

**A Comparative Analysis of the Assimilatory Consonantal Processes at Word
Edges in Tripolitanian Libyan Arabic and English as a Foreign Language**
تحليل مقارن لعمليات الإدغام الصوتي عند حواف الكلمات في اللهجة العربية الليبية واللغة الإنجليزية كلغة
أجنبية

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Abstract

Assimilation is a natural phenomenon existed in all human languages. It is a key aspect of natural pronunciation that plays a crucial role in listening comprehension and language production. Regressive assimilation of consonants at word boundaries contributes substantially to the achievement of speech fluency. In learning a language, non-native speakers would do well to emulate the assimilation processes of the new phonological system if they are targeting native-like pronunciation. This paper compares different categories of assimilation in terms of directionality, partialness, types of assimilation process, and change in sound in Arabic and in English. Comparative analysis reveals some commonalities and differences in relation to the rules governing regressive place assimilation in these languages. Based on the results of the analysis, explication of rules that govern the assimilation processes in both languages is hoped to be of great benefit to the teaching of assimilatory processes in English to Libyan EFL learners.

Keywords: Assimilation, Tripolitanian Libyan Arabic, English

الملخص

الإدغام ظاهرة طبيعية موجودة في كل اللغات الإنسانية، إنه عنصر أساسي من عناصر النطق الطبيعي الذي يلعب دوراً مهماً في فهم اللغة ونطقها. يسهم الإدغام الصوتي التراجعي للحروف الساكنة بين الكلمات في تحقيق طلاقة الكلام بشكل كبير. عند تعلم لغة ما من الأفضل للمتحدثين غير الناطقين بها محاكاة عمليات الإدغام للنظام الصوتي الجديد للحصول على النطق الأصلي. يقوم هذا البحث بمقارنة الخصائص المختلفة للإدغام من حيث الاتجاه وأنواع عملية الإدغام والتغيير في الصوت بين اللغتين العربية والانجليزية. كما يكشف التحليل المقارن عن بعض القواسم المشتركة والاختلافات فيما يتعلق بالقواعد التي تحكم الإدغام التراجعي للأصوات في هذه اللغات. بناءً على نتائج التحليل، من المتأمل أن يكون شرح القواعد التي تحكم عمليات الإدغام التراجعي في كلتا اللغتين ذا فائدة كبيرة لتدريس عمليات الإدغام الصوتي في اللغة الانجليزية للمتعلمين اللبنيين للغة الانجليزية كلغة أجنبية.

Introduction

A speech sound can be altered to become identical or comparable to its neighbouring sound (Webber, 2006; Demirezen, 2016). Linguists identify this as the process of assimilation. According to Alfozan (1989), assimilation is the most common cause of sound change. A speaker typically assimilates sounds to retain the speed of his speech (Febriyanti, 2015).

Assimilation is also a feature of connected speech in Arabic, where the nature of speech in Arabic which, according to Baraka (1988), does not contain isolated and consistent sounds; rather, it contains connected sounds and syllables that affect each other. The most common process taking place between neighbouring sounds in connected speech that leads to changes in terms of the phonemic features of these sounds and in terms of pronunciation is lateral assimilation, in which the /l/ of definite article /ʔil-/ assimilates to the following coronal sound, such as in /aʃams/ (the sun) and /atɒfaha/ (the apple) (Baraka, 1988, p. 95).

The analysis in this paper on consonantal assimilatory processes is done within Kohler's (1991) framework, which posits that there are universal phonological rules governing features of connected speech across languages. In line with its bid for universality, the framework has been applied to many languages such as German, Russian, Italian and French (Kohler, 2001). The present analysis is based on the assumption that perception of assimilatory processes in English is affected by universal perceptual features that enable native speakers to predict what a native speaker is going to say, and that exposing these universal phonological rules to non-native speakers of English will enable them as well to predict what a native speaker is going to say, and notice the similarities between the linguistic patterns in their first language (L1) with their counterparts in

the second language (L2), and in turn allowing these speakers to perceive connected speech in English better.

This study sets out to investigate the similarities and differences between the phonological rules governing assimilation in English and Arabic and how they can help English as a foreign language (EFL) learners in, or obstruct them from learning. This investigation focuses more on the similarities between the learners' first language (L1, i.e. Libyan Arabic) and their second language (L2, i.e. English) to formalize rules that govern assimilation in the L1, which will then be used to develop strategies for teaching and learning the assimilation processes of the L2. The linguistic patterns in L1 which are similar to their counterparts in L2 are assumed to facilitate learning.

Arabic and Tripolitanian Libyan Arabic

Arabic belongs to the Semitic division of the Afro-Asiatic language family (Kaye, 1997, p. 187; Ryding 2005, p. 1; Aoun et al., 2010, p. 1). A striking feature of the Arabic language is the pervasiveness of diglossia among its community of native speakers, where the chasm between "high" and "low" varieties is very pronounced. Modern Standard Arabic and the Qur'anic/Koranic Arabic are high varieties that generally cut across geographical locations and are used almost exclusively in formal contexts, whereas low varieties consist of colloquial speech or the vernaculars. These vernacular varieties can be characterized according to geographical locations. Newman (2002) divides them first into Eastern and Western Arabic, then further sub-dividing them into dialects corresponding to the nation states, for example Libyan Arabic, Lebanese Arabic, Egyptian Arabic, Jordanian Arabic, and Moroccan Arabic (p. 63).

The analysis carried out in this paper is concerned with the Libyan Arabic variety by evaluating some assimilatory processes in the Tripolitanian Libyan Arabic (TLA) variety in comparison with their counterparts in English.

Study Background

Phonological rules or processes arise out of the necessity to meet the demands of language users, both speakers and listeners. Assimilation, for instance, facilitates the task of the speaker, whereas dissimilation facilitates the task of the listener. Dissimilation, which is the phonological process of enhancing differences between sounds to make each of them more auditorily distinct, works in favour of the listener by contributing to better speech perception (Hyman & Katamba, 1999; Crystal 2008). Assimilation, on the other hand, being one of the many connected speech processes of speech, may lead to what Cauldwell (2013) calls jungle listening. Similar to how plants can either grow in individual pots in a greenhouse or in the wild among many other plants, the same is true of words (Cauldwell, 2013). A word pronounced by itself would be different from when pronounced in a running stream of speech.

Dominant phonological theories posited by renowned linguists such as McCarthy (1988) and Chomsky and Halle (1968) tend to give prominence to the articulatory dimension, partly due its higher accessibility for scientific observation as compared to the perception dimension. This bias to the articulatory dimension in phonological theories should be reconsidered, especially in attempts to solve phonological problems. This is because language is first and foremost a medium of communication. Communication is not a one-way traffic; a speech is at the same time produced *and* perceived. It is on this account that Jakobson (1968) insists on the primacy of perceptual factors in phonology, and the idea is further expanded by Ohala (1990) and Kohler (1990) who have shown the importance of perceptual factors in shaping phonological assimilation rules. Perhaps it may be safe to hypothesize that the emergence of problems in articulatory-oriented phonological theories can be attributed to the absence of consideration of perceptual factors.

With English being a global lingua franca, there is an increasing need for learners of English to achieve intelligible spoken English. Apart from contributing to the field of comparative linguistics; analysis of phonetic and phonological details of a language can also contribute to improved English for communication syllabi in an effort to improve second and foreign language learners' speech fluency and accuracy. As explained earlier, assimilation processes may be problematic

from the listener's point of view, and therefore needs to be exposed to non-native speakers. Lessons on assimilation processes may improve the non-native speakers' receptive and productive skills and enable them to speak the language closer to that of native speakers.

However, not many studies have been carried out on connected speech processes in Arabic dialects, and among studies that are published and available, Libyan Arabic variety is the least studied regional Arabic variety, according to Benkato and Pereira (2016). Another gap that has led to the writing of this paper is that no comparative analysis has been done between TLA and English. On top of that, most of Arabic language researchers and phoneticians use articulatory-oriented phonological theories such as Optimality Theory which neglects the perceptual factors that affect phonological processes.

Kohler's Theory on Connected Speech

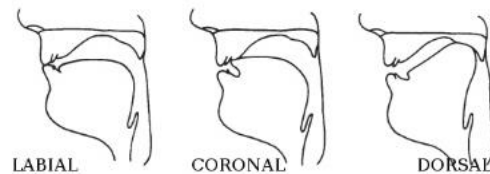
Kohler (1990) maintains that previous descriptions of sounds have been made through impressionistic observations, that is by basing them on ear and articulation training techniques rather than instrumental and experimental techniques. Moreover, restrictions set by standard social and stylistic forms of pronunciation, which lack most common aspects of connected speech, are what foreign language classroom are more likely to conform to (Kohler, 1990). That is why descriptions on natural speech phenomena such as assimilation, weak forms, and elision are incomplete in the works of Gimson and Jones (Kohler, 1990).

In terms of perception, Kohler (1966) has also advanced the idea that speech perception can either be purely auditory, in the case of pitch and loudness, or it can be the listener's re-interpretation, in

which upon perceiving an auditory signal he reconstructs the articulatory movements he would have performed as a speaker—for the latter, perception is then auditory-articulatory.

Regarding connected speech, for Kohler (2001), speech is dealt with as connected utterances (or phrase-level phonetics) rather than separate sounds. This implies that consonants and vowels are components in sequence, and not diverse combined components. Among the examples of rules given in Kohler's theory are:

Economy of tongue tip articulation: anticipatory or regressive assimilation, between stops and nasals, of coronal to following labial or dorsal articulator, also across morpheme and word boundaries such as *in Britain* /ɪn brɪtn/ [ɪm brɪtn] → [mb] and *Hudson Bay* /hʌdʌsən beɪ/ → [hʌdʌsəm beɪ]. (Figure 1 shows the tongue position for labial, coronal, dorsal sounds) created by David Newman Speech-Language Pathologist:



Kohler's Treatment of Regressive Place Assimilation

(Kohler, 1990) considers assimilation to be perceptually tolerated articulatory simplification. Based on Kohler's observation that some consonant types such as nasals and stops are more likely to undergo regressive assimilation of place compared to other consonant types such as fricatives. Regressive assimilation affecting nasal consonant is a widespread and natural phenomenon in human languages. He theorized that assimilation is less likely to happen when the members of a consonant type are relatively distinctive perceptually. That is why stops and nasals, which are

perceptually less distinctive than fricatives, undergo place assimilation while fricatives tend to not assimilate with other adjacent sounds.

Through the above observations, Kohler (1990) raised the following important questions:

- Why are apicals, rather than labial or dorsal gestures, eliminated during assimilation?
- Why is the assimilation process restricted to stops and nasals?
- Why does assimilation only occur before labials and dorsals across word boundaries and not on stops after labials and dorsals?

followed by answers which came down to being found either within the scope of speech production or within the scope of acoustics and perception:

The above discussed assimilations occur in syllable-final but not syllable-initial position due to the initial position of a word having greater value for the listener, and therefore requiring more effort from the speaker during its production as compared to sounds occurring in the final position. Kohler also explained that fricatives do not assimilate under any condition because they are acoustically more distinctive than nasals and stops, regardless of place cues, and thus assimilation is not tolerated. According to Kohler, these assimilatory processes comes from articulatory simplification, but its phonologisation presupposes perceptual evaluation.

Assimilation as Perceptually Tolerated Articulatory Simplification (Kohler, 1976)

In a study on assimilation in German, Kohler (1990) provides a more systematic way of categorising derivations of observable reduction forms according to particular phonetic environments within the generative framework. The following simplifications were presented with regard to the place and manner of articulation in stops across word boundaries:

- 1- Only coronals change. Sequences LABIAL # DORSAL and DORSAL # LABIAL stay unchanged, except for temporal overlap.

2- CORONALS assimilate to a following labial or velar (DORSAL) stop, but LABIALS and DORSALS are never targeted by coronals for place assimilation.

3- Only oral stops and nasals are assimilated, whereas fricatives are only coarticulated.

The present study compares the phonological rules govern assimilation processes in English and TLA with respect to the place and manner of consonant articulation as proposed by Kohler in 1-3.

Theoretical Questions

From the above theoretical review, two questions were developed to prompt the subsequent analysis:

1. What are the similarities and differences in Assimilation processes found in TLA and English?
2. Based on the explication of rules and regularities that govern the assimilation processes in both Arabic and English, how teaching similarities or differences will benefit Libyan EFL learners?

Method of Analysis

Contrastive Analysis

Contrastive analysis (CA) is a field of linguistics that is more interested in studying differences rather than similarities between languages. Nevertheless, a key principle of CA is that when a rule in L1 is entirely consistent with a rule in L2, then these two rules must lead to identical processes and outcomes (James, 1980). As a result, the L1: L2 identities (similar rules) need not be learnt by the learners in view that they have already been acquainted with such rules from their L1 knowledge (James, 1980, p. 151). In other words, when analogous processes are present in both languages (i.e., L1 and L2), comparable processing may apply and thus facilitate the speed and quality of the learning process. The learner of a foreign language will therefore find that some

features of L2 are relatively easy (these are elements from L2 related to their native language), and some other features are extraordinarily difficult (these are elements not related to their native language). Hence, the present analysis adopts a CA approach to compare and contrast features of TLA with English in terms of assimilation.

Data collection

To investigate the patterns of consonant assimilation in TLA and English, phrases that represent all C1C2 combinations (C1C2) across a word boundary were presented. This research compares and contrasts different categories of assimilation between Arabic and English in terms of directionality, partialness (partial or total assimilation), types of assimilation processes, and change in sound. The adopted framework is Kohler's (1990) categorisation of sounds according to being coronal or not in the following sequences: C1=non-coronal and C2=coronal, C1=coronal and C2=non-coronal, C1 and C2=non-coronals, and C1 and C2=coronals. The findings would offer commonalities and differences in relation to the rules governing assimilations in the two languages.

Consonantal Inventory of English

Manner of articulation	Place of articulation							
	Bilabial	Labio-dental	Dental	Alveolar	Palato-alveolar	Palatal	Velar	Glottal
Plosive	p, b			t, d			k, g	
Fricative		f, v	θ, ð	s, z	ʃ, ʒ			h
Affricate					tʃ, dʒ			
Nasal	m			n			ŋ	

Lateral				l				
Approximant (Glides)	w				r	j		

Table (1) shows manner and place of articulation of English consonants (Roach, 2009)

Types of Assimilation in English

Assimilation may be categorized in terms of partialness, whether it is complete or partial. In English, complete assimilation is applicable in the example of “ten mice” /ten maɪs/ [tɛm maɪs]. As for partial assimilation, Crystal (2008, p. 40) explains that the English phrase “ten bikes” /tɛn baɪks/ changes to [tɛm baɪks] because /n/ assimilates with the place feature of the following /b/ to surface as [m], and so the assimilation here is partial rather than total.

In English, emphatic assimilation can be shown in the example “*turn up trumps*” where the /n/ in *turn* becomes /m/ under the influence of subsequent sounds.

Consonants that are affected by assimilation are changed according to three main types of differences:

1. Difference in place of articulation

The most typical kind of assimilation in English is assimilation of place. It may occur as regressive (the final consonant of the preceding word is influenced by the first consonant of the next word) or progressive (the first consonant of the next word is influenced by the final consonant of the preceding word) (Cruttenden, 2008).

2. Difference in manner of articulation

Assimilation of manner is less noticeable and occurs more commonly as regressive assimilation. Examples are found in plosive-finals becoming a fricative or a nasal (Roach, 2009):

1-“that side” /ðæt saɪd/ [ðæs saɪd]

2- “good night” /gʊd naɪt/ [gʊn naɪt]

3. Difference in voicing

Assimilation of voice can also be found in restricted cases, and only as regressive assimilation across word boundaries. If the final consonant of a word is voiced and the initial consonant after it is voiceless, the voiced consonant is often found to have no voicing (Roach, 2009).

Examples of Assimilation in English

The following phrases, adapted from Kohler’s (1997) study, demonstrate some of the phonological rules that shape consonantal assimilation in English. Because regressive assimilation of place is the most common type of assimilation in English and many other languages, the examples will give more attention to this type of assimilation.

Consonants can be divided according to whether the consonants are produced using the front part of the tongue, i.e. coronal, or not, i.e. non-coronal. When two consonants meet at word edges, different assimilatory effects occur based on whether one or both of them are coronal or non-coronal.

I- C1 = non-coronal and C2 = coronal

Labial (bilabial and labiodental) and dorsal (velar) word-finals are never targeted by coronal word-initials for place assimilation:

1- “grief tone” /gri:f təʊn/ [gri:f təʊn]

2- “dream zone” /dri:m zəʊn/ [dri:m zəʊn]

3- “zigzag shape” /'zɪg,zæɡʃeɪp/ ['zɪg,zæɡʃeɪp]

II- C1 = coronal and C2 = non-coronal

When the word-final consonant is coronal nasal /n/, it assimilates to a labial or velar plosive word-initial:

- 1- “green mire” /gri:n 'maɪə(r)/ [gri:m 'maɪ(ə)r]
2- “in Cairo” /ɪn 'kaɪrəʊ/ [ɪŋ 'kaɪrəʊ]

Coronal nasal /n/ assimilates in place to a following fricative word-initial /f/, changing to /ɱ/, but not vice versa:

- 3- “green figs” /gri:n figz/ [gri:ɱ figz]

Coronal plosives /t, d/ assimilate in place to the next labial plosive or velar plosive word-initial:

- 4- “bad boy” /bæd bɔɪ/ [bæb bɔɪ]
5- “that girl” /ðæt ɡɜ:l/ [ðæk ɡɜ:l]

Coronal plosives /t, d/ do not assimilate in place to a following labial nasal word-initial:

- 6- “fat meal” /fæt mi:l/ [fæt mi:l]

Coronal plosives /t, d/ do not assimilate in place to a following non-coronal fricative word-initial:

- 7- “great forms” /ɡreɪt fɔ:mz/ [ɡreɪt fɔ:mz]
8- “sad faces” /sæd feɪsɪz/ [sæd feɪsɪz]

Coronal fricatives do not assimilate in place to a following non-coronal word-initial consonant:

- 9- “miss Bob” /mɪs bɒb/ [mɪs bɒb]
10- “fresh carrot” /fref ˈkerət/ [fref ˈkerət]

Non-nasal coronal sonorants /l, r/ do not assimilate to a following non-coronal word-initial consonant:

- | | | |
|---------------------|--------------------|--------------------|
| 11- “full contract” | /fʊl kɒntrækt/ | [fʊl kɒntrækt] |
| 12- “near company” | /nɪə(r) kʌmp(ə)ni/ | [nɪə(r) kʌmp(ə)ni] |
| 13- “severe pain” | /sɪ'viə(r) peɪn/ | [sɪ'viə(r) peɪn] |

III- C1 and C2 = non-coronal

If two adjacent non-coronal sounds differ only in voicing, they undergo voicing assimilation:

- 1- “big castle” /bɪg kæsəl/ [bɪk kæsəl]

However, when they differ in any other features, then voicing assimilation is blocked:

- 2- “big problem” /bɪg 'prɒbləm/ [bɪg 'prɒbləm]
- 3- “leap quickly” /li:p kwɪkli/ [li:p kwɪkli], *[li:k kwɪkli]

IV- C1 and C2 = coronal

Coronal fricatives behave differently, the only noticeable change being that /s/ becomes /ʃ/ and /z/ becomes /ʒ/ when followed by /f/:

- 1- “this shoe” /ðɪs ʃu:/ [ðɪʃ ʃu:]
2- “Times Share” /taɪmz ʃeə/ [taɪmʒ ʃeə]

Additionally, when two coronals disagree on sonority, assimilation does not occur:

- 3- “fell down” /fel daʊn/ [fel daʊn]
4- “tired lions” /taɪəd laɪənz/ [taɪəd laɪənz]
5- “triangle shape” /'traɪ,æŋɡəl ʃeɪp/ ['traɪ,æŋɡəl ʃeɪp]

Within sonorants, non-nasals induce total assimilation on nasal /n/, but not vice versa:

- 6- “in rapid” /ɪn ræpɪd/ [ɪr ræpɪd]
7- “in Los Angeles” /ɪn lɒs 'ændʒələs/ [ɪl lɒs 'ændʒələs]
8- “bear nose” /beə nəʊz/ [beə nəʊz]
9- “feel nostalgic” /fi:l nɒstaldʒək/ [fi:l nɒstaldʒək]

Coronal nasal /n/ assimilates in place to a following fricative /θ/ or /ð/ and will change to a dental nasal:

- 10- “in those” /ɪn ðəʊz/ [ɪn̪ ðəʊz]
11- “in third” /ɪn θɜ:d/ [ɪn̪ θɜ:d]

Coronal plosives /t, d/ assimilate in place to a following fricative /θ/ or /ð/ and will change to a dental plosive:

- 12- ‘cut through’ /kʌt θru:/ [kʌt̪ θru:]
13- ‘put these’ /pʊt ði:z/ [pʊt̪ ði:z]

14- 'inside that' /insaid ðæt/ [insaiɖ ðæt]

Consonantal Inventory of TLA

Manner of articulation	Place of articulation										
		bilabial	Labio-dental	Dento-alveolar	alveolar	post-alveolar	pala-tal	velar	Uvular	pharyn-geal	Glottal
Stop	plain	b		t, d				k, g		q	ʔ
	emphatic			tʰ, dʰ							
Fricative	Plain		f		s, z	ʃ, ʒ			X, ɣ	ħ, h	h
	emphatic				sʰ, zʰ						
Nasal		m			n						
Lateral	plain				l						
	emphatic				lʰ						
Tap or trill					r						
Glides		w					j				

Table (2) shows manner and place of articulation of TLA consonants (Elramli, 2012)

Types of Assimilation in Arabic

Assimilation in Arabic is comparable to that of English in that it can be categorized according to partialness (complete or partial assimilation). Complete consonantal assimilation, both regressive and progressive, occurs in Arabic, as illustrated in the example /ʕain maliana/ [ʕaim maliana] “satisfied”, where the /n/ changes to /m/; whereas partial assimilation is found in the example /min bayit/ [mim bayt] ‘from house’, where the /n/ also changes to /m/ (Alfozan, 1989, p. 53).

/inbaʕat/ [imbaʕat] “was sent” (Alfozan, 1989, p. 53)

/men bakri/ [mim bakri] “very early”

In Arabic, partial assimilation produces consonant clusters that share one or more, but not all, features, whereas complete assimilation produces identical or geminate consonant clusters. However, there are cases where partial assimilation involves changing more features than complete assimilation, one of them being the complete assimilation of the definite article /l/ to a following /r/ in words like r-rasim “the drawing” in contrast with the partial assimilation of /n/ to a following velar in some dialects like Libyan Arabic in words like /ʔinkitab/ ‘was written’ and /ʔinguulu/ ‘we say it’ (Owens, 1984, p. 46).

One phonetic feature that is common to all Arabic dialects is the existence of emphatic consonants. These consonants are produced with a secondary constriction in the posterior vocal tract (Al-Ani, 1970; Card, 1983; Davis, 1995; Lehn, 1963; Zawaydeh, 1999; Zuraiq, 2006). Emphatic assimilation in Arabic occurs as a result of the presence of neighbouring emphatic consonants and it can be recognized in words such as /laʕaʕ/ “smudge”, /baʕal/ “hero”, and /saʕaʕ/ “discontent” (Abu Mathkour, 2009). The /ʕ/ in those words affects its closest consonants so that they become more emphatic, for instance by making the /l/ in /laʕaʕ/ dark, in contrast with the clear /l/ in /laiθ/ “lion” even though for both words /l/ is the initial sound.

Consonants that are affected by assimilation in Arabic are changed according to three main differences:

1- Difference in place of articulation: Similar to English, regressive assimilation of place is the most common type of assimilation in Arabic.

2- Emphatic assimilation: emphatic sounds are also referred to as pharyngealized or velarized sounds. Pharyngealized sounds are a group of sounds in Arabic which involve the constriction of the pharynx, whereas velarized sounds involve raising the back of the tongue. These emphatic sounds affect their preceding and subsequent neighbouring sounds within words. For example, in /t^h/ “dates” the /l/ sound becomes more emphatic due to the influence of the emphatic sound /t^h/ preceding it; in /ba:s^h/ “bus”, the long vowel /a:/ and the /b/ sound become more emphatic due to the influence of the emphatic sound /s^h/ following them.

3- Difference in voicing: Again, similar to English, regressive assimilation of voicing across word boundaries occur in Arabic as well. If the final consonant is voiced and the following initial consonant is voiceless, the voiced consonant is often found to have no voicing, for example, /ʃak kabi:r/ [ʃak kabi:r] “big split”.

It is noted that voicing and emphatic assimilations across word boundaries in Arabic only occur if the places of articulation of the neighboring consonants are identical whether underlyingly or as a result of place assimilation.

Regressive assimilation is common in Arabic as it is in English and can be found within words or across neighbouring words, for example in /ilbareh/ [imbareh] “last night” and /min fəʊg/ [min fəʊg] “from above”.

Likewise, progressive assimilation is uncommon in Arabic just as it is uncommon in English and can only be found in a few cases such as /ni:ran/ [ni:~ran], where the long vowel /i:/ is nasalized. A third directionality of assimilation which Arabic, but not English, is known to have is bidirectional. It involves the two previous types of assimilation, regressive and progressive, simultaneously and is a distinctive feature in Arabic, attributed to the occurrence of emphatic assimilation in the language. For example, in /bat^h/ “hero” the emphatic phoneme /t^h/ has an effect

on both directions, in which it changes both the preceding /b/ and the following /l/ into emphatic sounds as well.

Examples of Assimilation in TL Arabic

The following phrases exemplify some phonological rules that produce assimilated consonants in TLA. Most of the examples used are created, while some others are gathered from past literature:

I- C1 = non-coronal and C2 = coronal

Labials and dorsals are not targeted by coronals for place assimilation:

- 1- /mauqef tariḫi/ [mauqef tariḫi] ‘historical situation’
- 2- /kalam zaid/ [kalam zaid] ‘trivial speech’
- 3- /dalam dames/ [dalam dames] ‘a complete darkness’
- 4- /farag ʃaasiʃ/ [farag ʃaasiʃ] ‘a big difference’

Labials and dorsals are also not targeted by coronals for emphasis assimilation as emphatic labials and dorsals are not part of the TLA consonant inventory:

- 5- /ḥalib sʕafi/ [ḥalib sʕafi] ‘pure milk’
- 6- /kalam sʕaʃab/ [kalam sʕaʃab] ‘difficult speech’
- 7- /ḥag dʕaiʃ/ [ḥag dʕaiʃ] ‘a lost right’

II- C1 = coronal and C2 = non-coronal

When C1 is coronal nasal /n/, it assimilates to a following labial or velar stop:

- 8- /min bakry/ [mim bakri] ‘very early’
- 9- /watan kabi:r/ [wataŋ kabi:r] ‘big homeland’

Coronal nasal /n/ does not assimilate in place of a following fricative:

10 - /laban χater/[laban χater] ‘thick yogurt’

11- /laban ħamd^s/ [laban ħamd^s] ‘a sour yogurt’

12- /laban řaadi/ [laban řaadi] ‘a plain yogurt’

And neither does nasal /n/ assimilate in place to a following pharyngeal /ħ/ or /ř/ since a pharyngeal nasal is impossible to articulate (Zurairq, 2006). However, alveolar nasal /n/ assimilates partially (in place) to fricative /f/ in TLA, yielding labiodental /m/:

13- /min frænsa/ [mim frænsa] ‘from France’

Coronal plosives /t, d/ assimilate in place to a following labial plosive, but not to a velar plosive:

14- /zeit beker/ [zeib beker] ‘an extraversion oil’

15- /zeit gadi:m/ [zeit gadi:m] ‘an old oil’

Voicing and assimilation also occurs simultaneously when place assimilation occurs (see example no. 12). This observation coincides with the generalisation that voicing assimilation only occurs when all other surface features of the two consonants are identical (Zurairq, 2006).

Coronal plosives /t, d/ do not assimilate in place to a following labial nasal:

16- /marrat maħamed/[marrat maħamed] ‘Mohamed’s wife’

Coronal plosives /t, d/ never assimilate in place to a following non-coronal fricative:

17-/samaad faased/ [samaad faased] ‘an expired fertilizer’

18- /samiid yaali/ [samiid yaali] ‘an expensive semolina’

19-/ħadi:d χaam/ [ħadiid χaam] ‘a raw iron’

20-/ħadi:t χaas^s/ [ħadi:t χaas^s] ‘private speech’

Coronal fricatives do not assimilate in place to a following non-coronal:

21- /ki:s bat^ʕat^ʕa/ [ki:s bat^ʕat^ʕa] ‘a bag of potatoes’

22- /ħɒʃ gadi:m/ [ħɒʃ gadi:m] ‘an old house’

Finally, non-nasal coronal sonorants /l, r/ do not assimilate to a following non-coronal:

23- /sel kebi:r/ [sel kebi:r] ‘a big flood’

24- /dar kamla/ [dar kamla] ‘a full furniture room’

25- /gamar bader/ [gamar bader] ‘a full moon’

III- C1 and C2 = non-coronal

If two contiguous non-coronal sounds differ only in voicing, they undergo voicing assimilation, but when they differ in any other features, then voicing assimilation is blocked:

26- /ħag kaamil/ [ħak kaamil] ‘a complete right’

27- /farag kabiir/ [farak kabiir] ‘a big difference’

28- /selk baid/ [selk baid] ‘a smashed wire’

29- /degig ɣali/ [degig ɣali] ‘an expensive flour’

In 28 and 29 voicing assimilation is not applicable.

IV- C1 and C2 = coronal

When two coronals are dissimilar on sonorancy, assimilation does not occur:

30- /qrar saari/ [qrar saari] ‘a valid decision’

31- /qrar s^ʕaʕeb/ [qrar s^ʕaʕeb] ‘a difficult decision’

32- /lel daafi/ [lel daafi] ‘a warm night’

33- /semiid libii/ [semiid libii] ‘a Libyan semolina’

Within sonorants, non-nasals trigger total assimilation of nasal /n/, but not vice versa:

34- /min ru:sia/ [mir ru:sia] ‘from Russia’

- 35- /min libia/ [mil libia] ‘from Libya’
36- /s^ʕaar naaʕim/ [s^ʕaar naaʕim] ‘it became soft’
37- /rat^ʕel nages^ʕ/ [rat^ʕel nages^ʕ] ‘an incomplete pound’

Within non-nasal sonorants, /l/ assimilates to /r/, but not vice versa:

- 38- /nabiil ragid/ [nabiir ragid] ‘Nabil is asleep’
39- /s^ʕair libi/ [s^ʕair libi] ‘he became Libyan’

In Standard Arabic, /θ/ and /ð/ exist phonemically but their actual representations in TLA are allophones /t/ and /d/, respectively. This is a case which not only occur when they are preceded or followed by /t/, and /d/, in which it looks like a complete assimilation, but also with the other consonants as well. See no. 43 :

- 40- /rad ðaliil/ [rad daliil] ‘a weak answer’
41- /ħarraθ taʕbaan/ [ħarrat taʕbaan] ‘a tired farmer’
42- /malað daafi/ [malad dafi] ‘a warm shelter’
43- /kass θaani/ [kass taani] ‘a second cup’ (Zuraiq & Zhang, 2006)

Moreover, /ð^ʕ/ in TLA is substituted by the /d^ʕ/ sound, and the final consonant /t/, in 44 changed to unreleased stop:

- 44- /qrarat ð^ʕalma/ [qrarat d^ʕalma] ‘unfair decisions’

According to Elfitoury (1976, p. 3), the voiceless interdental fricative, /θ/, and its voiced counterpart, /ð/, both found in Modern Standard Arabic, are used in the eastern and western regions of Libya. However, TLA lacks /θ/, and words realized with this sound in Modern Standard Arabic are realized with /t/ in TLA to produce /tla:ta/ ‘three’ instead of /θalaθa/ while /ð/ corresponds with /d/ to produce /ha:da/ ‘this’ instead of /ha:ða/ ‘this’. In the case of /ð^ʕ/, it merges with /d^ʕ/ to produce /d^ʕulum/ ‘injustice’ instead of /ð^ʕulm/. This process of replacing fricatives with homorganic stops is called “stopping” (Roach, 2000, p. 56). It should be noted that post-alveolar

affricate /dz/ is consistently reduced to /z/ in TLA and is thus excluded as a distinct consonant sound in this analysis.

Findings and Discussion

To begin the discussion of the analysis, the theoretical framework that underpins the analysis is restated first. Kohler explains that connected speech in general is controlled by a system of five conditioning factors: the speaker's tendency to reduce effort, the listener's demands for distinctivity, the distinctivity requirements set by the communicative situation, linguistic patterns, and social conventions. Place assimilation, for instance, takes place as a result of relaxed speech with reduced energy in speaking time or of higher speech rate with less time spent on producing some consonants such as coronal sounds. Nevertheless, while assimilation is a result of articulatory simplification, its phonologization presupposes a perceptual evaluation. This was based on Kohler's observation that some consonant types such as coronals, nasals, and oral stops are more likely to undergo regressive assimilation of place compared to other consonant types such as fricatives. He concluded that assimilation is more likely to happen when the members of a consonant class are less distinctive perceptually. Assimilation of fricatives are therefore not tolerated since fricatives are acoustically more distinctive than nasals and stops when place cues are taken into consideration. This explains why Kohler (1990) found listeners committing more errors when identifying nasals and stops compared to when identifying fricatives.

Based on Kohler's phonological theory that proposes the effectiveness of perceptual factors in shaping assimilated consonants, as well as previous phonological studies examining perceptual factors and how they affect the shaping of assimilated consonants among native speakers, it is hypothesized that comparing the perceptual rules governing the assimilation processes in both English and TLA will improve Libyan EFL learners' perception and comprehension of connected speech and ultimately their pronunciation and acquisition of the language. The present analysis examines assimilation in English and Arabic by focusing on the consonantal assimilatory

processes in both languages with respect to the place and manner of consonant articulation as proposed by Kohler.

From the investigation of the perceptual features that govern the assimilation rules in both languages, it was possible to recognize the similarities and differences in assimilation between both languages. In both Arabic and English, within the structure ‘C1 = non-coronal and C2 = coronal’, it was noted that labials and dorsals are never targeted by coronals for assimilation of place. However, labials and dorsals are never targeted by coronals for emphasis assimilation, as emphatic labials and dorsals are not part of the TLA consonant inventory. This suggests that language teachers should take into account these specific features of TLA while teaching English to Libyan students.

In both Arabic and English, regarding the structure ‘C1 = coronal and C2 = non-coronal’, when C1 is coronal nasal /n/, it assimilates to a following labial or velar stop. However, in Arabic, coronal nasal /n/ does not assimilate in place of a following fricative and, unsurprisingly, nasal /n/ does not assimilate in place of a following pharyngeal /ħ/ or /ʕ/, as a pharyngeal nasal is articulatorily impossible (Zuraiq & Zhang, 2006). However, alveolar nasal /n/ assimilates partially (in place) to fricative /f/ in TLA, and yields labiodental /m/. Similarly in English, coronal nasal /n/ assimilates in place of a following fricative /f/ to change to /m/. It is assumed that this identical feature of TLA makes it easier for students to produce the /m/ sound. Besides that, in English, coronal nasal /n/ assimilates in place of a following fricative /θ/ or /ð/, and will change to a dental nasal.

In both languages, coronal plosives /t, d/ assimilate in place to a following labial plosive. However, assimilation of /t,d/ to velar plosive takes place in English but not in Arabic. This implies that teachers must highlight this phonological feature which does not exist in Arabic. Also, in Arabic, voicing assimilation occurs simultaneously when place assimilation is taking place. This

observation is in line with the generalization that voicing assimilation only occurs when all other surface features of the two consonants are identical (Zuraiq, 2006). In both Arabic and English, coronal plosives /t, d/ do not assimilate in place to a following labial nasal. Furthermore, in both languages, coronal plosives /t, d/ do not assimilate in place to a following non-coronal fricative. Coronal fricatives do not assimilate in place to a following non-coronal. As a consequence, it may be possible to predict that Libyan Arab learners of English would recognize fricatives in English easily since Arabic exhibits similar consonants. Finally, in both languages, non-nasal coronal sonorants /l, r/ do not assimilate to a following non-coronal.

As for structure 'C1 and C2 = non-coronals', if two adjacent non-coronal sounds differ only in voicing, they undergo voicing assimilation. However, when they differ in any other features, then voicing assimilation is blocked. This feature which exists in both Arabic and English can be transferred from the learners' L1 to their L2.

Regarding structure 'C1 and C2 = coronals', when two coronals disagree on sonorancy, no assimilation takes place in either Arabic or English. Also, in both languages, English and Arabic, non-nasal sonorants trigger total assimilation of nasal /n/, but not vice versa. However, only in Arabic /l/ assimilates to /r/ within non-nasal sonorants, but not vice versa. Hence, language teachers should be aware of these features and address them appropriately when teaching Libyan students about assimilation.

Therefore, the analysis has shown that TLA and English shares commonalities (symmetries) and uncommonalities (asymmetries) which need to be taken into consideration in the teaching and learning of spoken English to TLA learners. Learning these natural phenomena in English by comparing them with similar features in the language they are more familiar with could help learners make good understanding of English pronunciation in general and assimilatory phonological processes in particular. Also, knowing the similarities and differences of assimilation processes in TLA and English can help teachers when they teach English pronunciation.

Conclusion

This paper has been concerned with investigating the importance of perceptual factors in shaping assimilation processes. It aimed at examining the perceptual saliency of assimilated consonants in TLA and English by comparing the assimilation processes of the two languages within the aspects of directionality, partialness, types of assimilation process, and changes in sound. The findings revealed that there are some common and uncommon rules governing assimilation in Arabic and English. The common rules and regularities may be transferred by the learners from their L1 to their L2; whereas with the uncommon rules, teachers should be aware of the differences that exist between the two phonological systems and address the issues connected to the differences when teaching English. This awareness can be attained through formalization of the rules and regularities governing assimilation in both Arabic and English so that they can be learned more systematically by both the teachers and learners. This study contributes to the body of knowledge by bridging the gap in research on assimilation in TLA and English using the contrastive analysis approach. This study also adopted Kohler's (1990) theory which has rarely been used in the context of Arabic phonological analysis, particularly in the TLA dialect.

References

- Abu-Salim, I. (1988) 'Consonant assimilation in Arabic: an autosegmental perspective', *Lingua*, 74, pp. 45-66.
313.
- Abu Mathkour, H. A. (2009). Phonological Assimilation in English and Arabi. *Social Sciences and Humanities*, 3(1), 1–12.
- Al-Ani, S. (1970). Arabic phonology. The Hague: Mouton. Beckman, J. (1998). Positional faithfulness. Ph.D. dissertation, University of Massachusetts, Amherst.
- Alfozan, A. I. (1989). Assimilation in Classical Arabic: A phonological study (Doctoral dissertation, University of Glasgow).
- Aoun, J.E., Choueiri, L. and Benmamoun, E. (2010) *The syntax of Arabic*. Cambridge: Cambridge University Press
- Baraka, B . (1988). *Elm Alaswat Alaam: Aswat Alugha Al- Arabiya*. Beirut: Markaz El-enmaa Elqaumy.
- Benkato, A., & Pereira, C. (2016). An annotated bibliography of Arabic and Berber in Libya. *Libyan Studies*, 47, 149.
- Card, E. (1983). A phonetic and phonological stud of Arabic emphasis. Ph.D. dissertation, Cornell University.
- Cauldwell, R.(2013). Pronunciation and listening. *The Routledge Handbook of Contemporary English Pronunciation*, 352.
- Cruttenden, A. (2008). *Gimson's pronunciation of English*. 7th ed. London: Hodder Education.
- Crystal, D. (2008) *A dictionary of linguistics and phonetics*. Oxford:Blackwell Publishers. Ltd.
- Chomsky, N. and M. Halle. (1968). *The Sound Pattern of English*. Harper and Row: New York
- Davis, S. (1995). Emphasis spread in Arabic and grounded phonology. *Linguistic Inquiry* 26: 465-498.
- Demirezen, M. (2016). Assimilation as a Co-Articulation Producer in Words and Pronunciation Problems for Turkish English Teachers. *Educational Sciences: Theory and Practice*, 16(2), 477-509.

- Elfitoury, Abubaker Abdalla. 1976. A Descriptive Grammar of Libyan Arabic. Ph.D Dissertation. Georgetown University.
- Elramli, Y. M. (2012). *Assimilation in the phonology of a Libyan Arabic dialect: A constraint-based approach* (Doctoral dissertation, Newcastle University).
- Febriyanti, D. N. (2015). Assimilation, Reduction and Elision Reflected in the Selected Song Lyrics of Avenged Sevenfold. *Journal of Language and Literature*, 15(1), 14-19.
- Hyman, L. M., & Katamba, F. X. (1999). 12 The syllable in Luganda phonology and morphology. *The syllable: Views and facts*, 45, 349.
- Jakobson, R. (1968). The role of phonic elements in speech perception. *STUF-Language Typology and Universals*, 21(1-6), 9-20.
- James, C. (1980). *Contrastive Analysis*. New York: Longman.
- Kaye, A.S. (1997) 'Arabic Phonology', in Alan, S.K. (ed.) *Phonologies of Asia and Africa*. Winona Lake, Indiana: Eisenbrauns, pp. 187-204
- Kohler, K. (1966). Towards a phonological theory. *Lingua*, 16, 337-351.
- Kohler, K. J. (1990). Segmental reduction in connected speech in German: Phonological facts and phonetic explanations. In *Speech production and speech modelling* (pp. 69-92). Springer, Dordrecht.
- Kohler, K. J. (1991). The Phonetics/Phonology Issue in the Study of Articulatory Reduction. *Phonetica* 48: 180-92.
- Kohler, K. J. (1994). Complementary Phonology a Theoretical Frame for Labelling an Acoustic Data Base Of Dialogues. In *Third International Conference on Spoken Language Processing*.
- Kohler, K. J. (2001). Articulatory dynamics of vowels and consonants in speech communication. *Journal of the International Phonetic Association*, 1-16.
- Lehn, W. (1963). Emphasis in Cairo Arabic. *Language* 39: 29-39.
- McCarthy, J.J. (1988). Feature geometry and dependency: A review. *Phonetica*, 43,84-108.
- Newman, D. (2002) 'The phonetic status of Arabic within the world's languages: the uniqueness of the lughat al-daad', in *Antwerp Papers in Linguistics*. pp. 65-75

- Ohala, J.J. (1990). The phonetics and phonology of aspects of assimilation. In J. Kingston and M .E. Beckman (eds.), *Papers in Laboratory Phonology I: Between the Grammar and Physics of Speech* (pp. 258-275). Cambridge: Cambridge University Press.
- Owens, J. (1984) A short reference grammar of Eastern Libyan Arabic. Wiesbaden: Otto Harrassowitz.
- Roach, P. (2009). *English phonetics and phonology paperback with audio CDs (2): A practical course*. Cambridge university press.
- Ryding, K.C. (2005) A reference grammar of Modern Standard Arabic. New York: Cambridge University Press.
- Weber, R. M. (2006). Function words in the prosody of fluent reading. *Journal of Research in Reading*, 29(3), 258-269.
- Zawaydeh, B. (1999) The phonetics and phonology of gutturals in Arabic. PhD thesis. Indiana University.
- Zurairq, W., & Zhang, J. (2006). Phonological assimilation in urban Jordanian Arabic. *Kansas Working Papers in Linguistics*, 28: 33-64