

A VOT Measurement of the Pronunciation of Word-Initial /p/ by Libyan Speakers of
English

by

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ABSTRACT

The absence of the consonant sound /p/ in Libyan Arabic leads Libyan speakers of English to pronounce /p/ as /b/. This study examines how Libyan Arabic speakers distinguish the English /p/ and /b/ in their production of L2 English. The study also examines the effect of the production contexts and the learning environment on two groups of Libyan Arabic speakers' attainment of the English /p/ in the USA and Libya. The study collected voice recordings of word-initial /p/ and /b/ in isolated-words, minimal pairs, and sentences in English from both Libyan Arabic speakers and American English speakers. The study also collected Libyan Arabic stop consonants /b/, /t/, /d/, /k/, and /g/ from the Libyan participants. The voice recording data were collected using the WhatsApp mobile application from all participants and the Libyan Arabic participants were also asked to fill an online survey. Using voice onset time (VOT) as a measurement tool, this study measured the English and Libyan Arabic data through Praat software. The findings show that most Libyan Arabic participants distinguish between /p/ and /b/, but they did not have as high VOT averages as the American participants' /p/. It also reveals that the production context, especially in minimal pairs and sentence contexts, has an effect on their participants' production. However, the learning environment does not have an effect on the Libyan participants' pronunciation of /p/ in this study.

DEDICATION

I would like to dedicate this work to my father and my mother for their love and inspiration, and to my brothers and my sisters for their support and encouragement.

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CHAPTER 1

INTRODUCTION

1.1 Overview

The Libyan Arabic (LA) consonant inventory does not include the voiceless consonant sound /p/, though it does include /b/ and a voicing contrast in stops at other places of articulation (e.g., /t/-/d/, /k/-/g/). Therefore, LA speakers encounter difficulty when learning a second language (L2) with /p/, such as English. An informal observation is that English /p/ is often pronounced as /b/ by L2 speakers whose L1 is LA. Other dialects of Arabic also lack /p/, and there are several studies that have investigated the articulation of English /p/ by speakers of other Arabic dialects (Buali, 2010; Flege & Port, 1981; Khattab, 2002). However, the literature does not include any studies related to the pronunciation of /p/ by LA speakers of English. The current study fills this gap by focusing on the production of /p/ and /b/ by LA speakers of L2 English.

The primary aim of this study is to determine whether and to what extent LA speakers of L2 English distinguish /p/ and /b/ in production, using voice onset time (VOT) as a measure of stop voicing. Two secondary research questions were also considered: (1) What is the effect of production context (e.g., isolated words vs. sentences) on the pronunciation of these sounds? And (2) Is there a difference in the way these sounds are produced by those who learned English in an English-speaking country compared to those who learned in a non-English-speaking country? Finally, this study also collects data on the production of the voicing contrast present in the LA consonant inventory by measuring VOTs for (L1) LA /t, k/ and /b, d, g/.

This chapter provides an overview of previous literature relevant to this study. It then discusses the research questions and possible outcomes of the study in more detail.

1.2 Literature Review

Various research studies have investigated the English consonant pronunciation difficulties encountered by speakers of multiple Arabic dialects who are learners of L2 English, including Ahmad (2011), Al-Saidat (2010), Buali (2010), Binturki (2008), Barros (2003), and Flege and Port (1981). Other studies, like Kharma and Hajjaj (1989), Marzouk (1993), Altaha (1995), and Munro (1993) only focused on the pronunciation of the English vowel sounds by speakers of multiple Arabic dialects and who are learners of L2 English. However, there are no published studies that tested the pronunciation of the English consonants by LA speakers of English as an L2, and specifically the pronunciation of the contrastive consonants /p/ and /b/. Several studies investigated the pronunciation of the English and Arabic consonants using voice onset time VOT as a measurement tool, such as Flege and Port (1981) and Khattab (2002).

This literature review will first discuss the LA consonant inventory, then VOT as a measurement of voicing, then VOT in English and Arabic languages, factors that affect VOT, learning context, related second language acquisition (SLA) theories and studies; finally a summary will be presented at the end of this section.

1.2.1 Libyan Arabic Consonant Inventory

This section presents the LA consonant inventory. Table 1 contains the LA consonants with their manner of articulation and place of articulation. The LA consonant inventory has 8 stop consonant sounds, 15 fricatives, 1 affricate, 2 liquids, 2 nasals, and 2 glides (Fantazi, 2003, 73).

Table 1: The Libyan Arabic consonant inventory (from Fantazi, 2003, 73)

<i>Place of Articulation</i>	<i>Manner of articulation.</i>					
	Plosive	fricative	affricate	liquid	nasal	glide.
Labial	b				m	w
Labiodental		f (v)				
dental plain	t d	s z		l		
emphatic	<u>t</u> <u>d</u>	<u>ṣ</u> <u>ẓ</u>				
interdental plain		(d)				
emphatic		za				
Alveolar		š (ž)	j	r	n	
Palatal						y
Velar	k g	x ġ				
Uvular	q					
Pharyngeal		ħ ʕ				
glottal.		h				

Table 1 shows that LA does not have the voiceless consonant /p/, despite having the voiced bilabial stop /b/ and a voicing contrast in stops at several other places of articulation.¹

1.2.2 Voice Onset Time (VOT) as a Measurement of Voicing

Over time, voicing contrast in stop consonants has been given great attention in many research studies. In the fields of second language acquisition (SLA), phonetics, and phonology, many researchers have focused on investigating the pronunciation difficulties that exist between voiced and voiceless consonants in English as a second language (L2)

¹ As shown in table 1, there are two types of sounds under some of categories in place of articulation for some of the LA consonants, for example, the dentals /t/, /d/, /s/, and /z/ are repeated but underlined in the second time. The sounds which are not underlined are plain and they are produced like their English counterparts, but the underlined sounds are different because they are “emphatic”; the emphatic consonants are produced with the same articulators of their counterparts, but they are made with greater constriction in the pharynx. Therefore, this type of consonants is also called “pharyngeal” (Abumdas, 1985, 22). This study will include LA plain consonant sounds in the LA materials and the LA emphatic sounds will not be used in this study.

and the native language (L1) of learners, such as Ahmad (2011); Al-Saidat (2010); Aoyama, et. al (2004); Binturki (2008); Buali (2010); Caramazza, et al (1973); and Flege and Port (1981).

The distinction of voiced and voiceless stops is often described as the presence or absence of voicing during the closure interval of a stop. If there is voicing during the closure of a stop, then the consonant is voiced, but if voicing is absent during the closure, it indicates that the sound is voiceless. However, Lisker and Abramson (1964) noted that this method for distinguishing between contrastive homorganic consonant stop categories like /b/-/p/, /d/-/t/, and /g/-/k/ does not work well for making a sufficient distinction between the articulatory features of the categories in many languages including English. Therefore, Lisker and Abramson (1964) proposed that the distinction between voiced and voiceless sounds can be made through voice onset time (VOT) (1964,387-388). They defined the term VOT as “the time interval between the burst that marks release of the stop closure and the onset of quasi-periodicity that reflects laryngeal vibration” (1964,422). Moreover, Cho and Ladefoged (1999) gave an articulatory definition of VOT as, “the time between the initiation of the articulatory gesture responsible for the release of a closure and the initiation of the laryngeal gesture responsible for vocal fold vibration” (1999, 225).

Lisker and Abramson (1964) ran a study to test VOT as a measurement tool for distinguishing between the stop consonants categories in eleven languages. They found VOT as an effective measurement tool for distinguishing between contrastive consonant sounds (1964, 422). In addition, a number of studies were conducted to test the reliability of Lisker and Abramson's VOT as an acoustic measurement in the production and

perception of homorganic stop consonants. These studies examined many different languages and found that VOT is more effective for distinguishing the voiced and voiceless stops in English, for example: Chen, Chao, and Peng (2007); Flege and Port (1981); Klatt (1975); Lisker (1975). VOT has since become an important measurement for distinguishing voicing between contrastive consonants. Therefore, this study will use VOT to measure the mispronunciation of the voiceless stop /p/ by LA speakers of English in initial position.

1.2.3 VOT in English and Arabic Languages

This section provides more details about voice onset time in L1 English, L1 Arabic, and Arabic speakers' L2 English (/p/).

1.2.3.1 VOT in English (L1)

The English consonants are classified phonologically into two types, voiceless such as /p t k/ and voiced such as /b d g/. The VOT measurements of the English consonants show differences between the voiceless and voiced stops. Lisker and Abramson (1964) tested the English stops of American speakers. In word-initial position of isolated words, the voiceless stop /p/ tended to be pronounced with long VOT durations of generally 50 ms or more ('long-lag'). In the same context, the voiced stop /b/ was pronounced in two different ways: with short-lag, where the stop tended to be produced with VOT durations close to zero, or with pre-voicing, where it tended to have voicing during the stop closure. VOT measurements for pre-voiced stops are negative, whereas short and long lag stops have positive VOT values. Subsequent studies of English VOT have found similar results (Also see, Cho and Ladefoged (1999); Flege & Port (1981); and Weismer (1979)).

1.2.3.2 VOT in Arabic (L1)

There have not been many studies on the phonetics of Arabic voicing contrasts. This section focuses on one experiment of a study by Flege and Port (1981) where they collected L1 Saudi Arabic and English and L2 English data to examine participants' production of some consonant sounds including /b/ and /p/. This section focuses on the L1 Saudi Arabic experiment and the other experiments will be discussed in the following sections. In Flege and Port's (1981) first experiment the researchers tested the VOT in Saudi Arabic by 6 adult native speakers of Saudi Arabic. They were assigned to read randomized lists of Saudi Arabic words. The lists of words were designed to test the participants' articulation of stops, thus the lists included “word-initial and word-final stop voicing contrasts” (1981, 127). They found that Saudi learners' “stop voicing contrast differs from that of American English speakers”. The Saudi participants' /t/, /k/ in initial position had shorter VOT than /t/, /k/ in English (1981, 130). Their participants produced the Saudi Arabic /t/ with VOT value of 37ms, /k/ with VOT value of 52ms, but Flege and Port did not provide measure the VOT values of the participants' production of /b/, /d/, and /g/ because the participants produced them with continuous voicing during the stop closure.

In Lebanese Arabic, the “absence or presence” of voicing during the closure of a stop consonant determines the voicing in the sound (Khattab, 2002:96). For example, in Lebanese Arabic, /b/ is characterized as “lead voicing” in onset/word-initial position which means that it is more vibrated because vibration in lead voicing takes place before the stop release of /b/ (2002:96). However, the vibration of the English /b/ usually begins after the stop release (i.e. “lag”) (Buali 2010, 9). Khattab (2002) ran a study where she

tested two groups of 3 monolingual and 3 bilingual Lebanese children's production of the English and Lebanese Arabic word-initial /b d g/ and /p t k/ in isolated words context. She found that both monolingual and bilingual participants had similar production of the English sounds. She suggested that the presence of /p/ in loanwords in Lebanese Arabic was the reason that they produced /p/ with positive VOT. However, she found that only one participant in the monolingual group produced the Lebanese Arabic voiced consonants /b d g/ with high negative VOT values and the voiceless sounds /p t k/ with high positive VOT values, but the other participants had variable productions of the values of the voiced and voiceless consonants in Lebanese Arabic. She also found that the bilingual group had more difficulty producing the Arabic voiced and voiceless consonants because they produced the voiceless and voiced consonants with short lag VOT values.

1.2.3.3 VOT in Arabic speakers' L2 English

Since LA does not have /p/ like many other Arabic dialects, a common observation in L2 speech is that Libyan speakers tend to replace /p/ with its homorganic voiced counterpart /b/. There is also evidence of phonological replacement of /p/ with /b/ in loanword adaptation. For example, Abdu (1988) stated that the Italian loanwords in the Libyan dialect that begin with /p/ were changed to /b/, including “pacco” in Italian meaning “packet” and in LA it is produced as “baakku” and “pala” meaning “scoop” is pronounced as “baala” (1988, 175).

In principle, there are several possible outcomes when an LA native speaker pronounces a /p/ in an L2. First, speakers could ignore the distinction between /p/ and /b/ and pronounce both as /b/. If LA voiced stops tend to be pronounced with pre-voicing, as

Flege and Port (1981) found with Saudi Arabic, then we would expect negative VOT for both sounds in this case. Second, LA speakers could pronounce /p/ with relatively high positive VOT, that is, in a native-English-like manner. The third possible outcome is that speakers may make a distinction between /p/ and /b/, pronouncing /p/ with some positive VOT, but that the VOT of /p/ on average is somewhere between values for /b/ and a native-English-like /p/.

There are studies in the literature that showed variable productions of /p/ by Arabic speakers of L2 English. Flege and Port (1981) ran a landmark study to test the pronunciation of voiced and voiceless stops. The researchers tested Saudi Arabic speakers' perception and production of stops in English and Arabic. They conducted three experiments in order to examine the phonetic differences of voicing (1981:126). The first experiment was discussed in section 1.2.3.2 because it is related to Arabic VOT and this section is focused on L2 English VOT measurement of /p/. Flege and Port's (1981) study included three groups of participants: two were Saudi groups of 6 participants each, where the first group consisted of those whose length of residence in the US was longer than the other Saudi group, and a third group consisting of 6 English American speakers.

The participants read minimal pairs of one-syllable English words containing /b d g/ and /p t k/ word-initially. The researchers found that the American group's /p t k/ in word-initial position had longer VOT values than that of both Arabic groups. The results also showed that the Saudi participants sometimes produced the English stop /p/ with voicing during the closure (negative VOT), and this was more frequent in the group who had been in the USA for a shorter time. When not pre-voiced, the VOT of /p/ averaged

14ms for the group who have lived for a shorter period in the USA and 21ms for the group with longer USA residency. The researchers also added that the American participants did not voice /p/ (Flege & Port, 1981, 133-135).

Flege and Port (1981) concluded from their study (which also measured stop closure and vowel durations) that the timing of /p/ suggests that the Saudi participants did grasp the phonological nature of the sound /p/, meaning that the contrast between /p-b/ is comparable to that between /t/ - /d/ and /k/ - /g/. However, the Saudi participants were unable to control all the articulatory dimensions by which this sound is produced (Flege & Port, 1981, 143-144).

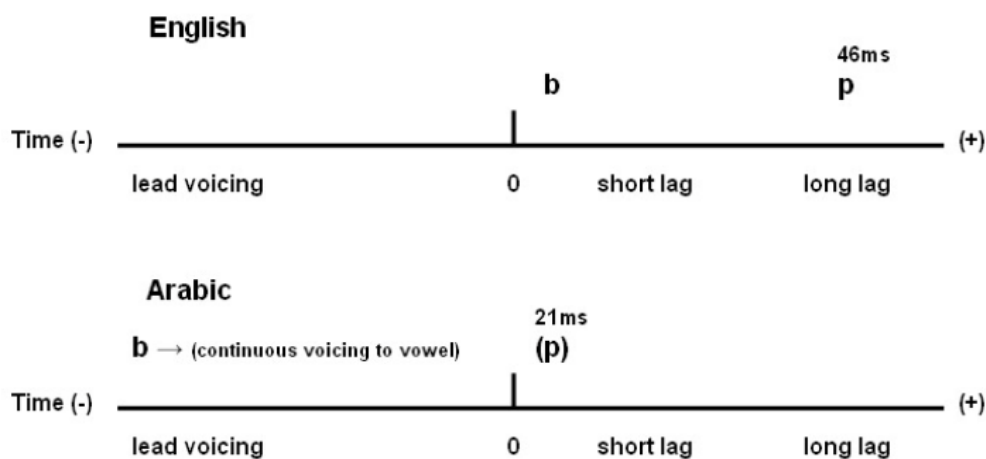
Buali (2010) presented a similar study. He examined the pronunciation of /p/ in a group of Saudi Arabic learners of English in Canada and found production results similar to those of Flege and Port (1981). In particular, speakers often pronounced /p/ with voicing during the stop closure, suggesting, as we have already discussed, that /p/ tends to be replaced with /b/ in L2 speech. Buali also collected data on the perception of (native English) /p/ by the same group of participants; he found that there was no relation between perception and production accuracy.

Several studies have also examined American listeners' perception of Arabic speakers' L2 English. One of Flege and Port's (1981) experiments tested American English listeners' perception of various L2 stops produced by Saudi Arabic speakers. Greater confusability was observed for the /p/-/b/ contrast compared to either of /t/-/d/ or /k/-/g/. That is, "intended" /p/s were heard as /b/ more often than /t/, /k/ were heard as /d/, /g/. They attribute this to two factors: one is "the short VOT values" and the other is because of "the occurrence of voicing in the production of /p/" (Flege & Port, 1981, 136-

142). Interestingly, they also found that “intended” /b/ was misheard as /p/ slightly more often than /d/, /g/ were heard as /t/, /k/, though they do not pursue a definitive explanation of this finding (1981, 142).

It is not surprising that English listeners would perceive a pre-voiced labial stop as /b/. However, even in cases where an L2 speaker distinguishes the VOT of /p/ and /b/ on average, confusability may persist if the VOT of /p/ is not sufficiently long. Figure 1 is a good example of how Arabic speakers could think they are making correct pronunciation of /p/, but English speakers may still hear it as /b/ because of the way speakers of Arabic articulate /p/. This figure is from Buali (2010), who used VOT values obtained from Flege and Port (1981, 135). (In the figure, “0” represents the stop release.)

Figure 1: VOT lag and lead voicing characteristics of English and Arabic stops
(from Buali, 2010)



In summary, Buali (2010) adds that the case of Saudi Arabic speakers' mispronunciation of /p/ leads to the “shortening” of the VOT of /p/ (2010, 8). Thus, producing a /p/ that is closer to zero. It is clear that both English and Arabic languages

share some similar stop “categories”, but these two languages contrast in their “VOT patterns” (Khattab, 2002, 96). Speakers of English as a native language usually do not have any vocal cord vibration during the production of either of the pairs /p b/, /t d/, /k g/. However, Lisker and Abramson (1964) stated that native English speakers' /p/, /t/, and /k/ in word initial position are released with aspiration and /b/, /d/, and /g/ are produced without aspiration (Lisker & Abramson, 1964, 385). Flege and Port (1981) also found that Saudi Arabic speakers were aware of the phonetic difference between /p/ and /b/, but they could not produce a /p/ that is close to the American English speakers' /p/. However, the variations of the results in these studies keep the question, “how Arabic speakers of English produce /p/?” unanswered in this literature.

1.2.4 Factors that Affect VOT

Voice onset time can vary depending on the context where the sounds occur. For example, VOT values are claimed to be larger or smaller depending on whether they occur within stressed or unstressed syllables. Therefore, this section explains which contexts could have an effect on the values of VOTs.

Measuring the VOT of sounds within different types of syllables in words results in different VOT values. That is because the position of the sounds plays an important role. Stress is the main factor that affects the VOT values.² Lisker and Abramson (1967) conducted a study in order to investigate some effects of contexts on VOT and that included stress and voicing of the sounds. They found that stress could have an effect on VOT values of voiceless consonants, like /p/, /t/, /k/, but stress did not have an effect on

² Phonologically, syllable structure may also affect whether a stop is pronounced with or without aspiration, and thus, with relatively longer or shorter VOT. In this study the focus is exclusively on contexts where English voiceless stops are pronounced with aspiration (in the onset of a stressed, word-initial syllable).

voiced consonants, like /b/, /d/, /g/. Stress affects voiceless consonants in word initial position by giving the sounds greater VOT values (1967, 16-17). The experiment in this study tests stops in onsets of stressed syllables, and most of the words were monosyllabic.

Lisker and Abramson (1967) made another comparison on the effect of isolated words and sentences contexts on VOT in the same study mentioned above. After testing the VOTs in isolated words and sentences contexts, they found that the VOTs in sentences either voiced or voiceless consonants were "significantly shorter" i.e. less positive for voiceless and less negative for voiced than the VOTs in isolated words (Lisker and Abramson, 1967, 9). So the position of the sounds has an effect on the VOT of the sounds because the results were different in each context. This result is important for the analysis of the data in this study because this study includes materials in the contexts of isolated-words, minimal pairs, and sentences.

In their cross-language study of voicing in initial stops of 11 languages, Lisker and Abramson (1964) found that the VOT of voiceless stop consonants could be affected by the place of articulation (1964, 399). They found that the velars have higher VOT values than the bilabial and alveolars. In addition, Klatt (1975) ran a study to test the effect of place of articulation of the American English stops on VOT and found similar results to Lisker and Abramson (1964). (Also see Cho and Ladefoged (1999) and Zue (1976)). The effect of place of articulation on VOT is relevant to this study because it tests two types of data. The main type is English data that only includes bilabials and the second type of data is LA data that has bilabial, alveolars, and velars.

There is some evidence that VOT can be affected by the following vowel. The VOT of /p/ in American English varies depending on the following vowel (Buali, 2010,

11). Klatt (1975) stated that the VOT in voiceless stop consonants was greater if the following vowel was a high vowel (1975, 691). In addition, Weismer (1979 as cited in Buali, 2010, 11) measured VOT in milliseconds for /p/ with six different following vowels: /pi/, /pe/, /pi/, /pɛ/, /pu/, and /pæ/ and found that VOT averages ranged from 57.60ms to 44.06ms. However, this does not appear to a very big difference. Therefore, the effect of the following vowel of the stop consonants will not be a considered in the measurements of this study not only because of the small variations that the vowels caused in Weismer's (1979) results but also because the materials in this study are minimal pairs, e.g. "pat" and "bat". The purpose of presenting this section was to highlight the point that there is, in specific conditions, some effect of the following vowel on VOT.

In summary, this section shows that VOT could be affected by some factors, including whether the syllable in which the sound occurs is stressed or unstressed, whether the sounds are within the context of isolated-words or sentences, whether place of articulation of the sounds affects the sounds or the vowel that follows the target consonant. Most of items in this study were monosyllabic and for the bisyllabic items, the stress is on the first syllable where the initial stops occur. Regarding the context (i.e. isolated words vs. sentences), the effect of these contexts will be taken into consideration. Finally, the effect of following vowel on the VOT of the stops is balanced in this study because the items are minimal pairs.

1.2.5 Learning Context

Learning an L2 in an L2 country could have many positive impacts on the learners' phonological improvement of L2. Levis (2005) emphasized the importance of learning L2 pronunciation in an L2 speaking country where learners could have the

chance of applying their English and listening to native speakers of the language. However, he also stated that the learning of pronunciation in particular in a native-language environment may not be a useful experience because not all speakers in the L2 country speak the same standard language as the language the learners listen to in their classrooms. For example, not all native speakers of English speak Standard American or Received Pronunciation in the UK (2005). Therefore, the learning process of pronunciation relies on factors that are more important than just being in the L2 speaking country.

Sanz and Leow (2011) highlighted the importance of studying abroad (SA) contexts. They conducted a study to examine the effectiveness of learning pronunciation in a SA environment and found that for a phonological development, a longer SA is needed for learners to obtain the phonological system of L2 (2011, 125).

As mentioned above, there are other studies in the literature that agree and contrast with the above views of the importance learning L2 phonology in an L2 context and most studies support the idea that the improvement of L2 sounds does not only depend on the learning context, but it also relies on other factors, including the suitability of the learning contexts. The current study examines the effect of the learning environment on the participants' learning of pronunciation in two settings—one where L2 is the dominant language and another where it is not. Thus the above studies are relevant to this study in the way that there could be a possibility that learning context may not be as important as other factors that help learners learn, like motivation, comfort, and social life.

1.2.6 Summary

This literature review provided some background information on some previous works related to the focus of this study and also showed the importance of VOT as a measurement tool that could distinguish between phonologically voiced and voiceless stops. Then some general information was provided about the effectiveness of L2 phonology learning context. There is clearly a need for more research on Arabic pronunciation of /p/ and /b/. Some of the above studies examined some dialects of Arabic, such as Buali (2010), Khattab (2002), and Flege and Port (1981). However, the literature lacks research on LA speakers' pronunciation of contrastive consonants specifically /p/ and /b/.

1.3 Research Question and Hypothesis

The previous section presented background information on VOT with previous studies that dealt with English and Arabic VOT and showed how they examined the production of the consonant sounds /p/ and /b/. This section narrows down the general discussion of other studies to present the research question and the hypotheses of this study. The main questions I am trying to answer in this study are: (1) Do speakers of LA distinguish /p/ and /b/ in the production of L2 English and to what extent? (2) Does context of the sounds within words, minimal pairs, and sentences have an effect on their production? (3) Does the learning environment (English-speaking vs. non-English-speaking country) affect LA speakers' learning of the voiceless consonant /p/? (4) What are the average VOTs for LA stops? To answer these questions, this study collected recordings of the production of English /p/ and /b/ and the native LA stops /t/, /k/, /b/, /d/, and /g/ by native speakers of LA. The English materials were also recorded by a control

group of native speakers of American English. The next paragraphs discuss some possible outcomes of the current study with respect to each of these questions.

With respect to the first research question, the findings of Buali (2010) and Flege and Port (1981) on Saudi Arabic speakers' L2 English suggest a high likelihood that some LA speakers of L2 English may voice the voiceless consonant /p/ in at least some contexts. If this occurs we would find productions of /p/ with negative VOT. And if this pattern is common among participants and contexts, we may find that average VOT values for /p/ and /b/ are not very different. On the other hand, the presence of /t/ and /k/ in the LA consonant inventory (and the phonological voicing contrast between /t/-/d/, /k/-/g/), may cause some LA speakers to produce /p/ with VOT averages similar to the LA /t/ and /k/. We might then expect a difference between L2 /p/ and /b/, but an overall lower VOT average for /p/ in L2 speech compared to the speech of native English speakers (under the assumption that native LA VOT for /t/ and /k/ is similar to Flege and Port's (1981) findings on Saudi Arabic). However, it is also possible that some speakers may show native-like pronunciation of /p/ in at least some contexts.

For the second research question, based on the literature review, I expect that context where the sounds occur may have an effect on their VOT. This study will compare the production of /p/ and /b/ in isolated words, a frame sentence, and as minimal pairs. If the findings of the current study are similar to those of Lisker and Abramson (1967), we would expect to see higher VOTs in isolated words compared to the frame sentence context. Furthermore, we might also expect that VOT differences between /p/ and /b/ may be exaggerated in the minimal pair context because participants may notice the difference between the contrastive sounds in the minimal pairs and they may try to

phonetically distinguish them. It is also possible that the effect of context may be realized differently for L1 vs. L2 speakers.

The context of learning is the third question that will be considered. The LA participants will be from one of two groups: those who learned English primarily in Libya and those who learned English primarily in the USA. We may expect that learning in an English-speaking country may have an effect on the production of L2 /p/. If this effect is positive, then the USA group would be expected to have a higher VOT average for /p/ compared to the Libya group.

And, finally, because there are few studies on the production of native LA stops, this study will also collect production data for LA speakers' L1. If LA is similar to other Arabic dialects, it is expected, on average, that /d/ and /g/ will have negative VOT and /t/ and /k/ will have positive VOT. This data will then allow comparisons between the L1 production of voicing contrasts and the production of L2 /p/ and /b/.

The next several chapters present the details of this study. Chapter 2 provides the methodology; chapter 3 discusses the results; chapter 4 provides some general discussion; and chapter 5 concludes.

CHAPTER 2

METHODOLOGY

In order to test the hypotheses of this study, I collected three kinds of data. First, recordings of English words with initial /p/ and /b/ were collected from LA speakers of L2 English and from a control group of native English speakers. The English materials were recorded in three ways: as isolated words, in a frame sentence, and as minimal pairs; this was done to compare the pronunciation of /p/ and /b/ in different production contexts. Second, the same group of LA speakers also recorded native LA words beginning with /t/, /k/, /b/, /d/, and /g/. The LA words were recorded as isolated words only. And third, the LA speakers were given a questionnaire to collect information about their demographics and English education. LA participants were recruited from two different groups: those whose English education took place primarily in Libya vs. in an English-speaking country; this was done to allow comparison of the effect of learning environment. The following sections provide more details about the methodology.

2.1 Participants

There were 19 participants in this study, 15 native speakers of LA and 4 adult American English speakers. The age range of the Libyan participants was from 20-36; there were 4 females and 11 males. All of the Libyan participants in this study were born and raised in Libya and they are all native speakers of Standard Arabic and LA.³ The LA participants were divided into two groups based on where their English education took

³ The use of standard Arabic is limited to official contexts and other special situations, including media, academic speech and writing, and politics but Libyan speakers speak Libyan Arabic dialect in all other situation. Thus, in this experiment, the participants spoke the Libyan Arabic stimuli in the Libyan Arabic dialect.

place. The first group consisted of 8 LA speakers of L2 who learned English in Libya and they were all living in Libya at the time of participation (hereafter, Libya Group). They were divided into 4 females and 4 males. The second group consisted of 7 LA speakers of L2 English who learned English at least partly in the USA and were all living in the USA at the time of participation (hereafter, USA Group). They were all males. The range of all LA participants' total length of English study was from 2-12 years. Additional information about the LA participants was collected in the form of a questionnaire, and the results will be discussed in chapter 3. Four adult native speakers of American English formed the Control Group. They were all graduate students at Arizona State University. They were divided into 2 females and 2 males.

2.2 Materials

This study included two types of target items. The first type of items is English words, sentences, and minimal pairs. The second type of items is LA words. The following sections explain each type of items separately.

2.2.1 English Materials

The English target items are 22 words including the target sounds word-initially. The target words are collected in 3 ways: as isolated words, in a frame sentence (*They say_____*), and as minimal pairs. An additional 22 items were included as foils/fillers in all contexts; these words included word-initial /k/, /g/, /t/, /d/, /f/, /v/, /l/ consonants.

Table 2 presents the English target items with word-initial /p/ and /b/. All of the items were pseudo-randomized with the filler items in the same way for all participants. Appendix A and B show the instructions and the materials lists exactly as they were given to the LA participants and the Control Group, respectively.

Table 2. English target items

/b/	butter	bat	bin	bee	bark	bay	beep	bar	ban	bet	base
/p/	putter	pat	pin	pea	park	pay	peep	par	pan	pet	pace

2.2.2 Libyan Arabic Materials

In addition to the English items above, LA participants also recorded a list of LA words. The LA items include: 10 target words beginning with the stop consonant /b/ and 19 target items that included contrastive consonants /k/-/g/, /t/-/d/ initially in monosyllabic isolated words only. This created a total of 29 target LA items divided into 10 /b/s, 5 /t/s, 5 /d/s, 4 /k/s, and 5 /g/s.

Table 3 presents the LA items with translation and transcription, but the LA items were shown to all of the participants in this order without translation and transcription (see Appendix A).

Table 3. Libyan Arabic target items

LA Items	Translation	Transcription	LA Items	Translation	Transcription
باب	door	[bæb]	بير	well	[bir]
تن	tuna	[tɪn]	كناك	what is wrong?	[kænk]
قال	he said	[gæɪ]	دار	room	[dær]
بار	obedient	[bær]	تبين	hay	[tɪbn]
قفل	lock	[gɪfl]	تل	wire	[tæl]
بيت	house	[bert]	برج	tower	[borʒ]
قبل	before	[gæbl]	كذب	lying	[kæðb]
بلح	mussels	[belh]	دب	bear	[dɒb]
قبر	tomb	[gæbr]	بحر	sea	[bæhr]
باي	bye	[baɪ]	كشك	kiosk	[kɪʃk]
قمل	lice	[gæml]	ديك	rooster	[dik]
تمر	date	[tæmr]	بركه	pool	[bɪrkh]
دير	do	[dir]	دق	knock	[dɪg]
بقرة	cows	[begr]	تم	okay	[tæm]
كلب	dog	[kælb]	-	-	-

2.3 Procedure

This study includes two types of data collection tasks. The first is a voice recording and the second is an online survey. The LA participants participated in both tasks, but the native English speakers only did the voice-recording task. The following section provides more details about the procedures of the data collection.

2.3.1 Voice Recording

All participants recorded themselves saying a list of ordinary English words and sentences, and the Libyan participants also recorded themselves saying a list of ordinary LA words. Due to the long physical distance between the study researcher and the participants (many of whom were living in Libya and others were living in different states in the USA at the time of participation), the participants were sent the materials list and instructions in English language via Facebook and email. The recording was collected remotely using the Voice Messaging feature on the application WhatsApp: a smartphone messaging application that is used for exchanging text and audio messages without having to pay for SMS (“WhatsApp,” 2014, Home page).

The instructions were made very clear in order to guide the participants and show them how to participate and that includes how to install and use the WhatsApp application. (See the complete instructions in Appendix A and B). The participants were able to ask me questions about the research procedures before beginning their participation. Then they did the recording in a quiet room on their own time and sent the resulting recordings through the application.

The participants started recording first the isolated words, then the sentences, and finally the minimal pairs. The minimal pairs were intentionally placed last in order to

avoid making the participants notice the purpose of the study. That is because each minimal pair contains two contrastive consonants and thus noticing the contrastive sounds may affect the way the participants would produce the isolated words and the sentences. In addition, the LA participants recorded the LA isolated words after the English materials. The whole recording process took less than 10 minutes per participant.

Afterwards, I transferred the materials from WhatsApp to my personal computer, where the voice recordings were labeled and stored with an arbitrary numeric code that does not identify the participant.

2.3.2 Survey Questionnaire

After the LA participants finished with the recording, they were asked to complete an online questionnaire with questions about demographics, their native language, their current level of English, their proficiency in speaking, listening, reading and writing English, the native language of the teacher(s) who taught them English, the length of their English language study in the USA/Libya, and where their English education took place (See the survey questions in Appendix C).

The participants' survey responses and recordings were linked by an arbitrary numeric code assigned randomly to each participant. Like the voice recordings, the survey data was stored without any identifying information from each participant except their arbitrary assigned numeric ID code.

2.4 Data Measurement

After receiving all data from all participants, the audio files were converted from ACC format into MP3 format using Audio Converter Lite software so the audio files could be analyzed using the software Praat (Boersma & Weenink, 2014, version 5.3.84).

The main focus of this research is to measure the voicing of the stop consonants /p/ and /b/ and determine if Libyan speakers produce /p/ differently from /b/. The best way to conduct this measurement is through VOT, which is regarded as an effective method for examining voicing in stop consonants in word-initial position before a vowel (see section 1.2.2).⁴

Following Lisker and Abramson (1964), VOT was measured differently for sounds with pre-voicing vs. sounds without pre-voicing. First, the measurement of pre-voiced consonants (negative VOT) was done by selecting the onset of voicing before the burst until the beginning of the burst. Second, the non-pre-voiced consonants (positive VOT) were measured by highlighting the release of the burst until the onset of the vowel. Below are two examples of both a negative VOT of /b/ and a positive VOT of /p/ on Praat.

Figure 2 is an example of a test word "butter" shown in the acoustic waveform (top panel) and spectrogram (bottom panel). The highlighted wave shows the position from which the measurement was taken for this sound. It is clear from the waveform that this /b/ has voicing before the burst, which means that it has a negative VOT.

⁴ Although MP3 format is not ideal for spectrographic analysis, durational information was recoverable from all recordings, so it is sufficient for VOT analysis.

Figure 2. Voiced consonant /b/ on Praat

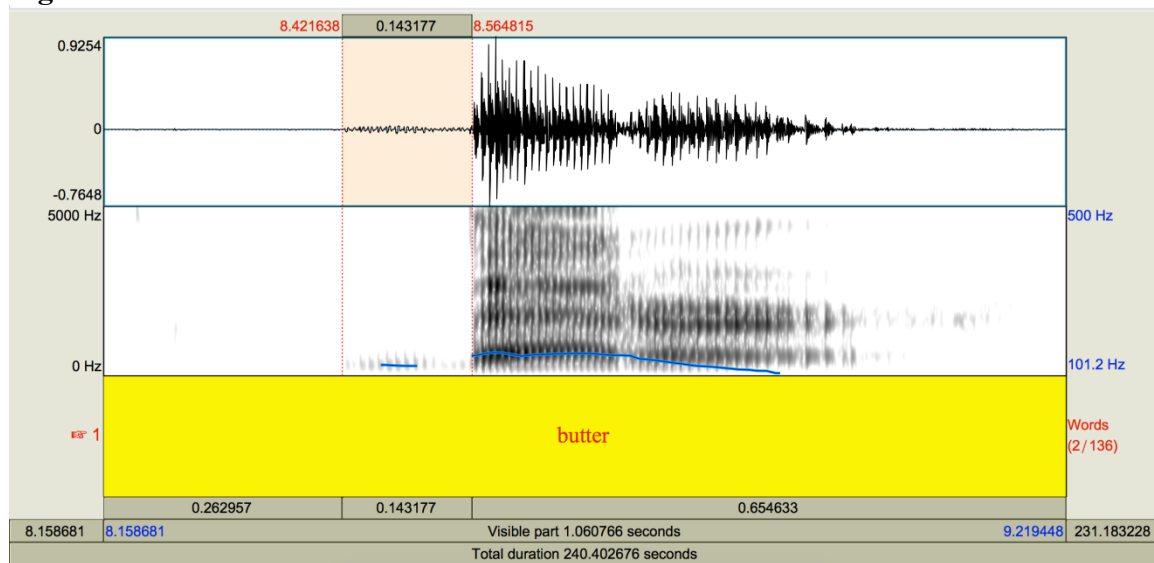
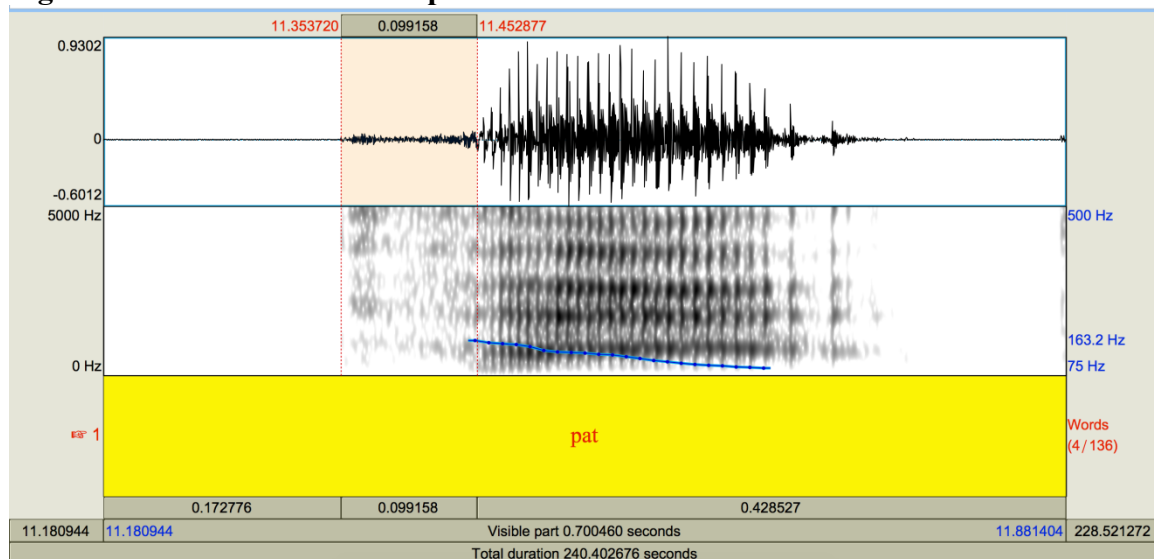


Figure 3 is an example of a test word "pat" shown in the acoustic waveform (top panel) and spectrogram (bottom panel). The highlighted wave shows the position from which the measurement was taken for this sound. It is clear from the waveform that this /p/ has a period of noise (i.e., aspiration) between the stop burst and the onset of voicing, which means that it has a positive VOT.

Figure 3. Voiceless consonant /p/ on Praat



VOT measurements were taken of the 66 English items for all 19 participants and the 29 Arabic initial consonants for the 15 LA participants. Thus, there was potential a total of 1,689 measurements of the data in this study. However, three Libyan participants skipped one English word each, so the total number of measurements was 1,686.⁵ When all measurements were taken, I created the averages and standard deviations of the VOT of each target sound for each participant in each context and the averages and standard deviations for each group as a whole using Microsoft Excel.

⁵ Participant 352 skipped /b/ in one context of sentences. 201 skipped /p/ in one context of isolated-words. 203 skipped /b/ in one context of sentences.

CHAPTER 3

RESULTS

This section presents the results of the collected data. First, the average VOTs for LA stop consonants are provided, then the combined results for L1 English vs. L2 English /p/ and /b/ are provided. After that, the effect of production context (isolated word, sentence, minimal pair) is presented. This is followed by the effects of learning environment on L2 English, which is discussed along with some details of the survey data collected from the LA participants. Finally, the results are examined for each LA participant individually.

3.1 Stop consonant VOT in Libyan Arabic and English

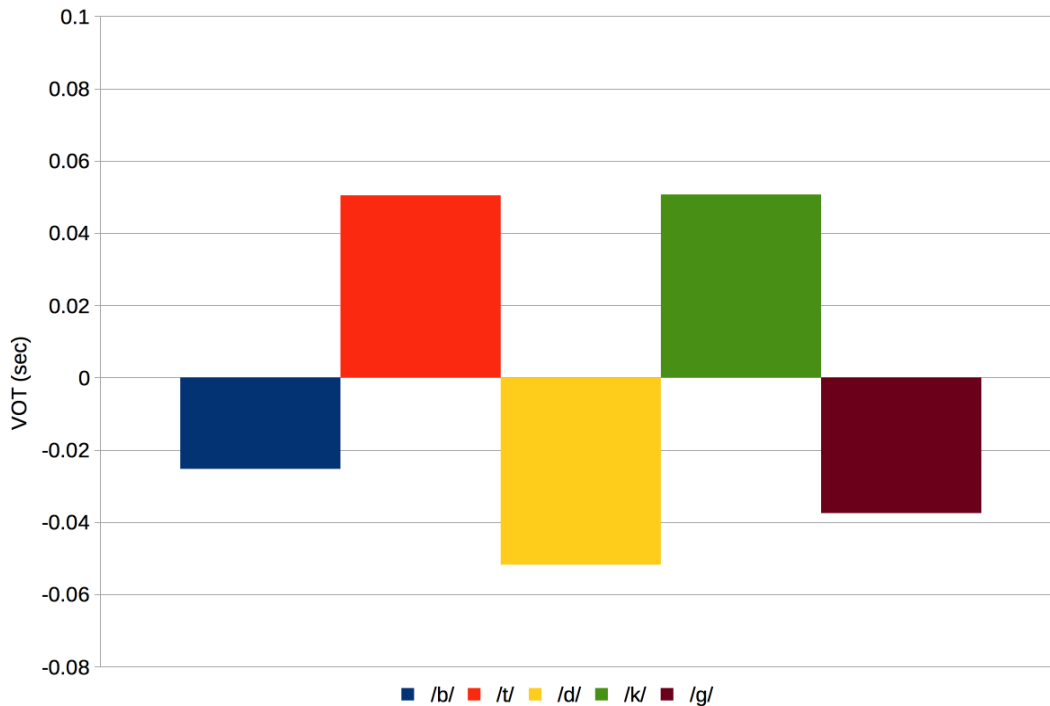
This section first presents the data for (L1) LA stop consonants (3.1.1). Then, the results for /p/ and /b/ (combined across contexts) are provided for the LA group compared to the control group (3.1.2). This section concludes with some discussion of these results (3.1.3).

3.1.1 Libyan Arabic

Table 4 gives the VOT averages and standard deviations (SD) for the LA stop consonants /b/, /t/, /d/, /k/, and /g/ across all LA participants. The phonologically voiced consonants /b/, /d/, and /g/ all show negative VOT, indicating that, on average, these sounds are produced with voicing during the stop closure. The phonologically voiceless consonants /t, k/ both have positive VOT averages around 50ms. These results are illustrated in figure 4.

Table 4. LA VOT averages

LA Sounds	VOT (sec)	
	Average	SD
/b/	-0.025	(0.057)
/t/	0.050	(0.018)
/d/	-0.052	(0.068)
/k/	0.051	(0.013)
/g/	-0.038	(0.064)

Figure 4. LA VOT averages by the Libyan participants

The LA initial /b d g/ results appear to be similar to those of the Saudi Arabic speakers in Flege and Port (1981). Although they did not provide VOT averages for the Saudi Arabic /b/, /d/, /g/, they stated that they were produced with “continuous glottal pulsing through the stop closure interval” (Flege & Port, 1981, 129). The VOT averages of the LA voiceless /t/ and /k/ are also similar to Flege and Port’s (1981) results for Saudi Arabic. They found that /t/ had a VOT value of 37ms and /k/ had a VOT value of 52ms, while the current study found a /t/ to have an average VOT of 50ms, while /k/ had an average VOT of 51ms.

3.1.2 Combined English Results

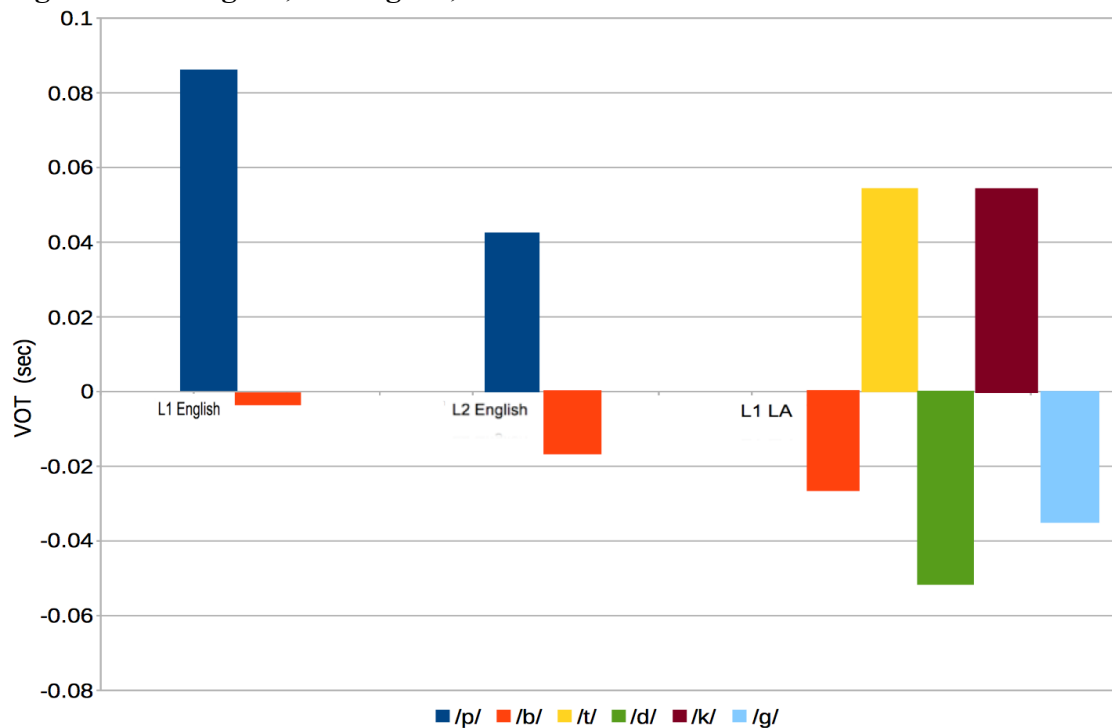
I combined the average VOTs for English /p/ and /b/ across production contexts for both the LA participants (L2 English) and the Control Group (L1 English). Table 5 provides these results. For L1 English participants, /p/ had a high positive VOT average (0.092sec), while /b/ had a VOT very close to zero (-0.003sec). For L2 English participants, /p/ had a moderate positive VOT of 0.041sec, while /b/ had a somewhat negative VOT (-0.018sec). Thus, on average, L1 English participants show a difference of nearly 100ms between the VOT of /p/ and /b/ even though /b/ is not strongly pre-voiced. And on average, L2 English participants show a difference of about 60ms between the VOT of English /p/ and /b/.

Table 5. L1 and L2 English /p/ and /b/ combined across contexts

	L1 English VOT (sec)		L2 English VOT (sec)	
	Average	SD	Average	SD
/p/	0.092	(0.027)	0.041	(0.052)
/b/	-0.003	(0.044)	-0.018	(0.066)

Figure 5 shows these results alongside the averages for L1 LA stop consonants (from 3.1.1). Although the L2 English results are different from the L1 English speakers' results, the contrast between English /p/ and /b/ appears to be pronounced by LA participants in a way that is somewhat similar to their native voicing contrasts.

Figure 5. L1 English, L2 English, and L1 Arabic



3.1.3 Discussion

Although the difference between /p/ and /b/ for the LA participants is not as large, on average, as that of the L1 English speakers, there is nonetheless some difference between the LA participants' pronunciation of /p/ and /b/. This provides an answer to the first research question of this study and shows that at least for some speakers in some contexts, there must be a difference in the production of English /p/ and /b/.

The data on native LA stop consonants was included to see whether LA speakers would produce the L2 English /p/-/b/ contrast in a way that is similar to their native voicing contrasts (i.e., /t/-/d/, /k/-/g/). From figure 5 we can see that the LA participants produced English /p/ somewhat like LA /t/ and /k/. The average VOT for English /p/ is slightly lower than that of LA /t/ and /k/, but it is not clear whether this difference is large enough to be significant. One difference between LA participants' English /p/ and LA /t/

k/ is in their variability. The higher standard deviation of English /p/ (0.052) compared to /t/ (0.018) and /k/ (0.013) suggests that participants were more variable in their pronunciation of English /p/. This is not very surprising, since there are differences among LA participants in their level of English pronunciation. More details about individual differences are discussed in a later section. There is also not a strong difference in the average for LA participants' L2 English /b/ and their LA /b/, suggesting that they may consider the English /b/ to be the same as the LA /b/.

3.2 Production Contexts

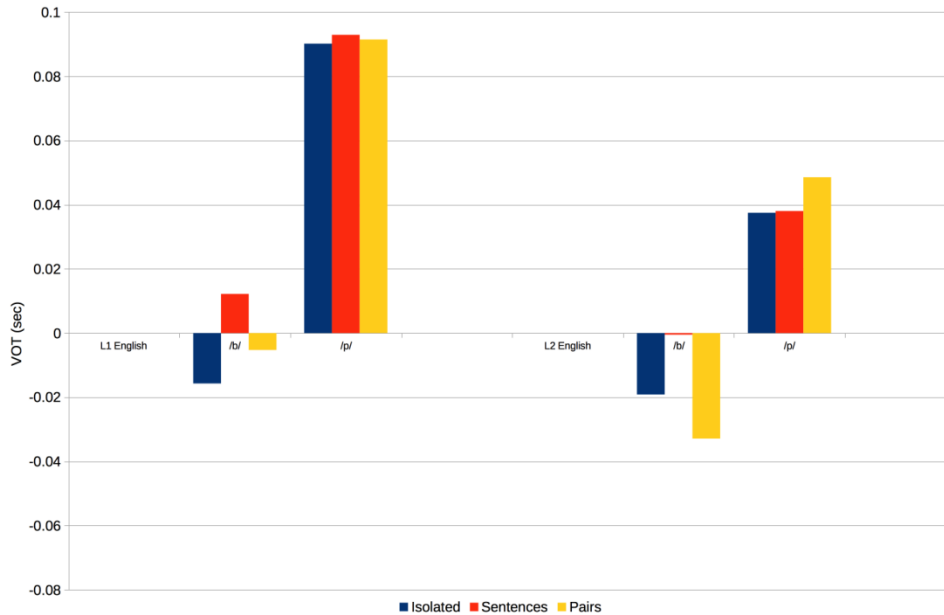
This section introduces the VOT averages of the L1 and L2 English data for /p/ and /b/ according to the context in which they were produced.

Table 6 presents the English /p/ and /b/ VOT averages for the Control Group (L1 English) and the LA participants (L2 English) separated by the production context (isolated words, sentences, minimal pairs). Figure 6 shows these results.

Table 6. VOT averages by production context

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
L1 English	/b/	-0.016	(0.053)	0.012	(0.005)	-0.005	(0.052)
	/p/	0.090	(0.025)	0.093	(0.031)	0.091	(0.026)
L2 English	/b/	-0.019	(0.064)	0.000	(0.056)	-0.033	(0.069)
	/p/	0.037	(0.052)	0.038	(0.052)	0.049	(0.051)

Figure 6. VOT averages by production context



For the L1 English group (left side of figure 6), the production context had an effect on the pronunciation of /b/. Although the difference in VOT average of /b/ for the different contexts was not very large, the standard deviations show that there was more variability in the isolated words (average -0.016, SD 0.053) and minimal pairs (average -0.005, SD 0.052) contexts compared to the sentence context, which had an average VOT of 0.012 sec and a standard deviation of 0.005. This suggests that participants varied in their productions of isolated words and minimal pairs; some participants produced these items with pre-voicing at least some of the time. Whereas, in the sentence context, very little pre-voicing was seen. In contrast, the results for the VOT of /p/ in the L1 English group show no effect of production context.

For the L2 English group (right side of figure 6), the production context had a somewhat similar effect on the average VOTs for /b/; the isolated words and minimal pairs had a more negative VOT compared to the sentence context, where the average

VOT was zero. However, unlike the L1 English data, the variability was similar across contexts and it is not clear whether the differences in the VOT averages for /b/ are significant. The pronunciation of /p/ by the L2 English group is slightly higher in the minimal pairs context compared to the isolated words and sentences, though again it is not clear whether the difference is large enough to be significant.

3.3 Learning Environment: USA vs. Libya Groups

Of the 15 LA participants in this study, 8 learned English primarily in Libya and were living in Libya at time of participation (Libya Group), while the other 7 learned English at least partly in the USA and were currently living in the USA at time of participation (USA Group). This section first introduces the results of the questionnaire to compare the characteristics of the two groups and then it provides the L2 English VOTs of the two Libyan groups in order to make a comparison between these two groups.

3.3.1 Survey Data

The following tables contain data about the LA participants' self-reported level in L2 English, duration of studying English during and after university (Bachelor's) in Libya, and length of studying English in the USA. The participants were not tested for their language level, but they were asked in the online survey to give a self-rated level of their English language.

The survey data in table 7 show that the largest number of participants in the Libya Group was in intermediate level (n=5) and most participants in USA Group were in advanced level (n=5).

Table 7. Self-reported English language level

	Elementary	Intermediate	Advanced
Libya Group (n=8)	1	5	2
USA Group (n=7)	1	1	5

Table 8 shows that 7 participants from Libya Group studied English from 3-4 years in high school in Libya and only one participant did not study English in high school. In USA Group five participants studied English from 3-4 years and two participants studied English from 1-2 years in high school in Libya.

Table 8. The years of studying English in high school

	None	1 Year	2 Years	3 Years	4+ Years
Libya Group	1	-	-	6	1
USA Group	-	1	1	2	3

In table 9, the years of studying English during university in Libya are shown. Two participants in Libya Group studied English for 1 year, 1 participant for 2 years, 1 participant for 3 years, and 4 participants of the same group studied English for 4 or more years during their study at their universities in Libya. Four participants in USA Group studied English for 1 year, 1 participant for 3 years, and 2 participants studied English for 4 or more years during university in Libya.

Table 9. The years of studying English during university (Bachelor's) in Libya

	1 Year	2 Years	3 Years	4+ Years
Libya Group (n=8)	2	1	1	4
USA Group (n=7)	4	-	1	2

Table 10 presents data from the participants' after university study of English in Libya where 2 participants from USA Group and 4 participants from Libya Group studied English for 1 year. Only 2 participants from USA Group studied English for 2

years and 1 participant from the same group studied English for 3 or more years after university in Libya. The rest of participants of both groups (2 in USA Group and 4 in Libya Group) did not study English after university in Libya.

Table 10. The years of studying English after university in Libya

	None	1 Year	2 Years	3+ Years
Libya Group (n=8)	4	4	-	-
USA Group (n=7)	2	2	2	1

In table 11, only 1 participant from Libya Group studied English in the USA for 5 months and the rest of the participants did not study English in an English speaking country. However, 3 participants in the USA Group studied English in the USA from 8-10 months, 2 participants studied English for 1 year, and 2 participants studied English for 2 years in the USA.

Table 11. The length of studying English in the USA

	None	5 Months	8-10 Months	1 Year	2 Years
Libya Group	7	1	-	-	-
USA Group	-	-	3	2	2

The total length of studying English for all LA participants ranged from 2-12 years. All Libya Group participants were BA and BS graduates in Libya and the participants in USA Group were all pursuing their higher education (MA, MS, or PhD) at different American universities at the time of participation. The length of the USA Group's residency in the USA ranged from 1-6 years.

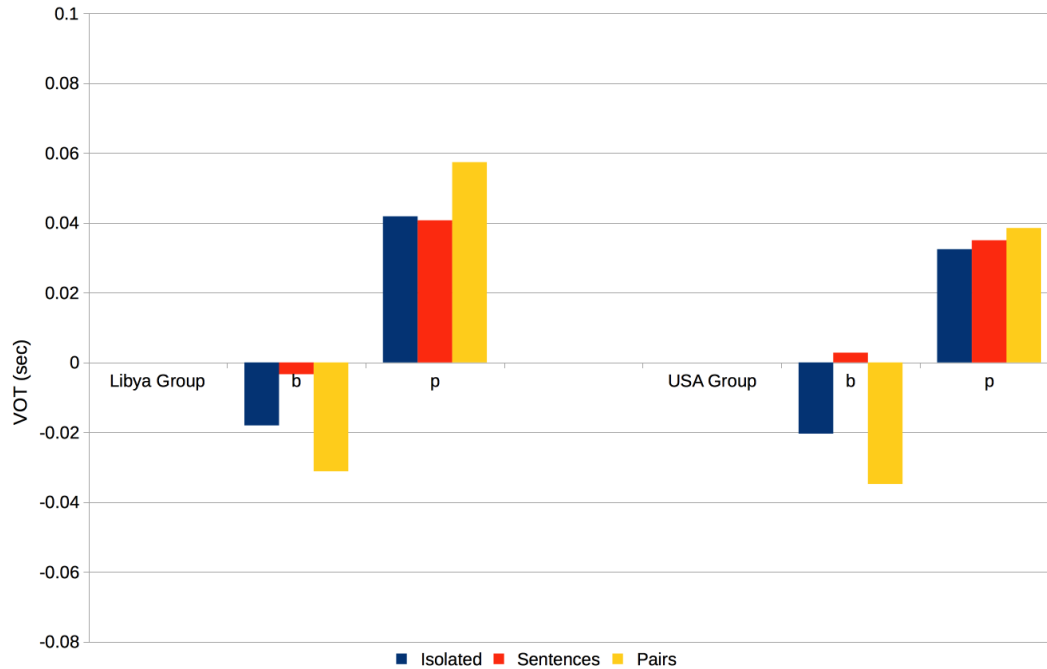
3.3.2 L2 English production data by group

Table 12 presents the VOT averages for L2 English /p/ and /b/ according by group and production context. The groups have very similar results in every context for L2 English /b/. There are slight differences for /p/, particularly in the minimal pair context, but the difference is not very large. These averages are illustrated in figure 7.

Table 12. L2 English VOT averages for each group

		Isolated Words VOT (sec)		Sentences VOT (sec)		Minimal Pairs VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
USA Group	/b/	-0.020	(0.063)	0.003	(0.048)	-0.035	(0.071)
	/p/	0.032	(0.039)	0.035	(0.044)	0.039	(0.048)
Libya Group	/b/	-0.018	(0.064)	-0.003	(0.063)	-0.031	(0.068)
	/p/	0.042	(0.060)	0.041	(0.058)	0.057	(0.053)

Figure 7. L2 English VOT averages for each group



One of the research questions of this study was focused on the learning environment. A possible outcome was that the learning environment would affect the production of L2 English /p/, and it was hypothesized that learners in an English-speaking country may have more native-like pronunciation of /p/. The results show that both groups made a difference on average between L2 English /p/ and /b/ in all contexts, though there was not a clear difference between the USA Group and the Libya Group in any context.

There is a fairly large amount of variability in the VOT data, since the standard deviations range from approximately 40 to 70ms. As the survey data showed, there were many differences in English education and level within each group. This suggests that individual difference may be more important than learning environment in this study. The next section discusses individual results in detail.

3.4 Individual Differences

This section presents and compares the individual differences of the VOT averages for all of the Libyan participants classified into three groups: those who showed no differences between the productions of /b/ and /p/ (No Difference group, n=4), those who showed a small difference between the productions of /b/ and /p/ (Small Difference group, n=4), and those who made a large difference between the pronunciations of /b/ and /p/ (Large Difference group, n=7). The data for each participant is discussed separately, with their L2 English and L1 LA data shown together.

3.4.1 No Differences Group

This group includes the individual differences of the LA participants who did not make differences between their productions of /b/ and /p/. There are 4 participants in this group.

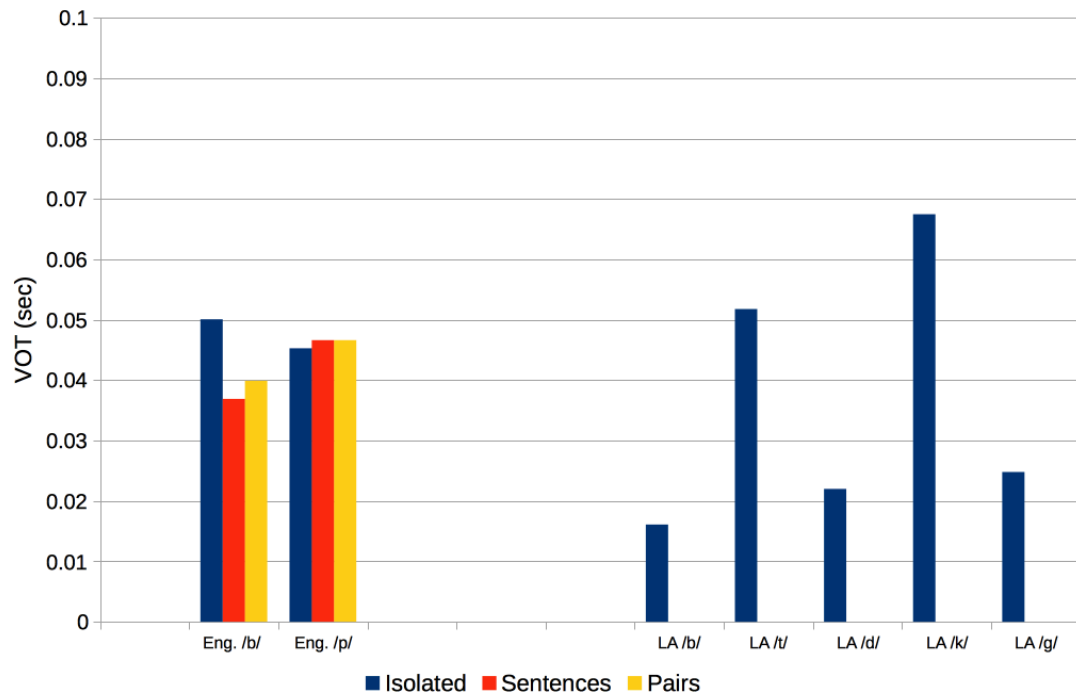
Participant 201 is a 29 year old male, who studied English for a total of 12 years, 10 in Libya and 2 in the USA. He currently lives in the USA. His self-rated English level is advanced, and he rates his speaking ability in English to be good. Table 13 presents the L2 English and L1 LA VOT averages for this participant, and figure 8 illustrates these results.

This participant did not distinguish /b/ and /p/ according to the average VOTs in each context. L2 English /b/ and /p/ were both pronounced with high positive VOT on average, which suggests the participant may have been overcorrecting the production of English bilabial stops so that both were voiceless with similar VOT to his native LA voiceless stops. Interestingly, however, this participant had positive VOT averages for all stop consonants in English and LA, even those that are phonologically voiced.

Table 13. English and LA VOT averages for participant 201

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	0.050	(0.031)	0.037	(0.065)	0.040	(0.035)
	/p/	0.045	(0.050)	0.047	(0.074)	0.047	(0.082)
LA	/b/	0.016	(0.006)				
	/t/	0.051	(0.014)				
	/d/	0.022	(0.007)				
	/k/	0.068	(0.012)				
	/g/	0.025	(0.001)				

Figure 8. English and LA VOT for participant 201

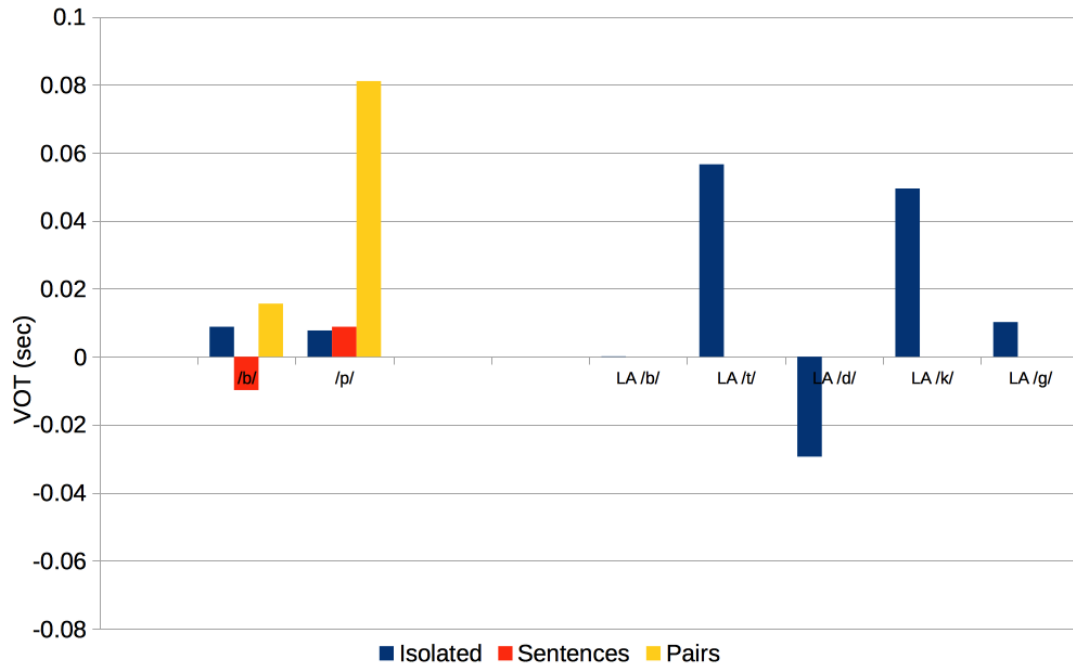


Participant 350 is a 22 year old female, who studied English for a total of 7 years in Libya. She currently lives in Libya. Her self-rated English level is intermediate, and she rates her speaking ability in English to be very good. Table 14 presents the L2 English and L1 LA VOT averages for this participant, and figure 9 illustrates these results.

This participant did not make any differences between L2 English /b/ and /p/ in isolated and sentence contexts, but made a sudden rise in their production of /p/ in minimal pairs context. The VOT of /p/ in the minimal pairs context exceeded the average VOT for the participants' native LA voiceless stops /t/ and /k/. These results suggest that this participant does, at some level, know how English /p/ differs from /b/ but did not reliably produce this difference until the materials were presented in a way that contrasted the two sounds (i.e., minimal pairs).

Table 14. English and LA VOT averages for participant 350

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	0.009	(0.007)	-0.010	(0.023)	0.016	(0.028)
	/p/	0.008	(0.030)	0.009	(0.017)	0.081	(0.040)
LA	/b/	0.000	(0.037)				
	/t/	0.057	(0.010)				
	/d/	-0.029	(0.073)				
	/k/	0.050	(0.010)				
	/g/	0.010	(0.002)				

Figure 9. English and LA VOT for participant 350

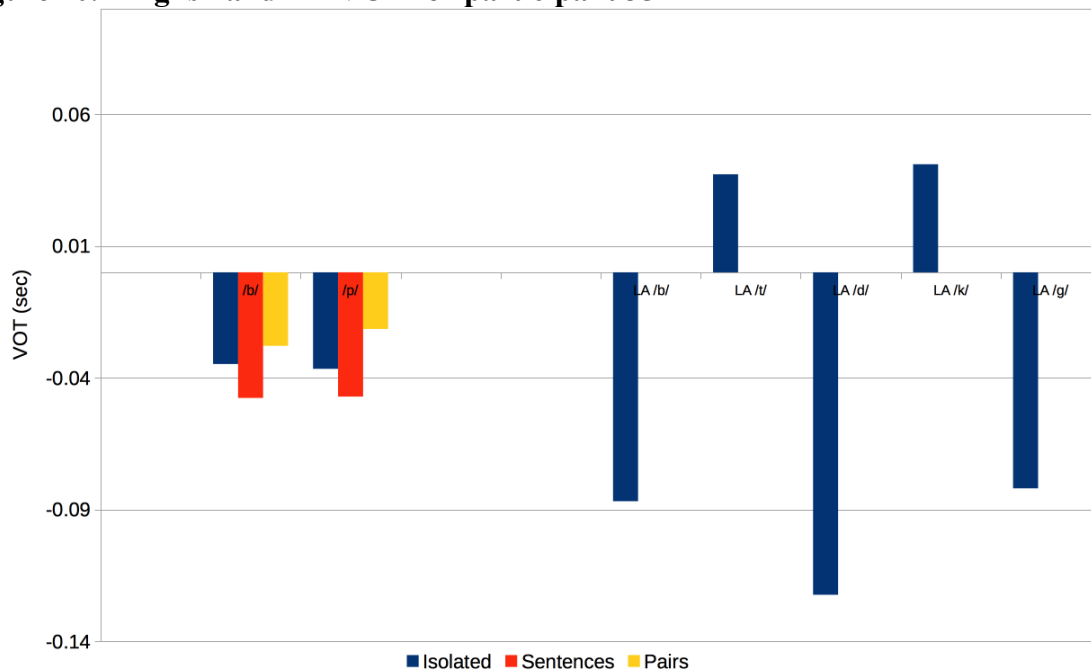
Participant 352 is a 30 year old male, who studied English for a total of 8 years in Libya. He currently lives in Libya. His self-rated English level is intermediate, and he rates his speaking ability in English to be good. Table 15 presents the L2 English and L1 LA VOT averages for this participant, and figure 10 illustrates these results.

Figure 10 shows that this participant did not make any difference between the L2 English /b/ and /p/. Instead they produced them both with similar negative VOT averages. Although there was a slight effect of context it was the same for /b/ and /p/. The negative VOT average of /b/ and /p/ nonetheless appears to differ from the native LA stops with negative VOT; that is, LA /b/, /d/, and /g/ were pronounced with high negative VOT averages, but English /b/ and /p/ were pronounced with VOTs roughly half as long. It is possible that this participant knew that bilabial stops in English are different from those in LA but was not aware of or could not produce the difference in VOT for /b/ and /p/.

Table 15. English and LA VOT averages for participant 352

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.035	(0.057)	-0.048	(0.054)	-0.028	(0.054)
	/p/	-0.037	(0.059)	-0.047	(0.070)	-0.022	(0.045)
LA	/b/	-0.087	(0.045)				
	/t/	0.037	(0.005)				
	/d/	-0.122	(0.046)				
	/k/	0.041	(0.008)				
	/g/	-0.082	(0.072)				

Figure 10. English and LA VOT for participant 352



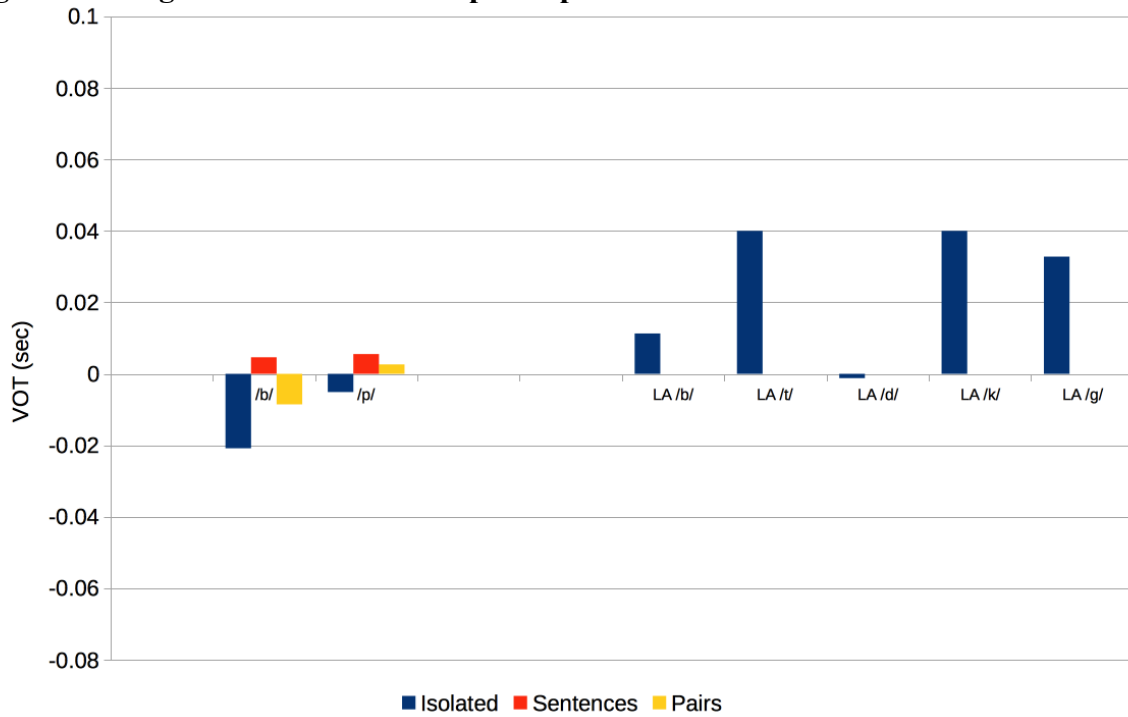
Participant 353 is a 22 year old male, who studied English for a total of 7 years in Libya. He currently lives in Libya. His self-rated English level is elementary, and he rates his speaking ability in English to be good. Table 16 presents the L2 English and L1 LA VOT averages for this participant, and figure 11 illustrates these results.

This participant produced both of their L2 English /b/ and /p/ with VOT averages close to zero and did not make any difference between the two sounds. The L2 English /b/ and /p/ averages were similar to the LA /b/, which was also near zero. This participants' LA voiced stops appear to have less pre-voicing than some other LA participants. It is interesting to note that LA /k/ and /g/ do not show a big difference in VOT for this participant.

Table 16. English and LA VOT averages for participant 353

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.021	(0.071)	0.005	(0.031)	-0.009	(0.036)
	/p/	-0.005	(0.059)	0.006	(0.017)	0.003	(0.047)
LA	/b/	0.011	(0.017)				
	/t/	0.040	(0.010)				
	/d/	-0.001	(0.053)				
	/k/	0.040	(0.007)				
	/g/	0.033	(0.011)				

Figure 11. English and LA VOT for participant 353



3.4.2 Small Differences Group

This section introduces the individual differences of the LA participants who made small differences between their production of L2 English /b/ and /p/. There are 4 participants in this group.

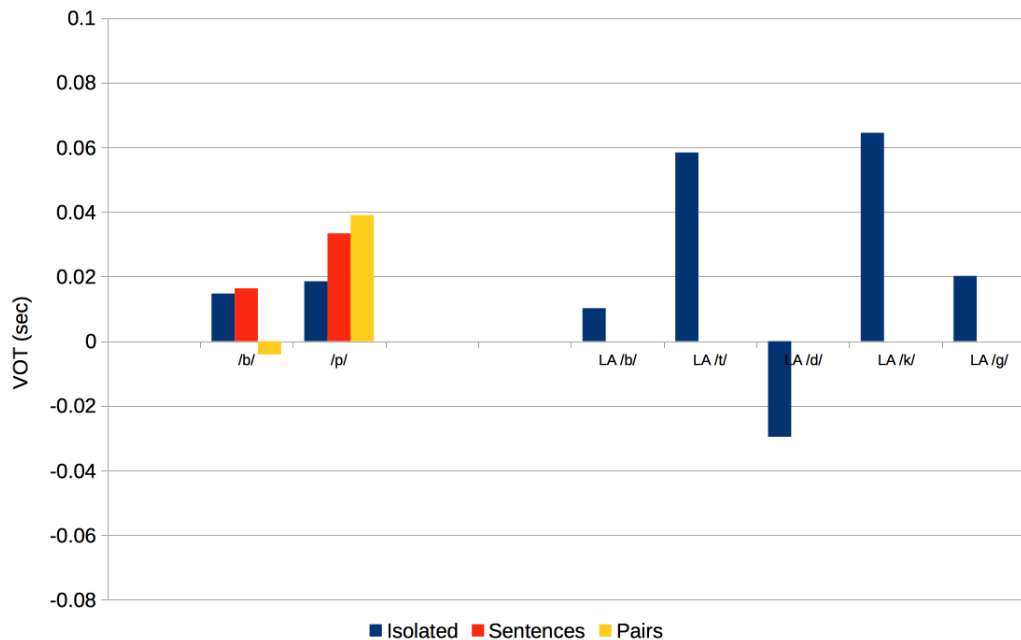
Participant 355 is a 25 year old female, who studied English for a total of 7 years in Libya. She currently lives in Libya. Her self-rated English level is intermediate, and she rates her speaking ability in English to be very good. Table 17 presents the L2 English and L1 LA VOT averages for this participant, and figure 12 illustrates these results.

This participant made no difference between the English /b/ and /p/ in the isolated words context but made some difference in the sentence and minimal pairs contexts. It is possible that the participant became more aware of their production of the contrast as the experiment went on. Nonetheless, this participant's VOT for /p/ was still smaller in all contexts than their LA /t/ and /k/. Their production of English /b/ was very similar to their LA /b/.

Table 17. English and LA VOT averages for participant 355

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	0.015	(0.004)	0.016	(0.027)	-0.004	(0.056)
	/p/	0.019	(0.012)	0.033	(0.025)	0.039	(0.030)
LA	/b/	0.010	(0.009)				
	/t/	0.058	(0.006)				
	/d/	-0.030	(0.062)				
	/k/	0.065	(0.010)				
	/g/	0.020	(0.008)				

Figure 12. English and LA VOT for participant 355

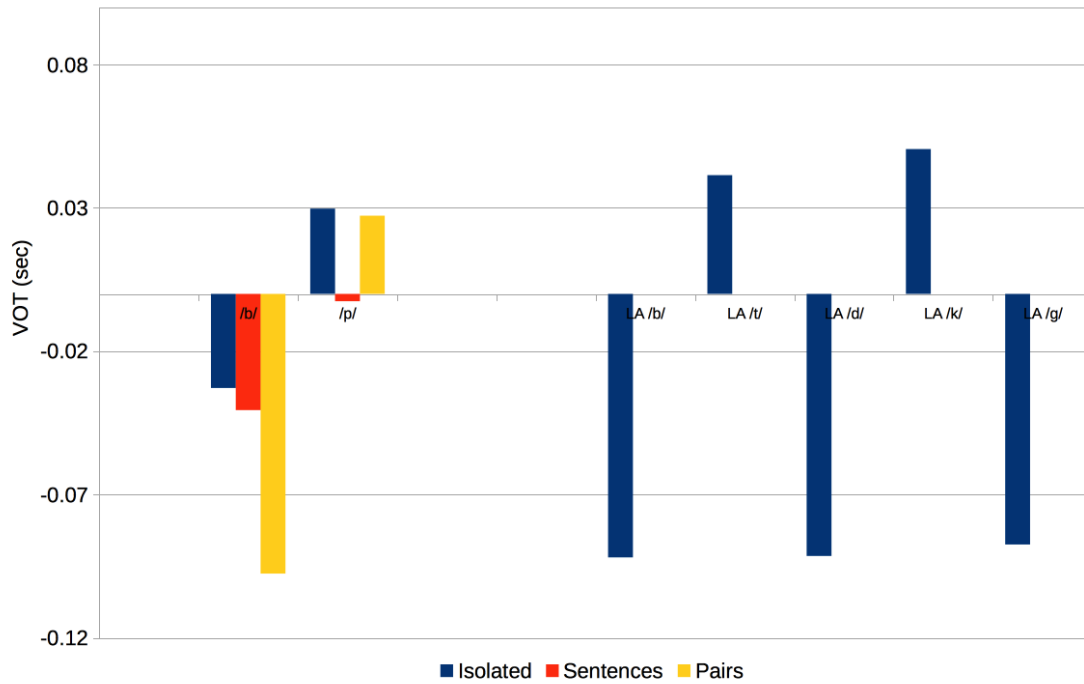


Participant 205 is a 26 year old male, who studied English for a total of 4.10 years, 4 years in Libya and 10 months in the USA. He currently lives in the USA. His self-rated English level is elementary, and he rates his speaking ability in English to be good. Table 18 presents the L2 English and L1 LA VOT averages for this participant, and figure 13 illustrates these results.

This participant made some difference between English /b/ and /p/ in all contexts. This difference was largest in the minimal pairs context, where /b/ was pronounced with much more pre-voicing on average. These results suggest that this participant was aware of the difference between English /b/ and /p/ but may have found it easier to exaggerate the pronunciation of /b/. The difference between /b/ and /p/ was smallest in the sentence context, where /p/ was pronounced with an average VOT near zero. It is possible that the production of positive VOT in /p/ takes more conscious effort for this participant and the sentence context made this more difficult.

Table 18. English and LA VOT averages for participant 205

		Isolated Words VOT (sec)		Sentences VOT (sec)		Minimal Pairs VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.033	(0.060)	-0.041	(0.047)	-0.098	(0.089)
	/p/	0.030	(0.014)	-0.003	(0.053)	0.027	(0.058)
LA	/b/	-0.092	(0.021)				
	/t/	0.041	(0.006)				
	/d/	-0.091	(0.009)				
	/k/	0.050	(0.008)				
	/g/	-0.087	(0.001)				

Figure 13. English and LA VOT for participant 205

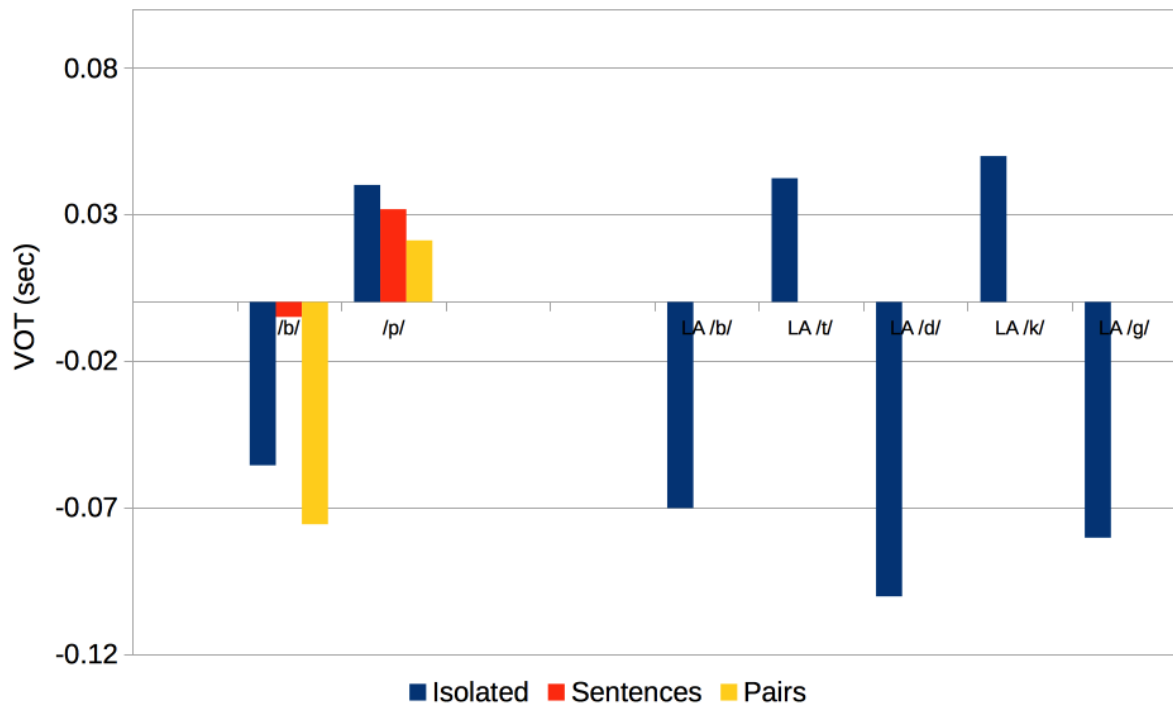
Participant 211 is a 29 year old male, who studied English for a total of 10.8 years, 10 years in Libya and 8 months in the USA. He currently lives in the USA. His self-rated English level is excellent, and he rates his speaking ability in English to be excellent. Table 19 presents the L2 English and L1 LA VOT averages for this participant, and figure 14 illustrates these results.

This participant made some difference between L2 English /b/ and /p/ in all contexts. The difference was largest in the isolated words and minimal pairs contexts because /b/ had more negative VOT. In the sentence context the VOT of /b/ was closer to zero. This is similar to the effect of context that was seen in the group averages. In the isolated words context /p/ was pronounced with similar VOT as LA /t/ and /k/. The average VOT of /p/ appeared to decline somewhat from the first context (isolated words) to the last (minimal pairs).

Table 19. English and LA VOT averages for participant 211

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.056	(0.054)	-0.005	(0.041)	-0.076	(0.054)
	/p/	0.040	(0.017)	0.032	(0.012)	0.021	(0.038)
LA	/b/	-0.070	(0.042)				
	/t/	0.042	(0.005)				
	/d/	-0.100	(0.023)				
	/k/	0.050	(0.005)				
	/g/	-0.080	(0.012)				

Figure 14. English and LA VOT for participant 211

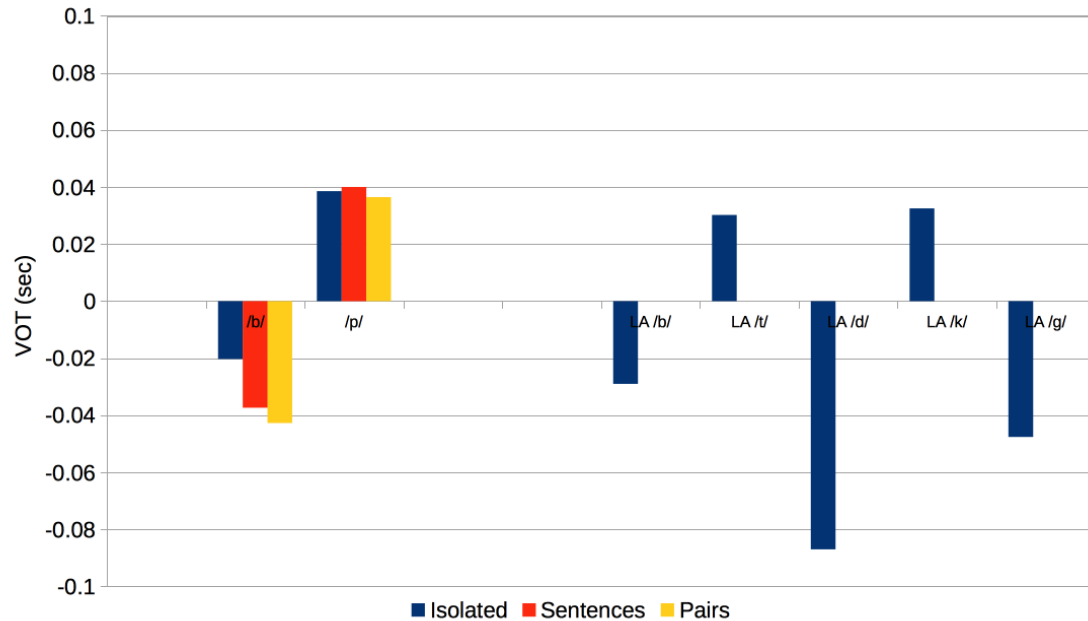


Participant 213 is a 28 year old male, who studied English for a total of 11 years, 9 in Libya and 2 in the USA. He currently lives in the USA. His self-rated English level is advanced, and he rates his speaking ability in English to be excellent. Table 20 presents the L2 English and L1 LA VOT averages for this participant, and figure 15 illustrates these results.

This participant made a some difference between L2 English /b/ and /p/ in all contexts and produced /p/ with similar VOT as their LA /t, k/. Production of English /b/ was also similar to LA /b/. This suggests that the participant was aware that the contrast between English /b/ and /p/ is in voicing and he treated the English voicing contrast like the LA voicing contrast.

Table 20. English and LA VOT averages for participant 213

		Isolated Words VOT (sec)		Sentences VOT (sec)		Minimal Pairs VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.020	(0.061)	-0.037	(0.048)	-0.043	(0.048)
	/p/	0.039	(0.025)	0.040	(0.025)	0.036	(0.021)
LA	/b/	-0.029	(0.054)				
	/t/	0.030	(0.015)				
	/d/	-0.087	(0.018)				
	/k/	0.033	(0.004)				
	/g/	-0.048	(0.042)				

Figure 15. English and LA VOT for participant 213

3.4.3 Large Differences Group

Participants who made large differences between their productions of L2 English /b/ and /p/ sounds are discussed in this section. The remaining 7 participants are in this group.

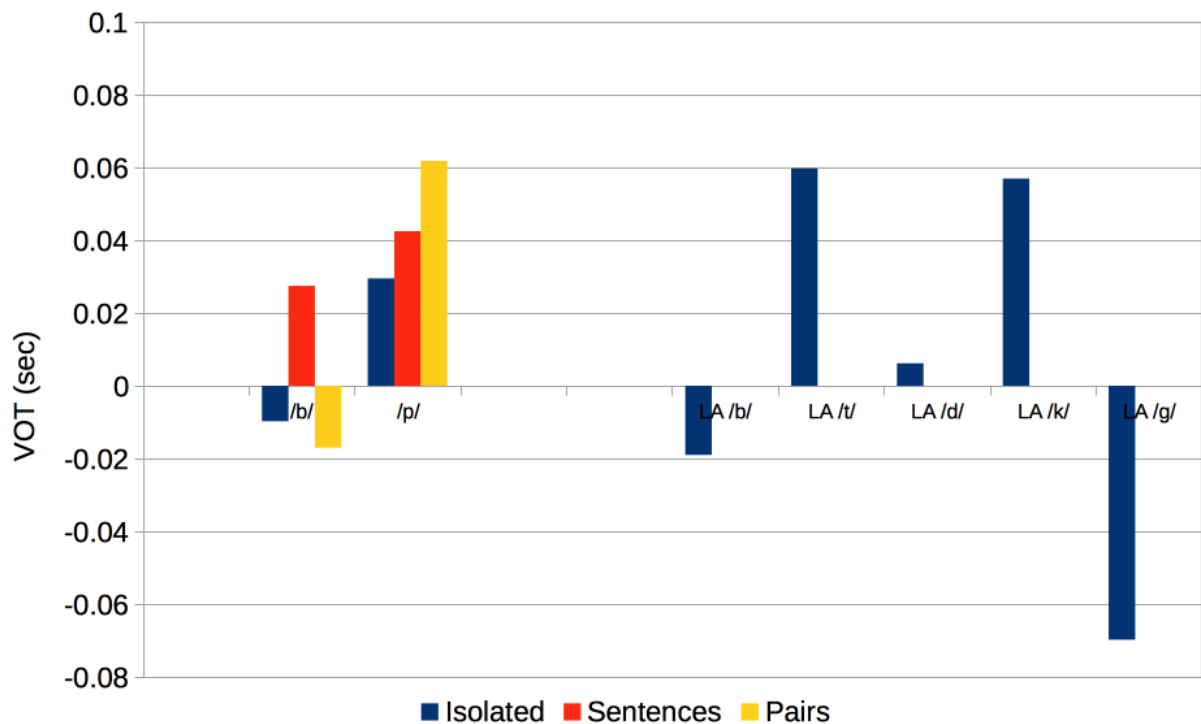
Participant 203 is a 26 year old male, who studied English for a total of 6.9 years, 6 years in Libya and 9 months in the USA. He currently lives in the USA. His self-rated English level is advanced, and he rates his speaking ability in English to be good. Table 21 presents the L2 English and L1 LA VOT averages for this participant, and figure 16 illustrates these results.

This participant made a fairly large difference between L2 English /b/ and /p/ especially in the minimal pairs contexts, where he had high positive VOT for /p/ which was similar to his LA /t, k/. His VOT average for /p/ in the isolated words context was lower. He also did not make a big difference between /b/ and /p/ in the sentence context since both were pronounced with similar positive VOTs. It is possible that the participant found the distinction more difficult to produce in connected speech and this resulted in some overcorrection of /b/ to /p/. Otherwise, English /b/ was pronounced like LA /b/.

Table 21. English and LA VOT averages for participant 203

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.010	(0.053)	0.028	(0.012)	-0.017	(0.055)
	/p/	0.030	(0.051)	0.043	(0.030)	0.062	(0.031)
LA	/b/	-0.019	(0.080)				
	/t/	0.060	(0.013)				
	/d/	0.006	(0.079)				
	/k/	0.057	(0.017)				
	/g/	-0.070	(0.073)				

Figure 16. English and LA VOT for participant 203

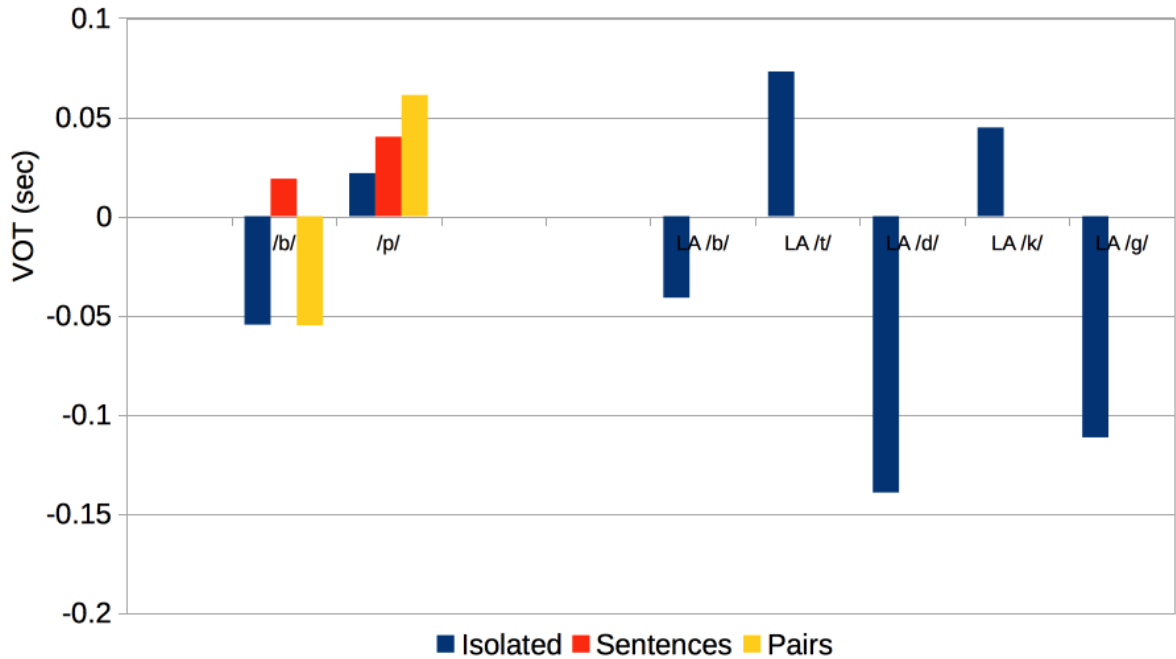


Participant 204 is a 28 year old male, who studied English for a total of 5 years, 4 in Libya and 1 in the USA. He currently lives in the USA. His self-rated English level is intermediate, and he rates his speaking ability in English to be very good. Table 22 presents the L2 English and L1 LA VOT averages for this participant, and figure 17 illustrates these results.

This participant also had higher VOT averages for L2 English /p/ in the minimal pairs context, where it was similar to LA /t/, than the isolated words and sentences contexts. This participant also made high negative VOTs for L2 /b/ in the isolated words and minimal pairs contexts and a low positive VOT in the sentence context, as shown in figure 18.

Table 22. English and LA VOT averages for participant 204

		Isolated Words VOT (sec)		Sentences VOT (sec)		Minimal Pairs VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.055	(0.066)	0.019	(0.006)	-0.055	(0.056)
	/p/	0.022	(0.062)	0.040	(0.045)	0.061	(0.009)
LA	/b/	-0.041	(0.070)				
	/t/	0.073	(0.009)				
	/d/	-0.139	(0.038)				
	/k/	0.045	(0.007)				
	/g/	-0.112	(0.039)				

Figure 17. English and LA VOT for participant 204

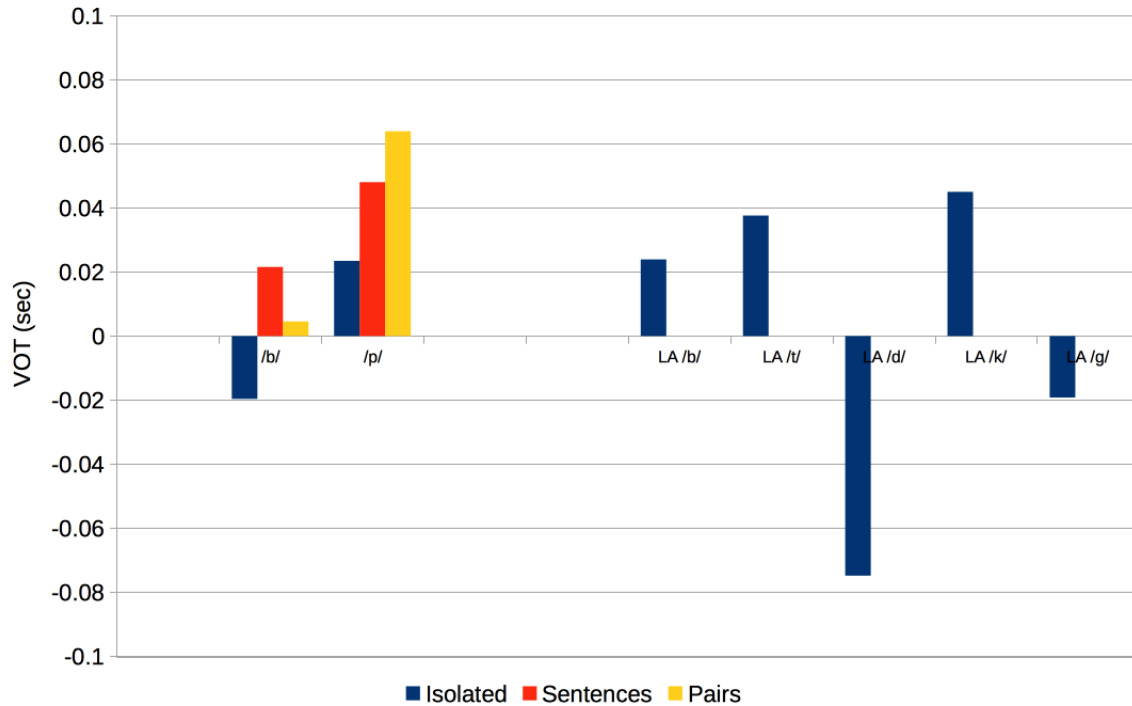
Participant 207 is a 36 year old male, who studied English for a total of 3 years, 2 in Libya and 1 in the USA. He currently lives in the USA. His self-rated English level is advanced, and he rates his speaking ability in English to be very good. Table 23 presents the L2 English and L1 LA VOT averages for this participant, and figure 18 illustrates these results.

This participant showed a large difference between L2 English /b/ and /p/ in the minimal pairs context and a smaller difference in the other two contexts. The participant's VOT average for /p/ was higher than LA /t, k/ in the sentence and minimal pairs contexts. It is also noticeable that he produced LA /d/ and /g/ with negative VOTs, but made LA /b/ with positive VOT.

Table 23. English and LA VOT averages for participant 207

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.020	(0.058)	0.022	(0.025)	0.005	(0.051)
	/p/	0.023	(0.029)	0.048	(0.024)	0.064	(0.022)
LA	/b/	0.024	(0.010)				
	/t/	0.038	(0.011)				
	/d/	-0.075	(0.012)				
	/k/	0.045	(0.012)				
	/g/	-0.019	(0.066)				

Figure 18. English and LA VOT for participant 207



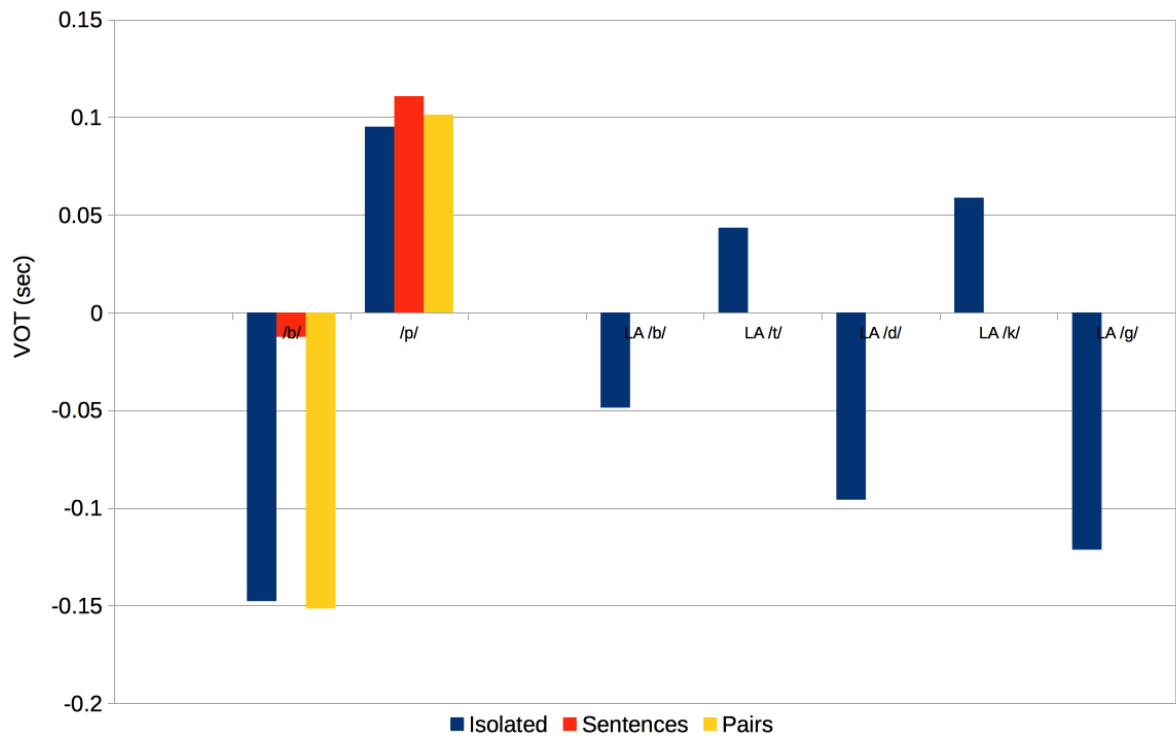
Participant 354 is a 26 year old male, who studied English for a total of 9.5 years, 9 years in Libya and 5 months in the USA. He currently lives in Libya. His self-rated English level is advanced, and he rates his speaking ability in English to be excellent. Table 24 presents the L2 English and L1 LA VOT averages for this participant, and figure 19 illustrates these results.

This participant made a large difference in the production of English /b/ and /p/ in all contexts, though similar to other participants, the sentence context caused /b/ to have a VOT closer to zero. In all contexts, /p/ was pronounced with a very high native-English-like VOT which was higher than his LA /t/ and /k/. English /b/ was also pronounced with a more highly negative VOT than LA /b/. This suggests that the participant was aware of the contrast and was careful to distinguish English /b/ and /p/.

Table 24. English and LA VOT averages for participant 354

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.148	(0.028)	-0.012	(0.146)	-0.152	(0.026)
	/p/	0.095	(0.030)	0.111	(0.024)	0.101	(0.018)
LA	/b/	-0.049	(0.062)				
	/t/	0.043	(0.005)				
	/d/	-0.096	(0.019)				
	/k/	0.059	(0.010)				
	/g/	-0.121	(0.010)				

Figure 19. English and LA VOT for participant 354

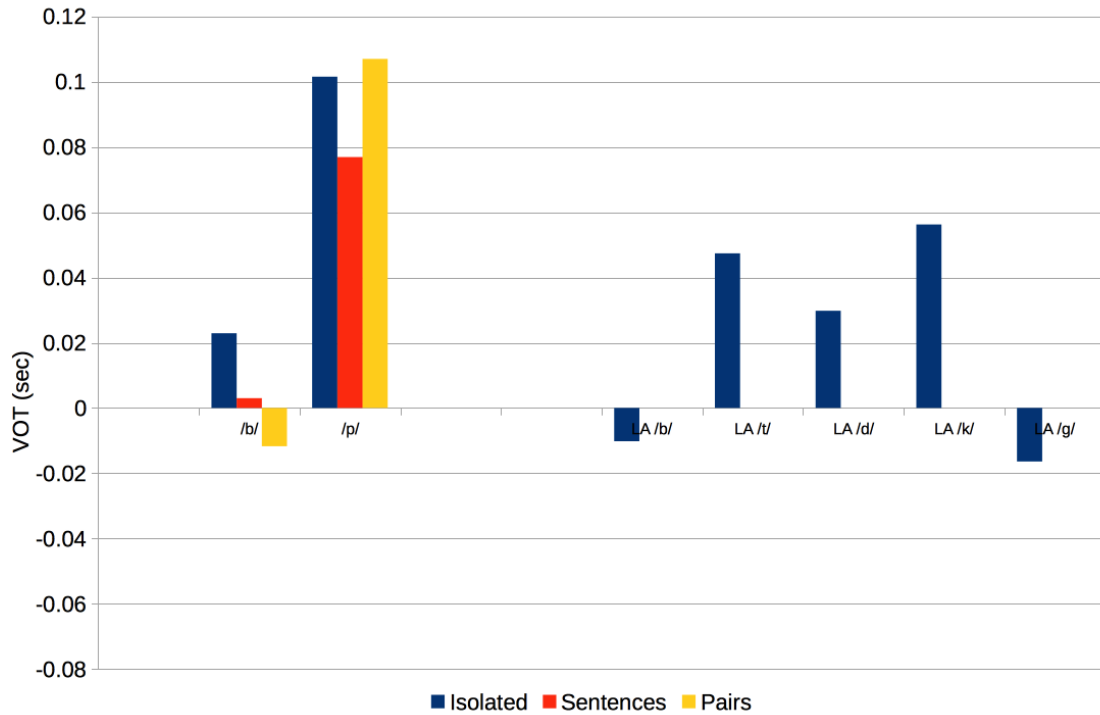


Participant 357 is a 24 year old male, who studied English for a total of 2 years in Libya. He currently lives in Libya. His self-rated English level is intermediate, and he rates his speaking ability in English to be good. Table 25 presents the L2 English and L1 LA VOT averages for this participant, and figure 20 illustrates these results.

This participant made native-like VOTs for L2 English /b/ and /p/ within all contexts. He had lower VOTs for L1 LA /t, k/ than the L2 English /p/. This participant did not have highly negative VOT averages for any of the sounds, and his English /b/ seems to be similar to his LA /b/. Though he produced L1 /b, g/ with negative VOTs on average, he made /d/ with positive VOT.

Table 25. English and LA VOT averages for participant 357

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	0.023	(0.029)	0.003	(0.043)	-0.012	(0.058)
	/p/	0.102	(0.033)	0.077	(0.036)	0.107	(0.019)
LA	/b/	-0.010	(0.050)				
	/t/	0.047	(0.025)				
	/d/	0.030	(0.073)				
	/k/	0.056	(0.006)				
	/g/	-0.016	(0.082)				

Figure 20. English and LA VOT for participant 357

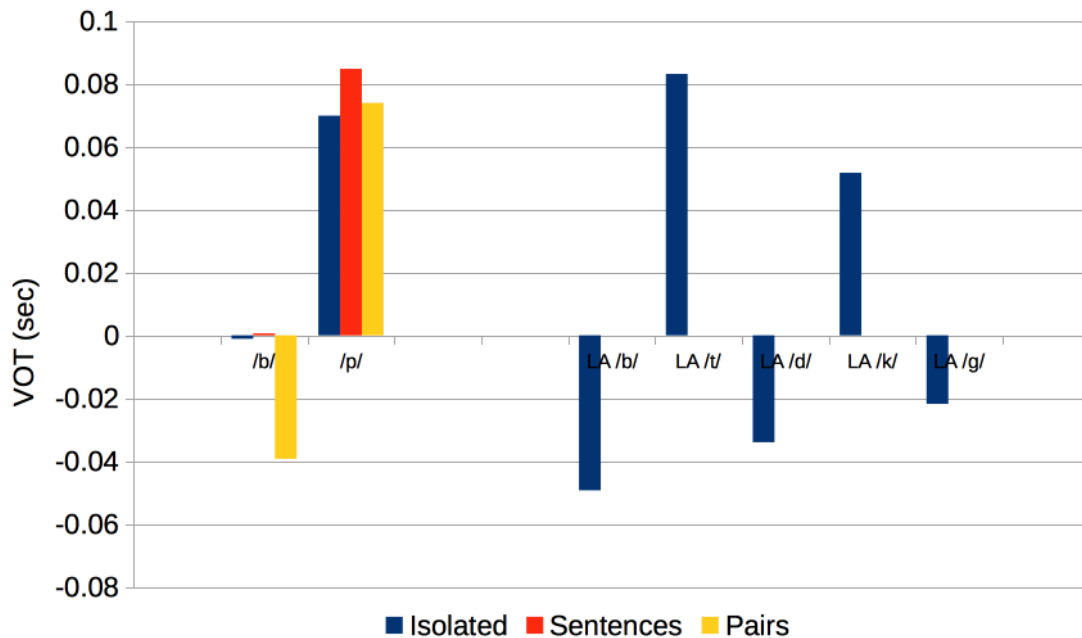
Participant 360 is a 20 year old female, who studied English for a total of 4 years in Libya. She currently lives in Libya. Her self-rated English level is intermediate, and she rates her speaking ability in English to be excellent. Table 26 presents the L2 English and L1 LA VOT averages for this participant, and figure 21 illustrates these results.

This participant produced L2 English /b/ and /p/ with native-like VOTs in all contexts, and her LA /t/ was pronounced with similar high positive VOT. The effect of the minimal pairs context was an increase in pre-voicing of English /b/.

Table 26. English and LA VOT averages for participant 360

		Isolated Words VOT (sec)		Sentences VOT (sec)		Minimal Pairs VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	-0.001	(0.045)	0.001	(0.055)	-0.039	(0.059)
	/p/	0.070	(0.018)	0.085	(0.021)	0.074	(0.023)
LA	/b/	-0.010	(0.054)				
	/t/	0.083	(0.016)				
	/d/	-0.034	(0.074)				
	/k/	0.052	(0.004)				
	/g/	-0.022	(0.045)				

Figure 21. English and LA VOT for participant 360



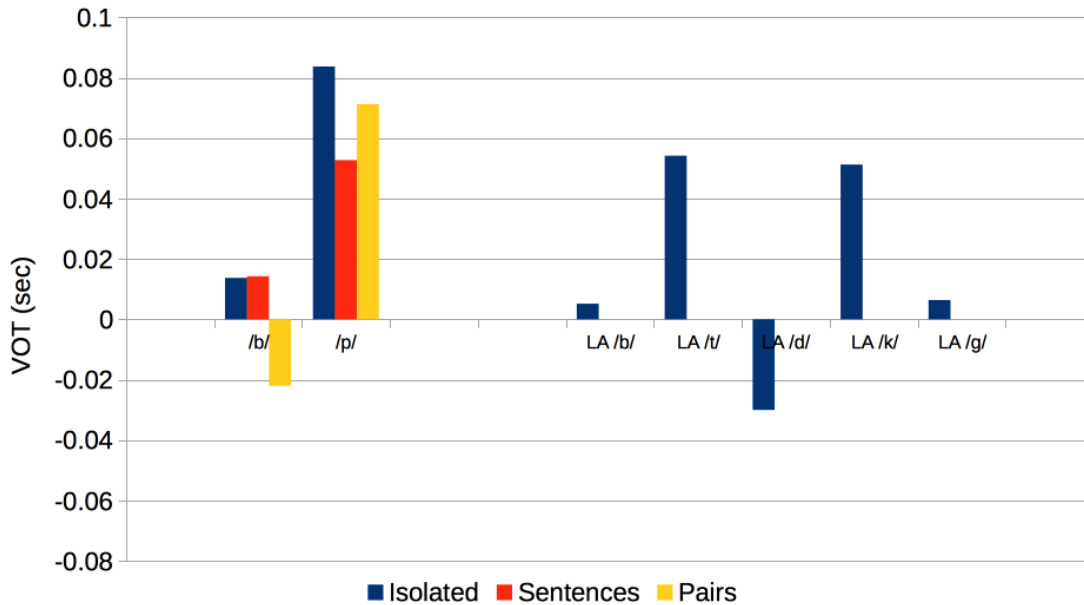
Participant 361 is a 20 year old female, who studied English for a total of 5 years in Libya. She currently lives in Libya. Her self-rated English level is advanced, and she rates her speaking ability in English to be excellent. Table 27 presents the L2 English and L1 LA VOT averages for this participant, and figure 22 illustrates these results.

Similar to participant 360, participant 361 had native-like VOTs for L2 English /b/ and /p/ within all contexts. In the sentence context, the VOT of English /p/ was slightly lower and similar to LA /t/ and /k/. Her English /b/ was similar to her LA /b/, though English /b/ was somewhat more pre-voiced in the minimal pairs context compared to the other two contexts.

Table 27. English and LA VOT averages for participant 361

		Isolated Words		Sentences		Minimal Pairs	
		VOT (sec)		VOT (sec)		VOT (sec)	
		Avg	SD	Avg	SD	Avg	SD
English	/b/	0.014	(0.004)	0.014	(0.004)	-0.022	(0.067)
	/p/	0.084	(0.020)	0.053	(0.016)	0.071	(0.020)
LA	/b/	0.005	(0.040)				
	/t/	0.054	(0.011)				
	/d/	-0.030	(0.048)				
	/k/	0.051	(0.019)				
	/g/	0.006	(0.030)				

Figure 22. English and LA VOT for participant 361



3.4.4 Summary of the Individual Differences

The individual differences section introduced three subgroups of the LA participants – No Difference group, Small Difference group, and Large Difference group. Although the participants in No Difference group made a difference between LA voiced and voiceless consonants, they did not extend this to L2 English /b/ and /p/. In general, the participants in No Difference group seem to have different reasons why they produced the sounds the way they did, some because of over-correction and others because they treated both /b/ and /p/ in English as equivalent to LA /b/.

Although participants in the Small Difference group made some difference between the L2 English /b/ and /p/, they made the L2 /p/ with lower VOTs than the American participants, usually with similar VOT as LA /t/ and /k/.

All participants in the Large Difference group made more native-like VOT averages for /p/ in all contexts, even higher than their LA /t/ and /k/ in most cases, but they sometimes made /b/ with higher negative VOT averages than the American participants, especially in the minimal pairs context.

Overall, the effect of context varied by participant. The minimal pairs context caused some participants to recognize the distinction between English /b/ and /p/, even if they did not treat them differently in the other contexts, and it caused others to exaggerate the contrast they already made. The sentence context also affected participants' VOTs. In some cases it made the VOT of /b/ closer to zero. And some participants may have found it more difficult to control the articulation of /p/ in the continuous speech of the sentence context.

This consideration of individual differences highlights the variation in the set of participants for this study. Participants showed a wide range of strategies of the L2 English /b-/p/ contrast.

3.5 Summary of the Findings

The LA data did not show any large differences between USA Group and Libya Group. The participants in these two groups produced the LA voiceless consonants /t/ and /k/ with positive VOTs above zero. Most participants in both LA groups produced the LA voiced consonants /b/, /d/, and /g/ with negative VOTs below zero.

In the combined results, it is clear that L2 English /p/ was produced with lower VOTs than both L1 English /p/ and L1 LA /t/ and /k/ and L1 English /p/ had higher VOTs than the L1 LA /t/ and /k/. The comparison between production contexts showed interesting results where L1 English /p/ was produced with higher VOT averages than L2 English /p/ in all contexts. In addition, L2 English /p/ in minimal pairs context had, on average, higher VOTs than the other contexts of L2 /p/, isolated words and sentences. This result highlighted the importance of context in this research study especially in the minimal pairs context where many LA participants found it easier to distinguish the contrastive sounds /p/ and /b/ than other contexts and in the sentence context where many LA participants had more difficulty articulating their L2 English /p/.

The results of the comparison between the learning environments, USA vs. Libya, showed that both LA groups made a difference between the productions of the English /p/ and /b/ in all contexts, however there was not a major difference between the Libya group and USA Group.

On average, the LA participants made a difference between the production of L2 English /p/ and /b/, but this difference was not as large as the L1 English speakers'. The LA participants also had lower VOTs for /p/ than their LA /t/ and /k/. However, there is no clear evidence that this difference is large enough to be significant. Therefore, I considered the individual differences of the participants in this study. The individual differences were presented in three subgroups of LA participants – No Difference group where 4 participants were found to have no distinction between the English /p/ and /b/; Small Difference group where 4 participants tended to make small and variable differences in their productions of English /p/ and /b/. This group also had lower VOTs for their English /p/ and /b/ than their LA /t/ and /k/; finally, the remaining 7 participants in the Large Difference group mostly made more native-like production of /p/ and /b/ and they produced higher VOTs for their English /p/ than their LA /t/ and /k/.

CHAPTER 4

GENERAL DISCUSSION

This study focused on answering three research questions. The first questioned whether LA participants distinguish the production of L2 English /p/ and /b/. The findings of this study showed that there are variable results of how participants produced their L2 English /p/ and /b/, but, on average, the majority of the LA participants made a fairly clear distinction between the production of L2 English /p/ and /b/. However, the distinction that the LA participants made was not as large as the American English speakers' distinction, especially in the production of L2 English /p/.

The second research question of this study focused on the effect of the production contexts, isolated words, minimal pairs, and sentences on the participants' pronunciation of the L2 English /p/ and /b/. The results revealed that there was a great effect of production contexts on the participants' pronunciation. For example, most LA participants seemed to realize the phonetic difference between /p/ and /b/ in the minimal pairs context, but the sentence context caused some difficulty for LA participants as, on average, LA participants could not make a clear distinction between /p/ and /b/ in the sentence context.

The last research question in this study examined the effect of the learning environment on the two groups of LA participants' production (USA Group vs. Libya Group). The results illustrated that the learning environment does not play a crucial role in the learning of L2 sounds and the findings of the survey data also showed that the participants did not only differ from where they live but there were more individual differences between the participants that affected their productions. This is why the study

also focused on the participants' individual differences.

There are several limitations in this study that affected the design of the study and the results. The data collection process was challenging because of the far physical distance between the participants and the researcher where Libya Group participants were all in Libya and the participants of USA Group were all in different states in the USA. Therefore, the participants were given instructions and were asked to record themselves without my presence with them. If there was not a far distance between me and the participants, this study could have tested the participants' perception of contrastive consonants in order to compare the participants' perceptual recognition of the contrastive sounds with their production. In addition, the number of participants was one of the important factors that affected the results of this study. I could not recruit a larger number of participants in this study because of the short time during which the study was conducted. I collected English /p/, /b/, /t/, /d/, and /g/ and LA /b/, /t/, /d/, /k/, and /g/. However, because of the short time, I could not measure all of the English contrastive pairs /t/, /d/, /k/, and /g/ that were produced by the participants of this study. Another important limitation in this study is the lack of control over the participants' learning experience.

There are several future directions that could improve this study. An important future direction would be the use of statistical analysis. Analyzing the collected English data /t d/ and /k g/ in the filler items could have provided interesting comparisons between the LA data in the results. In addition, including a larger number of participants and controlling for the speech rate of the participants could be helpful.

CHAPTER 5

CONCLUSIONS

This study focused on the pronunciation of /p/ and /b/ by LA speakers of L2 English and examined LA participants' distinction between L2 English /p/ and /b/ in their pronunciation. This study also looked at the effect of the production contexts and the learning environment on the attainment of /p/ by the LA participants. Chapter one presented a literature review of some related studies and found that the literature lacks studies about the VOT measurement of the English /p/ and /b/ by LA speakers of L2 English. Chapter two explained the methodology and the design of this study. Chapter three presented the results of this study and revealed that the findings confirmed the hypothesis because the majority of the LA groups made a difference between the articulation of the contrastive consonants /p/ and /b/, but this difference was not as large as the difference that the Control Group made. Therefore, I discussed the individual differences between the Libyan participants. The individual differences presented the participants who had no differences, small differences, and large differences between /p/ and /b/. The production context was important in the production of LA participants. The learning environment context did not have a great effect on the participants' pronunciation in this study.

This study initiated the VOT measurement of /p/ by LA speakers of English. There is still much more research work to be done on LA phonology, this study provided some of the first data of LA and it provides the foundation for future research.

REFERENCES

- Abdu, H. R. (1988). *Italian loanwords in colloquial Libyan Arabic as spoken in the Tripoli region*. (Unpublished Doctoral dissertation). University of Arizona, Tucson, Arizona. (Accessed from ASU Libraries)
- Abumdas, A. H. A. (1985). *Libyan Arabic Phonology*. (Unpublished Doctoral dissertation). ASU Libraries. University of Michigan. (Accessed from ASU Libraries)
- Ahmad, J. (2011). Pronunciation Problems among Saudi Learners: A Case Study at the Preparatory Year Program, Najran University Saudi Arabia. *Language in India*, 11(7).
- Al-Saidat, E. M. (2010). Phonological analysis of English phonotactics: A case study of Arab learners of English. *The Buckingham Journal of Language and Linguistics*, 3, 121-134.
- Altaha, F. (1995). Pronunciation errors made by Saudi university students learning English: Analysis and Remedy. *International Review of Applied Linguistics*, 109, 110-123.
- Aoyama, K., Flege, J. E., Guion, S. G., Akahane-Yamada, R., & Yamada, T. (2004). Perceived phonetic dissimilarity and L2 speech learning: The case of Japanese /r/ and English /l/ and /r/. *Journal of Phonetics*, 32(2), 233-250.
- Barros, A. M. (2003). *Pronunciation difficulties in the consonant system experienced by Arabic speakers when learning English after the age of puberty*, (Unpublished Master Dissertation), West Virginia University, Morgantown: USA. (Accessed from ASU Libraries)
- Binturki, T. A. (2008). *Analysis of pronunciation errors of Saudi ESL learners*, (Unpublished Master Dissertation), ProQuest. Southern Illinois University at Carbondale, Carbondale, Illinois: USA.
- Boersma, Paul & Weenink, David (2014). Praat: doing phonetics by computer [Computer program]. Version 5.3.84, retrieved August 27, 2014, from <http://www.praat.org/>.
- Buali, I. (2010). *The Perception and Production of /p/ in Saudi Gulf Arabic English: A Variationist Perspective* (Doctoral dissertation), Concordia University, Portland, Oregon. (Retrieved August, 28, 2014, from: <http://spectrum.library.concordia.ca/7001/>)
- Caramazza, A., Yeni-Komshian, G. H., Zurif, E. B., & Carbone, E. (1973). The acquisition of a new phonological contrast: The case of stop consonants in French-English bilinguals. *The Journal of the Acoustical Society of America*, 54(2), 421-428.

Chen, L. M., Chao, K. Y., & Peng, J. F. (2007). VOT productions of word-initial stops in Mandarin and English: A cross-language study. *In ROCLING*.

Cho, T., & Ladefoged, P. (1999). Variation and universal in VOT: evidence from 18 languages. *Journal of Phonetics*, 27, 207-227.

Fantazi, G. M. G. (2003). *Perception and production of syllable structure and stress by adult Libyan Arabic speaker acquiring English in the UK* (Doctoral dissertation), University of Durham, UK. (Accessed from Google Scholar)

Flege, J. E., & Port, R. (1981). Cross-language phonetic interference: Arabic to English. *Language and Speech*, 24(2), 125-146.

Khattab, G. (2002). VOT production in English and Arabic bilingual and monolingual children. *Amsterdam Studies in the Theory and History of Linguistic Science*. Series 4, 1-38.

Kharma, N. & Hajjaj, A. (1989). *Errors in English among Arabic speakers: Analysis and remedy*. London: Longman.

Klatt, D.H. (1975). Voice Onset Time, frication, and aspiration in word-initial consonant clusters. *Journal of Speech and Hearing Research*, 18, 686-706.

Levis, J. M. (2005). Changing contexts and shifting paradigms in pronunciation teaching. *TESOL Quarterly*, 39(3), 369-377.

Lisker, L., & Abramson, A. S. (1967). Some effects of context on voice onset time in English stops. *Language and speech*, 10(1), 1-28.

Lisker, L. & Abramson, A.S. (1964). A cross-language study of voicing in initial stops: acoustic measurements. *Word*, 20, 384-422.

Lisker, L. (1975). Is it VOT or a first-formant transition detector? *The Journal of the Acoustical Society of America*, 57(6), 1547-1551.

Marzouk, G. (1993). Some aspects of phonological transfer from Arabic to English. *Journal of the Irish Association for Applied Linguistics*, 13, 29-40.

Munro, M. J. (1993). Productions of English vowels by native speakers of Arabic: Acoustic measurements and accentedness ratings. *Language and Speech*, 36(1), 39-66.

Sanz, C., & Leow, R. P. (2011). *Implicit and Explicit Language Learning*. Georgetown University Press. Washington, DC.

Weismer, G. (1979). Sensitivity of Voice Onset Time (VOT) measures to certain segmental features in speech production. *Journal of Phonetics*, 7, 197– 204.

WhatsApp: Messenger Application. (2014). WhatsApp Inc [Mobile Phone Application]. Retrieved August 3, 2014, from <http://www.whatsapp.com/>.

Yeni-Komshian, G.H., Caramazza, A. & Preston, M.S. (1977). A study of voicing in Lebanese Arabic. *Journal of Phonetics* 5, 35-48.

Zue, V. W. (1976). *Acoustic characteristics of stop consonants: A controlled study* (No. MIT-TR-523). MIT Lexington Lincoln LAB.

APPENDIX A

INSTRUCTIONS AND MATERIALS FOR THE LIBYAN ARABIC PARTICIPANTS

A MEASUREMENT OF L2 SPEECH SOUNDS (I)

I am a graduate student under the direction of Professor Kathryn Pruitt in the Department of English at Arizona State University. I am conducting a research study to examine the pronunciation of some speech sounds articulated by Libyan speakers of English as a second language and by native speakers of American English.

I am inviting your participation, which will involve recording yourself saying some normal words and sentences in English and in Libyan Arabic, with an application on your smartphone and sending the recording to me. It will also involve anonymously answering a few questions through an online survey. Detailed instructions for downloading and using the smartphone application and for filling out the online survey are provided on the following pages. You will be able to complete the recording and the survey on your own time, and they should take less than 10 minutes each. You have the right not to answer any question, and to stop participation at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. In order to be eligible to participate in this study, you must be 18 years of age or older.

There is no direct benefit to you for participating in this study, but your participation will help the researchers learn more about L2 pronunciation, and this could lead to proposals that will help future teachers and learners of English. There are no foreseeable risks or discomforts to your participation.

Your voice recordings will be confidential and your survey responses will be anonymous. You have been given an arbitrary ID code that will be used to link your recordings and survey data without identifying you. The results of this study may be used in reports, presentations, or publications but your name will not be used.

If you have any questions concerning the research study, please contact a member of the research team at: xxx@asu.edu (Ali Garib) or xxx@asu.edu, (xxx) xxx-xxxx (Kathryn Pruitt). If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (xxx) xxx-xxxx.

Instructions for participation begin on the next page.

By following these instructions you certify that you are 18 years of age or older and that you consent to participate in this study.

Instructions – Page 1 of 2

❖ Let's start

Please follow the below instructions:

2.1 How to install the 'WhatsApp Messenger' application on your phone:

- a. Make sure your phone is connected to an internet connection.
- b. Please open 'PlayStore' or 'AppStore' on your phone.
- c. Please type the name of the application: 'WhatsApp Messenger' in the search bar.
- d. After you find the free application, please install it on your phone.

2.2 How to use the 'WhatsApp Messenger' application:

- a. Please save my phone number on your phone so you can find me on WhatsApp. My number is (xxx) xxx-xxxx.
- b. Please open the WhatsApp Messenger that you will find with your other applications in your phone and you will find my name/number in your list of contacts. Click on my name/number and it will open up the dialogue screen.
- c. After the screen has opened, you will find a voice recording button (that looks like a microphone) on the right bottom corner of the application. This button is the voice recorder.

2.3 How to record yourself:

- a. Please stay in a quiet room where there is no noise at all.
- b. Before you start recording, feel free to read the words, phrases, and sentences on the following pages.
- c. Instead of using your name, you were given an arbitrary ID code when the instructions were sent to you. Please have your code with you, and when you start the recording begin by saying this number clearly.
- d. When you are ready to record yourself, please press on the voice recording button and keep pressing. While you are still pressing on the recording, please say your ID number clearly and then read the words and sentences on the next several pages out loud into your phone.
- e. After you finish reading all of the materials, please move your finger from the voice recording button and the recording will be automatically sent to me. Thank you!
- f. If possible, do not move your finger from the recording button until you finish reading all of the words, phrases, and sentences. However, if you need to move your finger while recording, please repeat the preceding steps where you left off until all the materials have been recorded.

Instructions – Page 2 of 2

2.4 Complete the online survey

- a. After you finish with the recording, please click the link below from your computer, tablet, or smartphone. The link will lead you to a brief online survey.
- b. Have your ID code ready and enter it where instructed on the first page of the survey.
- c. Answer the questions on the survey and click “Submit” to finalize your answers when you reach the end.

To access the online survey please [click here](#).

If you have any trouble accessing the survey, please email Ali Garib at xxx@asu.edu.

List of items for recording – Page 1 of 4

Important reminder: Please say your ID number at the beginning of your recording.

First: Please read each word on this list out loud in order, beginning with word 1 and ending with word 44. (You do not need to read the numbers.)

No.	WORDS	No.	WORDS
1	butter	23	par
2	could	24	gap
3	pat	25	beep
4	very	26	down
5	do	27	peep
6	bat	28	gold
7	town	29	bar
8	pay	30	ten
9	good	31	pea
10	bin	32	cut
11	leave	33	ban
12	bee	34	den
13	deem	35	pin
14	pace	36	gut
15	leaf	37	putter
16	bark	38	coo
17	team	39	pan
18	pet	40	two
19	cold	41	bet
20	goo	42	cap
21	bay	43	base
22	ferry	44	park

List of items for recording – Page 2 of 4

Second: Please read each of the sentences below in order, beginning with sentence 1 and ending with sentence 44. (You do not need to read the numbers.)

No.	SENTENCES	No.	SENTENCES
1	They say pet.	23	They say base.
2	They say coo.	24	They say leave.
3	They say ban.	25	They say park.
4	They say two.	26	They say good.
5	They say bee.	27	They say bark.
6	They say gut	28	They say den.
7	They say pin.	29	They say pat.
8	They say do.	30	They say down.
9	They say bin.	31	They say pay.
10	They say cold.	32	They say pea.
11	They say peep.	33	They say town.
12	They say very.	34	They say bay.
13	They say bat.	35	They say ferry.
14	They say gold.	36	They say butter.
15	They say putter.	37	They say leaf.
16	They say gap.	38	They say beep.
17	They say pan.	39	They say goo.
18	They say deem.	40	They say bar.
19	They say bet.	41	They say could.
20	They say cap.	42	They say par.
21	They say pace.	43	They say ten.
22	They say team.	44	They say cut.

List of items for recording – Page 3 of 4

Third: Please read each of the pairs of words below in order, beginning with the pair marked 1 and ending with the pair marked 22. (You do not need to read the numbers.)

No.	PAIRS
1	bark – park
2	gold – cold
3	par – bar
4	team – deem
5	base – pace
6	good - could
7	pay – bay
8	ten - den
9	butter – putter
10	cut – gut
11	pin – bin
12	town - down
13	peep – beep
14	ferry – very
15	bat – pat
16	coo - goo
17	bee – pea
18	do – two
19	bet – pet
20	gap – cap
21	pan – ban
22	leave - leaf

List of items for recording – Page 4 of 4

Fourth: Please read each of the Libyan Arabic words below, beginning with the word marked 1 and ending with the word marked 29. (You do not need to read the numbers.)

WORDS	No.	WORDS	No.
بیر	16	باب	1
کنک	17	تن	2
دار	18	قال	3
تبين	19	بار	4
تل	20	قفل	5
برج	21	بيت	6
كذب	22	قبل	7
دب	23	بلح	8
بحر	24	قبر	9
کشک	25	باي	10
ديك	26	قمل	11
بركة	27	تمر	12
دق	28	دير	13
تم	29	بقر	14
		كلب	15

Reminder: Please visit the [online survey](#) after you have completed the recording.

If you would like more information about the purpose of this study, please contact Ali Garib (xxx@asu.edu) when you have finished both parts.

Thank you for your participation!

APPENDIX B

INSTRUCTIONS AND MATERIALS FOR THE AMERICAN PARTICIPANTS

A MEASUREMENT OF L2 SPEECH SOUNDS (II)

I am a graduate student under the direction of Professor Kathryn Pruitt in the Department of English at Arizona State University. I am conducting a research study to examine the pronunciation of some speech sounds articulated by Libyan speakers of English as a second language and by native speakers of American English.

I am inviting your participation, which will involve recording yourself saying some normal words and sentences in English with an application on your smartphone and sending the recording to me. Detailed instructions for downloading and using the smartphone application are provided on the following page. You will be able to complete the recording on your own time, and it should take less than 10 minutes. You have the right to stop participation at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty. In order to be eligible to participate in this study, you must be 18 years of age or older.

There is no direct benefit to you for participating in this study, but your participation will help the researchers learn more about pronunciation, and this could lead to proposals that will help future teachers and learners of English. There are no foreseeable risks or discomforts to your participation.

Your voice recordings will be confidential. You have been given an arbitrary ID code that will be used to label your recordings without identifying you. The results of this study may be used in reports, presentations, or publications but your name will not be used.

If you have any questions concerning the research study, please contact a member of the research team at: xxx@asu.edu (Ali Garib) or xxx@asu.edu, (xxx) xxx-xxxx (Kathryn Pruitt). If you have any questions about your rights as a participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (xxx) xxx-xxxx.

Instructions for participation begin on the next page.

By following these instructions you certify that you are 18 years of age or older and that you consent to participate in this study.

Instructions

❖ Let's start

Please follow the below instructions:

2.5 How to install the 'WhatsApp Messenger' application on your phone:

- e. Make sure your phone is connected to an internet connection.
- f. Please open 'PlayStore' or 'AppStore' on your phone.
- g. Please type the name of the application: 'WhatsApp Messenger' in the search bar.
- h. After you find the free application, please install it on your phone.

2.6 How to use the 'WhatsApp Messenger' application:

- d. Please save my phone number on your phone so you can find me on WhatsApp. My number is (xxx) xxx-xxxx.
- e. Please open the WhatsApp Messenger that you will find with your other applications in your phone and you will find my name/number in your list of contacts. Click on my name/number and it will open up the dialogue screen.
- f. After the screen has opened, you will find a voice recording button (that looks like a microphone) on the right bottom corner of the application. This button is the voice recorder.

2.7 How to record yourself:

- g. Please stay in a quiet room where there is no noise at all.
- h. Before you start recording, feel free to read the words, phrases, and sentences on the following pages.
- i. Instead of using your name, you were given an arbitrary ID code when the instructions were sent to you. Please have your code with you, and when you start the recording begin by saying this number clearly.
- j. When you are ready to record yourself, please press on the voice recording button and keep pressing. While you are still pressing on the recording, please say your ID number clearly and then read the words and sentences on the next several pages out loud into your phone.
- k. After you finish reading all of the materials, please move your finger from the voice recording button and the recording will be automatically sent to me. Thank you!
- l. If possible, do not move your finger from the recording button until you finish reading all of the words, phrases, and sentences. However, if you need to move your finger while recording, please repeat the preceding steps where you left off until all the materials have been recorded.

List of items for recording – Page 1 of 3

Important reminder: Please say your ID number at the beginning of your recording.

First: Please read each word on this list out loud in order, beginning with word 1 and ending with word 44. (You do not need to read the numbers.)

No.	WORDS	No.	WORDS
1	butter	23	par
2	could	24	gap
3	pat	25	beep
4	very	26	down
5	do	27	peep
6	bat	28	gold
7	town	29	bar
8	pay	30	ten
9	good	31	pea
10	bin	32	cut
11	leave	33	ban
12	bee	34	den
13	deem	35	pin
14	pace	36	gut
15	leaf	37	putter
16	bark	38	coo
17	team	39	pan
18	pet	40	two
19	cold	41	bet
20	goo	42	cap
21	bay	43	base
22	ferry	44	park

List of items for recording – Page 2 of 3

Second: Please read each of the sentences below in order, beginning with sentence 1 and ending with sentence 44.

No.	SENTENCES	No.	SENTENCES
1	They say pet.	23	They say base.
2	They say coo.	24	They say leave.
3	They say ban.	25	They say park.
4	They say two.	26	They say good.
5	They say bee.	27	They say bark.
6	They say gut	28	They say den.
7	They say pin.	29	They say pat.
8	They say do.	30	They say down.
9	They say bin.	31	They say pay.
10	They say cold.	32	They say pea.
11	They say peep.	33	They say town.
12	They say very.	34	They say bay.
13	They say bat.	35	They say ferry.
14	They say gold.	36	They say butter.
15	They say putter.	37	They say leaf.
16	They say gap.	38	They say beep.
17	They say pan.	39	They say goo.
18	They say deem.	40	They say bar.
19	They say bet.	41	They say could.
20	They say cap.	42	They say par.
21	They say pace.	43	They say ten.
22	They say team.	44	They say cut.

List of items for recording – Page 3 of 3

Third: Please read each of the pairs of words below in order, beginning with the pair marked 1 and ending with the pair marked 22.

No.	PAIRS
1	bark – park
2	gold – cold
3	par – bar
4	team – deem
5	base – pace
6	good - could
7	pay – bay
8	ten - den
9	butter – putter
10	cut – gut
11	pin – bin
12	town - down
13	peep – beep
14	ferry – very
15	bat – pat
16	coo - goo
17	bee – pea
18	do – two
19	bet – pet
20	gap – cap
21	pan – ban
22	leave - leaf

If you would like more information about the purpose of this study, please contact Ali Garib (xxx@asu.edu) when you have finished your recording.

Thank you for your participation!

APPENDIX C

SURVEY QUESTIONS

Phonetic Data Collection

This brief survey includes some questions that will assist the researcher of the study with the analysis of the recordings you provided.

By clicking "Continue", you acknowledge that you are 18 or older, you consent to participate in this study, and that you allow the researcher to use your answers in accordance with the purposes of the research study.

If you have any questions you may contact Ali Garb by email at ali.garib@asu.edu.

* Required

1. Please enter the ID number provided with your recording materials *

Demographic information

2. What is your age? *

3. What is your gender? *

Mark only one oval.

☐ Male

☐ Female

4. What is/are your native language(s)? *

A native language is one you learned in childhood and speak fluently.

5. What is the highest level of education you have attained?

Mark only one oval.

- ☐ High school
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ PhD
- ☐ Other: _____

English Language Use Each Week

6. How many hours do you spend watching English movies or TV programs in English each week? *

Mark only one oval.

- ☐ Less than 1 hour
- ☐ 1-2 hours
- ☐ 3-5 hours
- ☐ 6-10 hours
- ☐ 11-15 hours
- ☐ more than 15 hours

7. On average, how often do you speak with native English speakers? *

Mark only one oval.

- ☐ Never or very rarely
- ☐ Once a month
- ☐ Once a week
- ☐ Several times a week
- ☐ Every day
- ☐ Other: _____

8. Do you currently live in a country where the main language is English?

Mark only one oval.

- ☐ Yes
- ☐ No

Questions about your English proficiency

9. What is your current level of English? *

Mark only one oval.

- ☐ Elementary
- ☐ Intermediate
- ☐ Advanced

10. Please rate your English proficiency in each of these areas. *

Mark only one oval per row.

	Good	Very good	Excellent
Listening	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Speaking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Writing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questions about your English education

11. How many years did you study English ... *

Mark only one oval per row.

	None	1 year	2 years	3 years	4 or more years
in high school?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
in university (Bachelor's)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Did you study English pronunciation during your study of the English language?

(in high school or university (Bachelor's))

Mark only one oval.

- ☐ Yes
- ☐ No

Questions about your English education

13. After university (Bachelor's), did you study English in Libya? *

Mark only one oval.

- ☐ Yes Skip to question 14.
- ☐ No Skip to question 16.

Post-university English instruction in Libya

14. How many years did you study English in Libya after university (Bachelor's)? *

Mark only one oval.

- ☐ Less than 1 year
- ☐ 1 year
- ☐ 2 years
- ☐ 3 or more years

15. If known, please write the native language(s) of your English instructors in Libya after university (Bachelor's).

Questions about English education

16. After university (Bachelor's), did you study English in the US, UK, or Canada? *

Mark only one oval.

- ☐ Yes Skip to question 17.
- ☐ No Skip to question 19.

Skip to question 19.

Post-university English instruction in US

17. How many years did you study English in the US/UK/Canada after university (Bachelor's)? *

Mark only one oval.

- ☐ Less than 1 year
- ☐ 1 year
- ☐ 2 years
- ☐ 3 or more years

18. If known, please write the native language(s) of your English instructors in the US/UK/Canada.

Skip to "End of survey."

Visiting an English Speaking Country

19. Have you ever travelled to an English speaking country? *

English speaking country is a country where English is spoken as a first language, like the USA, the UK or Canada.

Mark only one oval.

- ☐ Yes
- ☐ No Skip to "End of survey."

Visiting an English Speaking Country

20. How long did you stay in the English speaking country you visited? *

Mark only one oval.

- ☐ 1 week or less
- ☐ 2-4 weeks
- ☐ 2-3 months
- ☐ 4-6 months
- ☐ more than 6 months
- ☐ Other: _____

End of survey

You have reached the end of this survey. Please click "Submit" to finalize your survey response.

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