic [f] and [dʒ] because they do not exist in the KA phonemic inventory and are closest sounds phonetically. As the perception test results show, the students can perceive [f] and [dʒ] better than [v] and [ʒ]. According to PAM, English [dʒ] and [f] are good exemplars of KA [dʒ] and [f], but English [ʒ] and [v] are poor exemplars of these sounds, respectively. The PAM framework makes a category-goodness type of sound pairs. Following PAM predictions, we anticipate that Kuwaiti English students will learn to discriminate in their perceptions between these [v] and [f] or [ʒ] and [dʒ]. Once they correctly perceive them, they will be able to produce them with correct pronunciation because there is typically a correspondence between perception and production (Flege, 1995).

Predictions about data can also be made through the SLM. According to this model (Flege, 1995), if learners perceive a new sound correctly, they will be able to produce it correctly. Their perception is based on how they discriminate a target L2 sound with the corresponding L1 sound. In discrimination tests, we noticed that our students discriminated [v] from [f] and [ʒ] from [dʒ] in most of the trials. This provides us with data to anticipate that Kuwaiti learners of English may be able to acquire these English fricatives in a nearly-native manner.

Similarly, we can see these results in the predictions of the FM (Brown, 1998). According to FM, if a feature is required to differentiate between two confusing L2 sounds that are active in the L1, learners can acquire those L2 sounds successfully. In our study, Kuwaiti learners of English confused [ʒ] with [dʒ] and [v] with [f] maximally. Feature [voice] differentiates between [v] and[f], and feature [continuant] distinguishes between [ʒ] and [dʒ]. Both features are active in feature geometry of KA, which has dental stops [t–d] and dental fricatives [θ – ð] differentiated by a feature continuant. In the same line, [t–k] have voiced counterparts [d–g] in KA, which clearly show that feature [voice] is active. In this scenario, FM predicts that English learners who speak KA as L1 will be able to discriminate [v] from [f] and [ʒ] from [dʒ], and once they perceive these sounds correctly, they will also produce them with correct pronunciation. After conducting perception tests of KA learners of English, the results positively confirm the FM hypotheses. This study also confirms the predictions of the other two models of SLA (PAM, SLM), which were not previously tested in the perspective of KA. For further research, it is worth noting our prediction of expected outcomes of learning pronunciation of English fricatives ([v] and [ʒ]) for Kuwaiti students.

6. Conclusion

In this paper, we addressed the perception of English labial fricative [v] and coronal fricative [ʒ] by KA undergraduate English students. The findings show that Kuwaiti students can differentiate between [v] and [f] excellently, and they also differentiate between [ʒ] and [dʒ] adequately. The position of the consonant in the word is not a problem for KA learners for [v], but for [ʒ], they experience various levels of difficulty when the consonant occurs word-initially, word-medially, and

word-finally. This implies that the study participants have acquired English fricative [v] in their perception, but they are still in the process of learning English [ʒ]. We also tested the predictions of models of second language acquisition—SLM, FM, and PAM—and then hypothesised that KA undergraduate English students may acquire English labial and coronal fricatives fairly well.

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Appendices

Appendix-1

Consonant Inventory of Kuwaiti Arabic by Aldaihani (2014)

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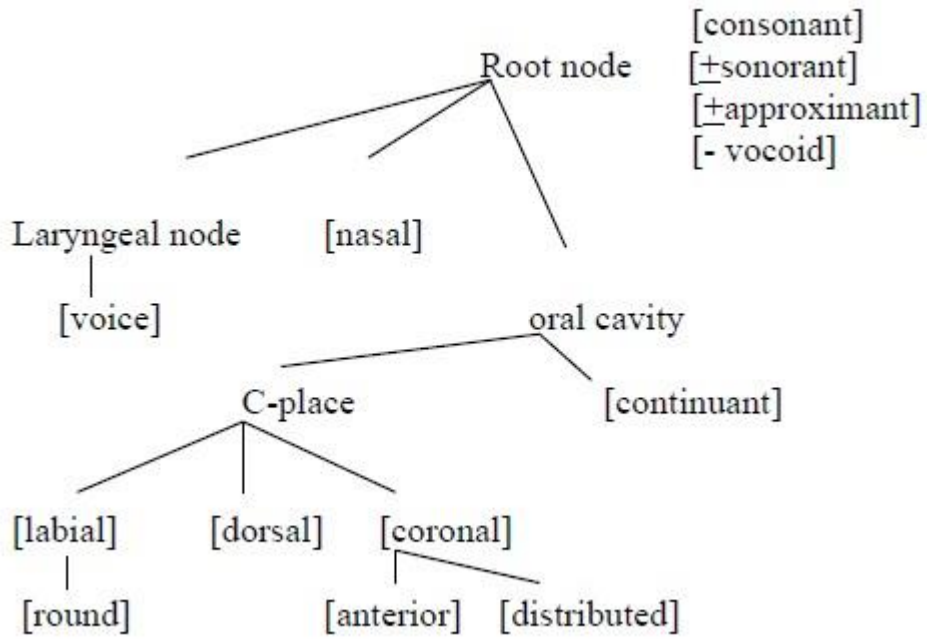
Manner of Articulation		Place of Articulation											
		Bi-Labial	Labio-Dental	Inter-Dental	Dental	Alveolar	Palator-Alveolar	Palatal	Velar	Uvular	Phar.	Glottal	
		LABIAL (4)		CORONAL (16)					DORSAL (5)		GUTTURAL (4)		
OBSTRUENTS	Plosive (Stops)	… b … ب	.....	.....	t d ت د	.....	.....	.....	k g ك …	q … ق …	.....	ʔ … ء …	7
	Emphatic (Stops)	.....	.....	.....	$t^ʕ$ … ط ….	….	.....	.....	.....	.....	.....	.....	1
	Fricatives	.....	f … ف …	θ ð ث ذ	.....	s z س ز	ʃ … ش …	.....	.....	χ ʁ خ غ	ħ ʕ ح ع	h … ه …	11
	Emphatic (Fricatives)	.....	.....	…$ð^ʕ$ … ظ	.....	$s^ʕ$ … … ص	.....	.....	.....	.....	.....	.....	2
	Affricates	.....	.....	.....	.....	.....	ʧ ʤ … ج	.....	.....	.....	.....	.....	2
SONORANTS	Nasal (Stops)	… m … م	.....	.....	.....	… n … ن	.....	.....	.....	.....	.....	.....	2
	LIQUIDS Lateral	.....	.....	.....	.....	… l … ل	.....	.....	.....	.....	.....	.....	1
	LIQUIDS Emphatic (Lateral)	.....	.....	.....	.....	… …. …	.....	.....	.....	.....	.....	.....	
	LIQUIDS Trill	.....	.....	.....	.....	… r … ر	.....	.....	.....	.....	.....	.....	1
	Semi-vowels (Glide)	… w … و	.....	.....	.....	.....	.....	… j … ي	.....	.....	.....	.....	2
		3	1	3	3	6	3	1	2	3	2	2	29

Note. Sounds to the left of the cell are voiceless; sounds to the right are voiced.

Appendix-2
Feature Geometry by Clements and Hume (1995)



Appendix-

Discrimination Test for Perception /p, ʋ, ʒ/

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S. No.	Example		S. No.	Example	
1	apa	aga	33	ava	afa
2	aga	aga	34	ava	ava
3	aka	aga	35	afa	afa
4	apa	aba	36	aʒa	aja
5	aba	apa	37	aja	aja
6	aba	aba	38	aja	aʒa
7	ava	afa	39	ata	ada
8	ava	ava	40	ada	ada
9	afa	afa	41	ata	ata
10	aʒa	aja	42	ada	ata
11	aja	aja	43		
12	aja	aʒa	44		
13	ata	ada	45		
14	ada	ada	46		
15	ata	ata	47		
16	ada	ata	48		
17	apa	aba	49		
18	aba	apa	50		
19	aba	aba	51		
20	ava	afa	52		
21	ava	ava	53		
22	afa	afa	54		
23	aʒa	aja	55		
24	aja	aja	56		
25	aja	aʒa	57		
26	ata	ada	58		
27	ada	ada	59		
28	ata	ata	60		
29	ada	ata	61		
30	apa	aba	62		
31	aba	apa	63		
32	aba	aba	64		

Appendix-

Identification Test for Perception /p, v, ʒ /

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S. No.	Examples	S. No.	Examples	S. No.	Examples
1	chair	33	home	65	picture
2	Table	34	pay	66	photo
3	window	35	sleeping	67	veil
4	gite	36	food	68	room
5	House	37	pie	69	chicken
6	Money	38	water	70	divine
7	Genre	39	drink	71	falcon
8	Car	40	pride	72	bird
9	Job	41	friend	73	saver
10	Jacques	42	boy	74	snake
11	Train	43	nipple	75	lion
12	Happy	44	cat	76	revere
13	Family	45	dog	77	tiger
14	version	46	rapid	78	fox
15	brother	47	camel	79	leave
16	mother	48	donkey	80	sister
17	Father	49	coupler	81	uncle
18	pleasure	50	tree	82	live
19	Plane	51	salad	83	manager
20	Street	52	cup	84	king
21	shopping	53	book	85	save
22	measure	54	pen	86	queen
23	Cold	55	tap	87	princes
24	Hot	56	pencil	88	
25	Beige	57	petrol	89	
26	Strong	58	rope	90	
27	student	59	floor	91	
28	Rouge	60	wall	92	
29	teacher	61	van	93	
30	School	62	carpet	94	
31	massage	63	kitchen	95	
32	airport	64	volt	65	

Appendix- 6

Discrimination Test for Perception /p, v, ʒ/

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S. No.	Example	
1	jail	girl
2	girl	girl
3	chair	glass
4	ʒolie	ʒolie
5	ʒolie	Jolie
6	Jolie	Jolie
7	major	major
8	measure	major
9	measure	measure
10	page	page
11	beige	page
12	beige	beige
13	gite	gite
14	gite	jeet
15	jeet	jeet
16	fault	fault
17	volt	fault
18	volt	volt
19	safer	saver
20	saver	saver
21	safer	safer
22	leaf	leaf
23	leave	leaf
24	leave	leave
25	pay	pay
26	pay	bay
27	bay	bay
28	nipple	nibble
29	nibble	nibble
30	nipple	nipple
31	rope	rope
32	rope	robe