Phonological Rules in English and Arabic: A Comparative Study

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Abstract

This study sheds light on the relationship between phonological representation of words, phrases and forms, and their phonetic output by means of phonetic rules as proposed by Noam Chomsky and Halle (1968) with regard to phonological rules which are approached mathematically via notations. This practice, which is embodied visually in this paper, is more effective than rule statements so that the reader can get acquainted with the mechanisms these rules follow in order to activate the phonological images stored in the mind in conjunction with their phonetic realization.

Accordingly, this paper aims at providing those who study English as a foreign language with a tangible guideline to process these rules and enrich them with clear and explicit data pertaining to the phonetic context comparable with Arabic and its phonological rules.

Introduction

1. Notations Used in Phonological Rules

When sounds experience change, three things should be known: 1. which sounds to be changed, 2.the way they are changed, and (3) under what environments they change. The change is indicated by means of feature symbols. These symbols represent the phonetic environments that trigger the change. Hymen (1975:14) identifies five types of phonological rules

1. Phonological rules that trigger feature change,

2. Phonological rules that spark sound segment deletion,

3. Phonological rules that lead to sound segment insertion,

4. Phonological rules that result in segment coalescence, and

5. Phonological rules concerning metathesis.

The following symbols are the key notations used in phonological rules:

1. _____ indicates the segment to be changed

2. / refers to the environment in which phonetic processes take place.

3. ⟶ (arrow) indicates the process of change.

4. { (parenthesis) is a formal device meaning either -----or ; that is to say it is employed when one rule has an identification lacking in the other.

5. ( ) (braces) is a formal device meaning each rule has a specification not accruing in the other (Schane ,1973 :64-5)

6. Ϛ means one or more consonants.

7. V stands for vowel

8. ˜ stands for nasalization

9. # stands for syllable boundary

10. ## stands for word boundary

11. + represents a morpheme boundary.

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12.   θ represent zero realization of a phoneme.

13. Nas. means a nasal feature, alveo. means alveolar, lenite means lenition, obst. means obstruent, palat. refers to palatal sounds, lab. means a labial sound, fric. Means fricative, sibl. means sibilant, and post-alveo. means post-alveolar.

2. Phonological Rules and Notations

A phonological rule is a formal device capturing sound -related processes that the mind performs in producing and understanding speech. That is to say, phonological rules are intended to relate the abstract underlying representation of a sound segment as stored in the mind to its actual, concert form as pronounced and heard clearly. Being so, phonetic rules ,which are in fact language-specific ,modify and elaborate the sounds in the speaker's mind to bring about the physical realizations of these sounds by violating some rubrics that the phonology of a given language system follows, sparking a fierce conflict between identity and optimal conventions. Identity conventions require correspondence between the sounds of a given language as far as the place or manner of articulation and/ or voicing whereas phonological rules demand suitable sequence of these sounds that guarantee ease of articulation. Pronouncing a form causes conflict between faithfulness constrains demanding identity between input and output and markedness rules that call for no match between them (Fromkin, et al, 2007:237).

It is worth mentioning that the phonetic representation, arrived at by applying phonological rules to the phonological level, includes the phonetic characteristics of sounds and is, of a course ,devoid of the physiological and acoustic properties such as pitch, rate of the sound ,loudness and the like (ibid.) To give a clearer picture of the role of phonetic rules, Steinberg (1991: 35) argues that phonological rules are applied to the surface structure which is, in turn,

resultant from the deep structure with the application of transformation rules as indicated by Chomsky's standard theory (1965). The following diagram illustrates the role of phonological rules in connecting the phonemic representation with phonetic representation of sounds

Phonemic Representation

Phonological rules
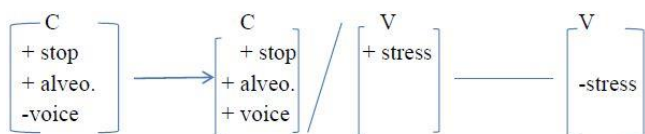
Phonetic Representation

Figure (1) : Phonological and Phonetic levels as Connected by Phonological Rules   (Following Steinberg, 1991:31)

Consequently, the phonetic realization of sound segments is modified versions of the sounds stored in the mind by virtue of phonological rules. Referred to as allophones, these segments display no big divergence from the original abstract ones from which they descend. For instance, dark [ɫ] and light [l] are two allophones of the phoneme /l/ and it is the context that determines the presence of one phone rather than another (Yule ,2010 : 43-4).
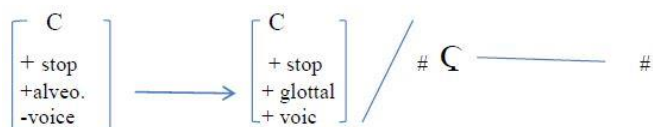
3. 1 Feature Change Rule

Regarded as the leading phonetic process, the phonological rule that triggers change in some phonetic properties of a sound is given a priority in this paper. It should be emphasized that this change is not arbitrary but is context – dependent. Of these rules of feature change is one so called intervocalic alveolar flapping which recommends that a voiceless consonant alveolar stop will be voiced when found intervocalically provided that the preceding vowel is stressed and the following vowel unstressed. As a consequence, /t /and /d/ are pronounced as a flab consonant [ɾ] in words

like *butter* [bʌɾ ə] and *notable* [nouɾbl] (Yule, 2010: 44). The same holds true for *writer* [raiɾər], which is indistinguishable from *rider*[raiɾər] as far as pronunciation is concerned. This flap consonant is phonetically transcribed as [D], an archiphoneme having shared features of /d/ and /t/.This rule can be stated as follows:

In line with this rule, [t] sounds in the words mentioned here gets neutralized as far as voice is concerned, triggering ambiguity between, say, *latter* and *ladder, writer and rider,* and so on, a problem that can only be solved during contextual factors.
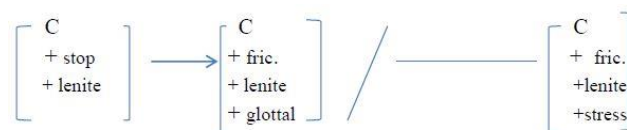
Yavas (2011: 61-2) suggests that in American English, a glottal stop emerges as an allophone of /t/ phoneme as in bottle [bʌʔl] or [bʌtl]. Shaped whenever vocal cords are held tightly, glottal stop, similar to preglottalized [t], is an allophone in words such as *Batman* [bæʔmən], *Hitler* [hiʔlər], *atlas* [æʔləs], *Atlanta* [æʔləntə], *he hit me* [hihiʔmi] in which the glottal stop substitutes for [t]. However, such replacement does not occur in *atrocious*, [ətrɔʃəs] not * [əʔrɔʃəs], *attraction* [ətrækʃən] and not *[əʔ rækʃən] (the asterisk * means unacceptability). This is because the substitution of glottal stop for [t] sound can only take place when [t] is found syllable-finally. It follows that the words that do not admit this replacement have [t] in their onsets as is the case with [ə. tr ækʃən]. In the passing, the rule can be adjusted as:

The rule above mentioned is insightful simply because it tells us when we glottalize what is non-glottal. Simultaneously, it is indicative of the place where the speaker comes from.
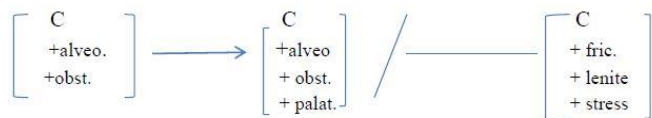
On the other hand, Arabic glottalization is more flexible than its English one. It should be emphasized that the glottal stop in English is an allophone of the phoneme [t], but it stands as a phoneme in its own right in Arabic and, in consequence, evokes a functional contrast, which is the key characteristic of a phoneme, to produce one other word with a new meaning. As such Arabic has two glottal stops; one is voiceless fricative [h]and the other is voiced stop (hamza)/ʔ/. Along with the latter, there are two types: a. hamzat wasl (glottal stop with juncture) b. hamzat qata which is needed here because its pronunciation demands closing vocal cords tightly. Hamzat alwasl is ruled out since it is very weak. The Arabic glottal stop, for example, is found in [ʔkele]) (اكل)(eat) .[sa ʔle] (سال)(ask), [qeraʔ]) (قرا)(read),etc. The voiceless glottal/ h/, when stressed, turns into [ʔ] as in[hiz] (هز)(move) which is changed into [iz]. The same holds true for the fricatives /w/ and /j/ as in [tfawit] (تفاوت) (difference) and [meʕaːʃ] (معاش)(living standard) which are to change into [tfawʔt] and [meʕaːʔʃ] respectively (انيس,2006:95-6). It is worth noting that these sounds that are prone to change in this way share lenition feature. As such, this process can be notionally written as:

It has been noticed glottalization in Arabic is more clear-cut due to the presence of more than one glottal sound segment.
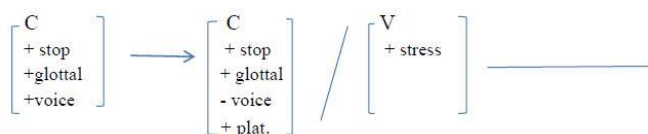
In English, feature change can be observed once an obstruent alveolar undergoes palatalization when followed by a palatal glide /j/ and, being so, the alveolars [s ,z, t, d] in *I miss you ,we please you , we hit you* and *we fed you* change into [š ,ž , č , ĵ] respectively. Palatalization involves

experiencing the backing effect on the segment to be changed. The following rule illustrates this process of palatalization (Hymen, 1975: 13):

$$\begin{bmatrix} C \\ +alveo. \\ +obst. \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +alveo \\ +obst. \\ +palat. \end{bmatrix} / \_\_\_ \begin{bmatrix} C \\ +fric. \\ +lenite \\ +stress \end{bmatrix}$$
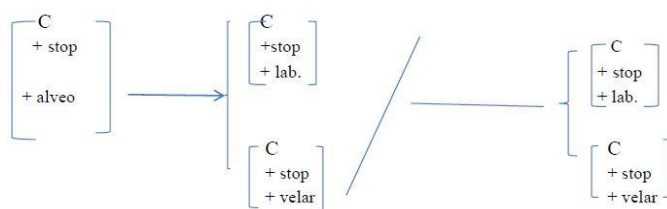
Palatalized sounds become so for ease of articulation which are otherwise difficult to utter. The yet-to-come segment has bearing on the final phonetic shape the produced forms.

In Arabic, platalization is sometimes realized in some contexts; the glottal voiced stop [ʔ] which is geminated as in /ʔʔʕdʒemi/ (اعجمي)(a foreigner) is pronounced with the second glottal stop is palatalized to glottal /h/ when stressed to become [ʔhʕdʒemi] (انيس, 2006:88). The operation can be stated as:

$$\begin{bmatrix} C \\ +stop \\ +glottal \\ +voice \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +stop \\ +glottal \\ -voice \\ +plat. \end{bmatrix} / \begin{bmatrix} V \\ +stress \end{bmatrix} \_\_\_$$
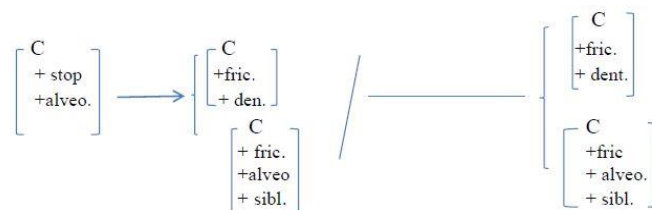
3.2   Segment Change Rule

According to Roach (2010:110-11), there are some sounds that are susceptible to change due to the influence of an adjacent vowel, a process referred to as assimilation. This influence is attributable to place and/ or manner of articulation in addition to voicing. In casual speech, the voiceless alveolar sound [t] is made bilabial in such words as *that person* [ðæpəsn], *that man* [ðæpmæn], *meat pie* [mi:p pai] when followed by a labial consonant. The stop [p] will be velar [k] once preceding a velar consonant as in *quite good* [kwaik gud]. Consequently, this rule can be formulated as follows:

$$\begin{bmatrix} C \\ +stop \\ +alveo \end{bmatrix} \rightarrow \begin{bmatrix} \begin{bmatrix} C \\ +stop \\ +lab. \end{bmatrix} \\ \begin{bmatrix} C \\ +stop \\ +velar \end{bmatrix} \end{bmatrix} / \_\_\_ \begin{bmatrix} \begin{bmatrix} C \\ +stop \\ +lab. \end{bmatrix} \\ \begin{bmatrix} C \\ +stop \\ +velar \end{bmatrix} \end{bmatrix}$$
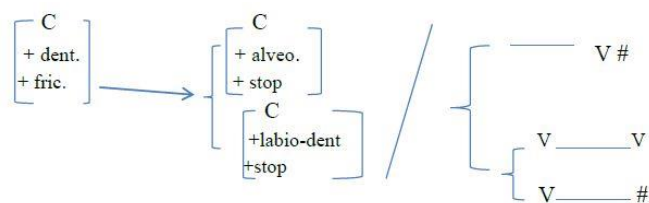
Assimilation, which is a universal feature in all languages, is badly needed though foreign learners have first suffered from. It renders complex pronunciation easy.

In Arabic, the voiceless alveolar stop [t] is assimilated to interdental voiceless fricative [θ] if followed by [θ] as in / buʕdet θemu:d/ثمود بعدت) Themood is distanced) which is pronounced as [buʕdeθ θemu:d]. This change is obtained because of place of articulation. In the same vein, [t] would be made [s] when coming before voiceless alveolar fricative [s] as in / wadʒat syarah / (I found a car) وجدت سيارة which is usually heard as [wadʒas syarah], a change that is notationally triggered as follows (حسان, 2006:51).

$$\begin{bmatrix} C \\ +stop \\ +alveo. \end{bmatrix} \rightarrow \begin{bmatrix} \begin{bmatrix} C \\ +fric. \\ +den. \end{bmatrix} \\ \begin{bmatrix} C \\ +fric. \\ +alveo \\ +sibl. \end{bmatrix} \end{bmatrix} / \_\_\_ \begin{bmatrix} \begin{bmatrix} C \\ +fric. \\ +dent. \end{bmatrix} \\ \begin{bmatrix} C \\ +fric \\ +alveo. \\ +sibl. \end{bmatrix} \end{bmatrix}$$
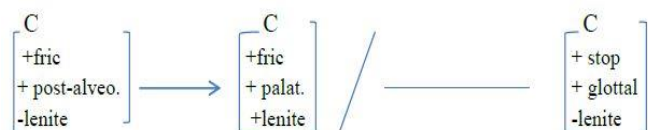
Black English speakers usually use alveolar plosives for interdental fricatives when articulating words beginning with interdental fricative segments followed by a vowel as in *think* and *the* which are pronounced as [tiŋk] and [de] respectively by the people in question. In the same tendency, African American speakers produce [f] and [v] in words having interdental fricatives found intervocalically and post-vocalically such as *nothing* [nʌfiŋ], *with* [wif], *mother* [mʌvə], *smooth* [smu:v], etc, a pronunciation which is stigmatized as sloppy in standard English (Yavas, 2011:65). This rule can be stated as below:

$$\begin{bmatrix} C \\ +dent. \\ +fric. \end{bmatrix} \rightarrow \begin{bmatrix} \begin{bmatrix} C \\ +alveo. \\ +stop \end{bmatrix} \\ \begin{bmatrix} C \\ +labio-dent \\ +stop \end{bmatrix} \end{bmatrix} / \begin{bmatrix} \_\_\_ V\# \\ V\_\_\_V \\ V\_\_\_\# \end{bmatrix}$$

Analogously, colloquial Arabic spoken in south cities of Missan and Thi-Qar in Iraq displays what is condemned in standard Arabic as sloppy. Those
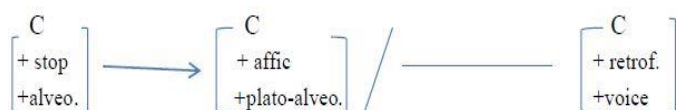
southern Iraqi people switch /dʒ/ sound to the glottal glide /j/, a process of lenition or weakening and, therefore, one comes across such words as [diyaye] for [di dʒadʒe] (دجاجة)(hen), [reya:l] for [redʒa:l] (رجل)(man) and so forth (Mustafawi, 2006: 34). This process can be depicted as:

$$
\begin{bmatrix} C \\ +fric \\ +\text{post-alveo.} \\ -lenite \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +fric \\ +palat. \\ +lenite \end{bmatrix} / \underline{\qquad} \begin{bmatrix} C \\ +stop \\ +glottal \\ -lenite \end{bmatrix}
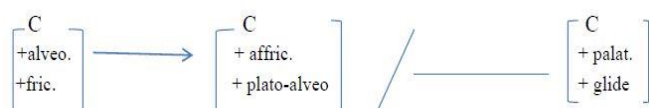$$

A word of caution should be voiced here with regard to this rule; this process is only applicable where there is a strict adjacency between /d/ and /dʒ/ and this alternation would be blocked if there is an intervening sound as in /dʒad/ (جد)(grandfather) which cannot be switched to / jad/ (Johnstone, 1976: 273).

Affrication is a common phenomenon in both English and Arabic. In English, alveolar stop are predisposed to be affricated at the begging of words when fallowed by / ɹ / as in *train* [tʃrein] ,*drain*] d3rain] and *tribe* [tʃraib] in which the affected sound is subtly different from the standard affricate in the sense that the former is closer to plosives sound in production. Such a verbal activity is attested in children's misspelling of the target word *train* as *chrain* or *chain* (yavas, 2011:61). This rule can be visualized as

$$
\begin{bmatrix} C \\ +stop \\ +alveo. \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +affic \\ +\text{plato-alveo.} \end{bmatrix} / \underline{\qquad} \begin{bmatrix} C \\ +retrof. \\ +voice \end{bmatrix}
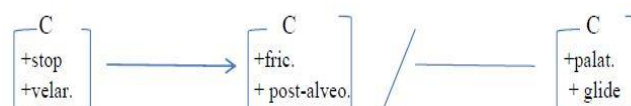$$

These affricated words are mainly manifested in American English and spark some sort of ambiguity on the part of the English foreign learners' recognition.
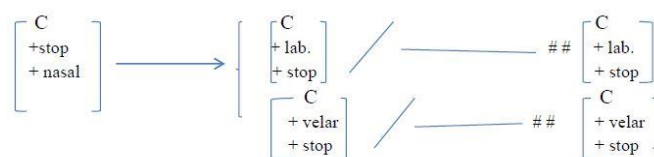
Affrication is also observable whenever an affricative alveolar is followed by the palatal glide [j] as in *did you* [di dʒu:], *could you*[kʌ dʒu:], *eat your dinner* [i:tʃ jo: dinə] (ibid.). This process can be formed in the following rule:

$$
\begin{bmatrix} C \\ +alveo. \\ +fric. \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +affric. \\ +\text{plato-alveo} \end{bmatrix} / \underline{\qquad} \begin{bmatrix} C \\ +palat. \\ +glide \end{bmatrix}
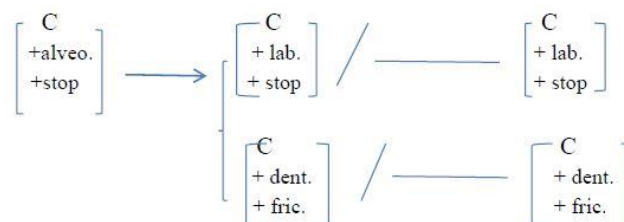$$

Affrication in Arabic is manifested in colloquial rather than classical or standard language. Mustafawi (2006:64) contends that in Qatari Arabic, /k/ and /g/ are to be affricated to / tʃ / and / dʒ/ when followed by [i:] or [i] as when the word /kibi:r/ (large), /qari:b/ (nearby) and / riqiq/ (thin) that are changed into [tʃ ibi:r] , [dʒari:b] and [ridʒidʒ] respectively. Referred to as affrication rule, this process can be symbolically depicted as:

$$
\begin{bmatrix} C \\ +stop \\ +velar. \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +fric. \\ +\text{post-alveo.} \end{bmatrix} / \underline{\qquad} \begin{bmatrix} C \\ +palat. \\ +glide \end{bmatrix}
$$

In English, the negative prefix *in-* or *im-* should coincide with the word to which it is attached as far as place of articulation is concerned as in *impossible* [impɔsibl], *intolerant* [intɔlərənt], *incorrect* [iŋkərəkt] where the negative prefix becomes bilabial or velar (Crystal, 2003:329). The distributional character of the prefix in question can be depicted as:
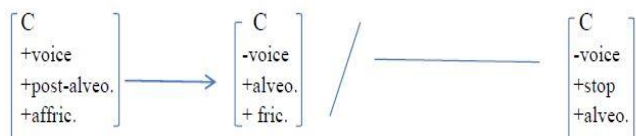
$$
\begin{bmatrix} C \\ +stop \\ +nasal \end{bmatrix} \rightarrow \begin{matrix} \begin{bmatrix} C \\ +lab. \\ +stop \end{bmatrix} / \underline{\qquad} \# \# \begin{bmatrix} C \\ +lab. \\ +stop \end{bmatrix} \\ \begin{bmatrix} C \\ +velar \\ +stop \end{bmatrix} / \underline{\qquad} \# \# \begin{bmatrix} C \\ +velar \\ +stop \end{bmatrix} \end{matrix}
$$

Additionally, English presents a sound segment change where the alveolar voiced stop is changed into a labial as in *good boy* [gub boi] or interdental as in *bad thing* [bæθ θiŋ] (Roach, 2010: 111), a rule that is written as:

$$
\begin{bmatrix} C \\ +alveo. \\ +stop \end{bmatrix} \rightarrow \begin{matrix} \begin{bmatrix} C \\ +lab. \\ +stop \end{bmatrix} / \underline{\qquad} \begin{bmatrix} C \\ +lab. \\ +stop \end{bmatrix} \\ \begin{bmatrix} C \\ +dent. \\ +fric. \end{bmatrix} / \underline{\qquad} \begin{bmatrix} C \\ +dent. \\ +fric. \end{bmatrix} \end{matrix}
$$

Following حسان (2006:55), Arabic introduces a segment change as indicated by the voiced post-alveolar affricate /dʒ/ being switched to voiceless fricative /ʃ/ as in /idʒtima:ʕ / (اجتماع) (meeting) which is converted to [iʃ tima:ʕ] and /idʒterə/ (
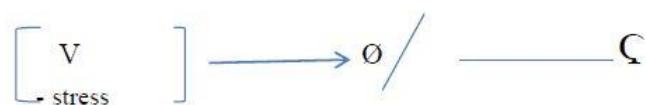
chewed) (اجتر)would be uttered as [i ʃ terə], a process which can be formulated as:

$$\begin{bmatrix} C \\ +voice \\ +post\text{-}alveo. \\ +affric. \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ -voice \\ +alveo. \\ +fric. \end{bmatrix} / \underline{\hspace{2cm}} \begin{bmatrix} C \\ -voice \\ +stop \\ +alveo. \end{bmatrix}$$
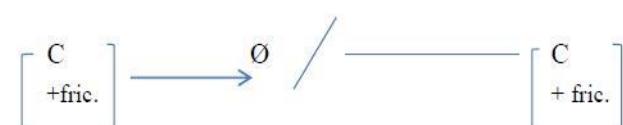
3.3 Segment Deletion Rules

Defined as a typical characteristic of casual and rapid speech, deletion involves disappearance of a sound segment under particular circumstance (Roach, 2010: 113).Alternatively called elision, deletion intends to trigger ease of articulation and hence it is assumed as an inevitable technique that speakers adopt

According to Fromkin et al (2007: 115), unstressed vowels are liable to deletion in words such as *mystery* [mistri], *general* [dʒenrl] ,*vigorous* [vigrəs], *funeral* [fʌnrəl] and *memory* [memri], a process referred to notionally as :

$$\begin{bmatrix} V \\ -stress \end{bmatrix} \longrightarrow \emptyset / \underline{\hspace{2cm}} \varsigma$$
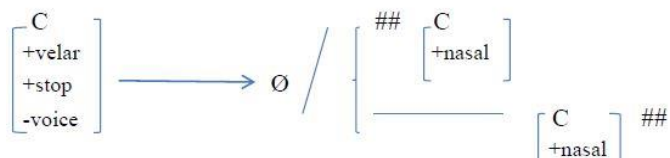
By the same token, deletion does occur when two fricatives are juxtaposed, particularly [fθ] and [sθ], where the former fricative cluster is made [ft] and the latter [st] as in *fifth* [fift] and *sixth* [sikt] respectively, a distributional process referred to as dissimilation and can be recognized in the following mathematical rubrics (Yule, 2010: 44)
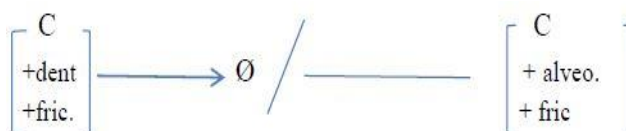
$$\begin{bmatrix} C \\ +fric. \end{bmatrix} \longrightarrow \emptyset / \underline{\hspace{2cm}} \begin{bmatrix} C \\ +fric. \end{bmatrix}$$

Additionally, silent g that has bothered English learners for ages in such words as *sign, design, resign* and *consign* is indicative of a phonological rule of segment deletion. Worded differently, the phoneme /g/ should disappear whenever found word-initially before a consonant and such deletion is also a must when /g/ occurs before a word-final nasal. It should be borne in mind that elision is blocked in such morphologically related words as

signature, designation, paradigmatic, syntagmatic and *agnostic*, a distribution that is symbolically expressed in the rule below (Fromkin et al, 2007: 115)

$$\begin{bmatrix} C \\ +velar \\ +stop \\ -voice \end{bmatrix} \longrightarrow \emptyset / \begin{bmatrix} \#\# \begin{bmatrix} C \\ +nasal \end{bmatrix} \\ \underline{\hspace{1cm}} \begin{bmatrix} C \\ +nasal \end{bmatrix} \#\# \end{bmatrix}$$
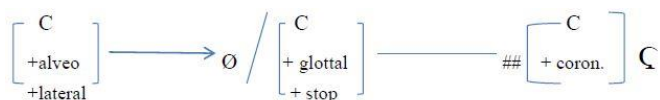
Interdental fricatives [θ,ð] in English are prone to elision when found before the alveolar fricatives [s,z] as exemplified by *clothes* [klouz] and *months* [mʌnz] (Yavas, 2011:64). Depicted symbolically, this process is seen as follows:
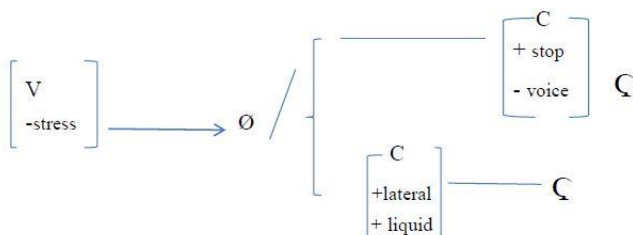
$$\begin{bmatrix} C \\ +dent \\ +fric. \end{bmatrix} \longrightarrow \emptyset / \underline{\hspace{2cm}} \begin{bmatrix} C \\ +alveo. \\ +fric \end{bmatrix}$$

In Arabic, the labial glide /w/ would be dropped from the verb to which the emphatic nasal suffix /n/ is added as in /tedʕuːn/ (call+pl.) (تدعون)which turns into [tedʕn]. The same is said about the palatal glide /j/, which is deleted, if the same suffix is added to it as in /jermiːjn/ (يرمين)(throw+pl.) which changes into [jermin] (حسان,2006:58). This rule can be represented as follows:

$$\begin{bmatrix} C \\ +glide \\ +lab. \end{bmatrix} \longrightarrow \emptyset / \underline{\hspace{2cm}} + \begin{bmatrix} C \\ +nasal \\ +alveo. \end{bmatrix}$$
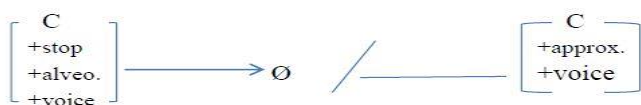
Moving to an interesting peculiarity of Arabic pertaining to the pronunciation of the definite article [ʔl], one might observe that the [l] disappears once this article is attached to a word beginning with a coronal sound, e.g. [ʔ-sajjaːra] (السيارة)(the car), [ʔ-ʃedʒerə](الشجرة)(the tree), [ʔ-ʃemis] (الشمس)(the sun), etc. as opposed to [ʔlweld] (الولد)(the boy), [ʔlhudud] (hoopoe)(الهدهد), [ʔlkeir] (الخير)(the good), etc. where [l] is also pronounced (Mustafawi, 2006:22-7). Accordingly, the definite article rule is realized as follows:

$$\begin{bmatrix} C \\ +\text{alveo} \\ +\text{lateral} \end{bmatrix} \longrightarrow \emptyset \ / \begin{bmatrix} C \\ +\text{glottal} \\ +\text{stop} \end{bmatrix} \_\_\_\_\_ \## \begin{bmatrix} C \\ +\text{coron.} \end{bmatrix} \ \varsigma$$

Attested in optimal syllable structure and children's language, segment deletion is the leading rule to serve to facilitate articulating linguistic forms. One such rule is associated with the deletion of schwa in unstressed syllables resulting in aspiration of the preceding plosive, e.g. *potato* /pəteitou/ which is then adjusted to [pteitou]. Such deletion is frequent when the schwa is followed by a liquid consonant, viz.[l] and [r], causing syllabic consonants as in *police*/pəli:s/ and *correct*/ kərekt/ which are to be read as [pli:s] and [krekt] respectively (Roach, 2010: 114). Motivated by this tendency, this deletion rule is formulated as follows:

$$\begin{bmatrix} V \\ -\text{stress} \end{bmatrix} \longrightarrow \emptyset \ / \begin{cases} \_\_\_\_\_ \begin{bmatrix} C \\ +\text{stop} \\ -\text{voice} \end{bmatrix} \varsigma \\ \_\_\_\_\_ \begin{bmatrix} C \\ +\text{lateral} \\ +\text{liquid} \end{bmatrix} \varsigma \end{cases}$$

African American Vernacular English (AAVE) opts for reduction of word-final consonant clusters; *left hand* is reduced to [lef han], *past* and *passed* both to [pa:s] and so forth, a process that can be described as follows(Yule,2010:211):

$$\begin{bmatrix} C \\ +\text{stop} \\ +\text{alveo.} \\ +\text{voice} \end{bmatrix} \longrightarrow \emptyset \ / \_\_\_\_\_ \begin{bmatrix} C \\ +\text{approx.} \\ +\text{voice} \end{bmatrix}$$

In classical Arabic, in particular Holy Quran, the plosive alveolar
[d] disappears when preceding [z] and [dʒ] as in وَلَقَدْ زَيَّنَّا ٱلسَّمَآءَ ٱلدُّنْيَا بِمَصَٰبِيحَ(الملك:5)/weleqd zeina ʔldunja: bimsæbi:h/ which should be read as [weleq zaina ʔdunja: bimsæbi:h]. The disappearance is also 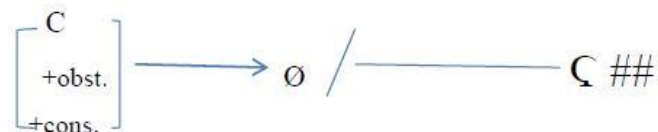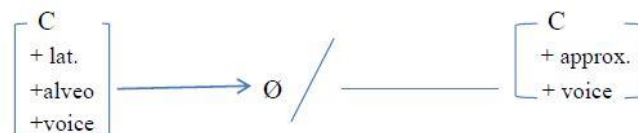recognized in the verse قَدْ ضَلُّوا ضَلَالا بَعِيدًا (النساء:167)/ qed dʒelo Dhelaln beʕidn/, a process that can be phonetically represented as [qe Dhelo
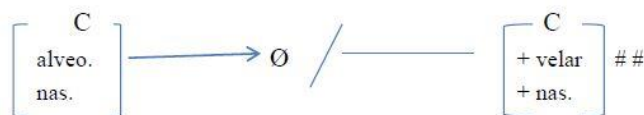
dʒelaln beʕidn](انيس,2006:128) , a process that can mathematically represented as:

$$\begin{bmatrix} C \\ +\text{obst.} \\ +\text{cons.} \end{bmatrix} \longrightarrow \emptyset \ / \_\_\_\_\_ \ \varsigma \ \##$$
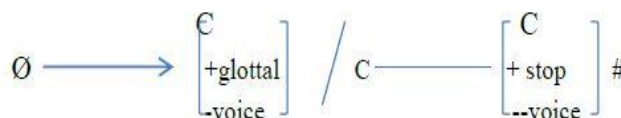
Similarly, the lateral sound [l], when followed by a liquid, is omitted as in the verse that says قُلْ يَا أَهْلَ ٱلْكِتَابِ هَلْ تَنْقِمُونَ مِنَّا (المائدة: 59) qulja?hlualkitab heltinquumu:nmin?a:/ that is read as [quja?hlualkitab heltinquumu:nmin?a:] (ibid.). This rule can be realized as follows:

$$\begin{bmatrix} C \\ +\text{lat.} \\ +\text{alveo} \\ +\text{voice} \end{bmatrix} \longrightarrow \emptyset \ / \_\_\_\_\_ \begin{bmatrix} C \\ +\text{approx.} \\ +\text{voice} \end{bmatrix}$$

Concerning the pronunciation of / ŋ/ or / ŋg/ in English words, it has pointed out that the velar nasal/ ŋ/ occurs word-finally as in *sing, wrong*,etc but this occurrence is restricted since it is only found after a lax vowel such as [I,u,æ,ʌ,ɛ] where the rule can be structured as (Yavas, 2011: 68)

$$\begin{bmatrix} C \\ \text{alveo.} \\ \text{nas.} \end{bmatrix} \longrightarrow \emptyset \ / \_\_\_\_\_ \begin{bmatrix} C \\ +\text{velar} \\ +\text{nas.} \end{bmatrix} \## $$

In casual speech, addition of a sound is a must in certain context to facilitate pronouncing linguistic forms in all languages. English displays some insertion rules one of which is called preglottalization where the glottal stop [?] is assigned to the voiced stops in coda position as in /lukt/(looked), /kats/ (cats) and /hints/ (hints) that are pronounced as [lu?kt], ka?ts] and [hin?ts] (Guessenhoven and Jacobs, 2011: 114). Here, the rule can be stated as:

$$\emptyset \longrightarrow \begin{bmatrix} C \\ +\text{glottal} \\ -\text{voice} \end{bmatrix} \ / \ C \_\_\_\_\_ \begin{bmatrix} C \\ +\text{stop} \\ --\text{voice} \end{bmatrix} \#$$

In the same vein, Stageberg (1981:33-4) argues that voiceless stop insertion is quite common phenomenon and the intervening sound is placed between a nasal sound and a voiceless fricative in the same syllable as in *something* [sʌmpθiŋ], *length* [leŋkθ], *prince* [prints], and *warmth*[wo:mpθ]. He (ibid) concede that the excrescent [p] following [m] is justified because the absence of [p] renders the soft palate close the oral cavity, a process which leads top difficulty in pronunciation. However, this insertion can be formed as:

$$\varnothing \longrightarrow \begin{bmatrix} C \\ + stop \\ -voice \end{bmatrix} / C \underline{\quad\quad} \begin{bmatrix} C \\ +fric. \\ -voice. \end{bmatrix}$$

Consonant clusters in English with [l] preceded and followed by a consonant do not stand and require [ə] insertion between the lateral alveolar at hand and the following consonant as in *pistol* [pistəl], not [pistl] *tingle* [tiŋgəl] not [tiŋgl] and *candle* [kændəl] not [kændl], a phonetic process that can be notationally stated as (ibid)

$$\varnothing \longrightarrow \begin{bmatrix} V \\ - tense \\ - stress \end{bmatrix} / C \underline{\quad\quad} \begin{bmatrix} C \\ + alveo. \\ + lat. \end{bmatrix} C$$

It has been argued that vowel insertion is a common process in all languages to ease articulation in complex consonant sequences. Referred to as epen- thesis, this insertion is manifested in English pronunciation of s-suffix when added to words ending with the a sibilant sounds, viz. [s , ʃ, tʃ , z, ʒ , dʒ]as in *gases, washes, matches*, noses, *garages* and *George's* where the suffix in question is realized as [əz] or [iz] (Aitchison, 1999:62). The rule in this case can be written as

$$\varnothing \longrightarrow \begin{bmatrix} V \\ -stress \end{bmatrix} / \begin{bmatrix} C \\ + affric. \\ + sibil. \end{bmatrix} \underline{\quad} \begin{bmatrix} C \\ +alveo. \\ +fric. \end{bmatrix}$$

Similarly vowel insertion is detected in past tense morpheme (-ed) attached to verbs ending with /t/ or /d/ as in *decided* and *wanted* where the pronunciation of this suffix would be /id/ or /əd/. the rule below illustrates this process clearly(ibid.):

$$\varnothing \longrightarrow \begin{bmatrix} V \\ - stress \end{bmatrix} / \begin{bmatrix} C \\ + stop \\ +alveo. \end{bmatrix} + \underline{\quad\quad} \begin{bmatrix} C \\ + stop \\ + alveo \end{bmatrix}$$

Arabic, on the other hand, admits vowel insertion in consonant clusters; Iraqi Arabic says that /hidʒ + na:/ (our pilgrimage) is realized as [hidʒina:] with an epenthetic [i]. The same is said about /dafaʕit+lek/ (I paid you) which is converted into [dafaʕitilek]. In support of this tendency, البعلبكي (1999:78) contends that epenthetic vowel is a common practice that Arab speakers resort to in conformity with the phonological structure of Arabic syllable. As such, /ketb/ (wrote) كتب, /kerm/ (award) كرم and /ebd/ عبد turn into [ketəb], [kerəm] and [ebəd] respectively. This rule can be visualized as follows :

$$\varnothing \longrightarrow \begin{bmatrix} V \\ + lax \\ + high \end{bmatrix} / CC + \underline{\quad\quad} + C$$

3.5 Coalescence Rule.

Analyzed as fusion of two features or two segments, coalescence is a historically developmental property the purpose of which is to merge two different phonemes or morpheme. Modern English/ʒ/ is thought to be a result of the combination of /z/ and /j/as in *occasion, measure, rouge, television, revision,* etc, a phenomenon that can be captured in the following rule(Crystal, 2003:78):

$$\begin{bmatrix} C \\ +fric \\ +alveo \\ +voice \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ +fric. \\ + post-alveo. \\ + voice \end{bmatrix} / \underline{\quad\quad} \begin{bmatrix} C \\ + palat. \\ + glide \end{bmatrix}$$

In this vein, the suffix (–ation) in in words like *formation, relation, nation* and the like is analyzed as coalescence of the morphemes *ate* and *tion*.

Scrutinized phonologically, nasalization is a universal phenomenon whose analytic nature is brewing controversy; some phoneticians identify it as some sort assimilation and, therefore, it is listed under feature change rule conventions, others subsume it under coalescence. Stated differently, vowels preceding a syllable- final nasal should be nasalized, e.g. *room* [rʊ́:m], *long* [lớ:ŋ], *noon* [nʊ́:n], and so forth (Schane, 1973:66-7). The rule of vowel-nasalization can be stated as :

$$V \longrightarrow \begin{bmatrix} V \\ + nas . \end{bmatrix} / \underline{\hspace{1cm}} \begin{matrix} C \\ + nas .\# \end{matrix}$$

Following Yavas (2011:67), Australian English exhibits coalescence in a consonant cluster made up of an alveolar stop or a fricative followed by /j/; the sequences [tj] and [sj] in *nature* and *omission* come to blend together as [tʃ] and [ʃ] respectively in these words, a process that shows no merging of an alveolar stop or fricative as in *tune* [tju:n] and *assume*[əsju:m] as illustrated in the rule below:

$$\begin{bmatrix} C \\ +stop \\ + alveo. \\ -voice \\ -stress \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ +fric. \\ + post\text{-}alveo \\ - voice \\ -stress \end{bmatrix} \longrightarrow \underline{\hspace{1cm}} \begin{bmatrix} C \\ +palat. \\ + glided \end{bmatrix}$$

Vowels are subject to coalescence too; in Southern American English, /ai/ is realized as [a:] when not followed by a voiceless consonant as in *buy* [ba:] and *miles* [ma:lz] where the latter vowel is understood as a blend of the two segments, /a/ and /i/.Similarity AAVE speakers monophthongize the diphthong / ɔi / to / o:/ as in *oil* [o:l] ,a sense of coalesce produced by speakers of Black English (ibid: 86) Accordingly, the former vowel coalesce is notationally realized as:

$$\begin{bmatrix} V \\ + front \\ +open \end{bmatrix} \longrightarrow \begin{bmatrix} V \\ +back \\ + open \end{bmatrix} / \underline{\hspace{1cm}} \begin{bmatrix} C \\ + voice \\ V \end{bmatrix}$$

Arabic, on the other hand, displays a variety of coalescence; the glottal stop [ʔ] is lengthened or geminated to be called "Hamzat almad" when

following another glottal stop as in /ʔʔaXið/ (I take) which is converted to [ʔa:Xið/. Germination of [ʔ] also takes place when [ʔ] is followed by [a:] as in/meʔasi/ (ماسي)(castrophes) that is to change into [meʔa:si] (انيس,2006:89]. Here, the phonetic rule can be formed as:

$$\begin{bmatrix} C \\ + glottal \\ + stop \end{bmatrix} \begin{bmatrix} C \\ + glottal \\ + stop \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ + glottal \\ + stop \end{bmatrix} \emptyset\# / \begin{bmatrix} C \\ + glottal \\ + stop \end{bmatrix} \begin{bmatrix} V \\ +open \\ + back \end{bmatrix}$$

حسان(2006:71)points out that nunation followed by [a:] is basically derived from emphatic noon; the form لتنجحا /litendʒehn/ comes from لتنجحن [litendʒehnn]   (You should succeed). This rule can be formulated as:

$$\begin{bmatrix} C \\ +nas. \\ + aleveo. \end{bmatrix} \begin{bmatrix} C \\ + nas. \\ + alveo \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ + nas \\ + alveo. \end{bmatrix} \emptyset / \underline{\hspace{1cm}} \begin{bmatrix} V \\ + open \\ +back \end{bmatrix}$$

According to انيس(2006:70-2), Arabic displays some sort of coalescence in assimilation where nasalized and oral features are intermingled; the palatal glide, for instance, in /men jequ:l/ (من) (يقول)(whoever says) is phonetically geminated alongside disappearance of the preceding /n/ to be [mejjequ:l] in which case the pronunciation of [j] keeps the air escape from the nose and the mouth at the same time. The same is said of all words ending with /n/ or nunation followed by words beginning with /n/,/m/ and /w/. Here the phonological rule can be stated as:

$$\begin{bmatrix} C \\ +nas. \\ C \\ +glide \end{bmatrix} \longrightarrow \begin{bmatrix} C \\ +geminated \end{bmatrix} / \begin{bmatrix} C \\ + nas \\ + alveo. \end{bmatrix} \#\# \underline{\hspace{1cm}}$$
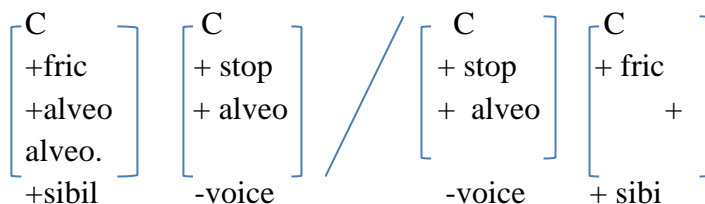
Additionally,/θ/, which is pronounced as [tʼ] when preceded by a word-final /t/ as in [kema bu ʕtʼ mu:d]   (كما بعدت ثمود (هود, 59) As Themood is distanced). Viewed as an integration of alveolar and dental properties, [tʼ] is crated due to the influence of yet-to-come sound, a process which is

found in Arabic and English as in *meet three* [mi: t′ri:] (ibid.). Being so, the rule will be:

$$\begin{bmatrix} C \\ +alveo \\ +stop \end{bmatrix} \rightarrow \begin{bmatrix} C \\ +dent. \\ +stop \end{bmatrix} / \underline{\hspace{2cm}} \ \#\# \begin{bmatrix} C \\ +dent. \\ +fric. \end{bmatrix}$$

3.6 Metathesis

Simply defined, metathesis is reversal in order between two neighboring sound segments such that the segments X Y would be YX as in *ask* [æsk] which is sometimes uttered as [æks] (Hymen 1975:15). Metathesis is also realized in *spaghetti* which is pronounced as [pə sk ɛ ti] and in *asp* with the metathesized pronunciation [a:ps]. Generally speaking, the sequence [sp] would be metathesized as [ps] as shown in the aforesaid examples, and, hence, the rule in this concern can be formulated as follows:

$$\begin{bmatrix} C \\ +fric \\ +alveo \\ alveo. \\ +sibil \end{bmatrix} \begin{bmatrix} C \\ +stop \\ +alveo \\ -voice \end{bmatrix} / \begin{bmatrix} C \\ +stop \\ +alveo \\ -voice \end{bmatrix} \begin{bmatrix} C \\ +fric \\ + \\ +sibi \end{bmatrix}$$

In fact, metathesis is not a basic phonological process and the context in which it occurs is arbitrary. English displays innumerable metathesized forms which are mainly found in children language; [əminəl] for / əniməl/ (animal), [nukjələ]for /njukliə/ (nuclear), /rivelənt] for /rilevənt/ (relevant), [əsteriks] for / əsterisk/ (asterisk), [modrin] for / modərin/ (modern), [patrin] for /patə:n/ (pattern),etc. Attested in errors performance, metathesis is a historically motivated phenomenon available in all languages (Crystal,2003:291)

Arabic also presents countless metathesized forms; Cairene Arabic speakers usually say [mutedʒewiz] (متزوج)for /mutezewidʒ/ (متجوز) (married) [?hbel] (اهبل)for /?bleh/((ابله) simple-minded) and [plenti] (بلنتي) for [penəlti] (بنلتي) (penalty) , Iraqi children say [dʒrawibi] (جراويبي) for /dʒwaribi/ (جواريبي)(my socks) and [jelbeʕ] (يلبع) for /jelʕeb / (يلعب)(play), Iraqis say [kerheba]

for[khreba:](كرهباء) (كهرباء) electricity), [?hdeʃ] (اهدعش)for /da: ʕʃ/ (داعش)(ISIS), [muntezəh] (منتزه)for /mutenezəh/ (متنزه)(park), [?ʕdʒez] (جزع)for /? dʒezʕ/ (عجز) ((get impatient), [safi:ha] (صفيحه)for/ sahi:fa/ (صحيفه)(journal), [marhadʒan] (مرهجان)for /mahradʒan/ (مهرجان) (festival) and the like (حسان,2006:74-6).

Since it is motivated by historical considerations, metathesis (also known transposition) is difficult to account for in terms of phonological rules and this is why phoneticians devote little attention to it and it is assigned back seat in their approach to phonology and phonetics(Fromkin, et al :2007: 281).

Conclusions

This study arrives at the following conclusions

1. There is pressing need to construct phonological rules notationally in order for the reader to process the extensive accounts of rule statement in few symbols in a recorded time.

2. Phonological rules, which are meant to relate phonemic representative of linguistic forms to their actual realizations, are found more in Arabic than English because the grammar of Arabic is more sophisticated and requires further details.

3. There are few cases ,especially in Arabic, that do not admit formation a phonological rule which capture transformation between two levels phonological and phonetic ones.

4. Feature change rules are varied and more flexible than other kinds of

rules while metathesis rules are very few, if any, in both languages.

5. There is a good deal of overlap between coalescence rules and features change rules; that is to say, there is a fine line of demarcation between the rules that spark phonetic property of sound and those that yield integration of some phonetic features.

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المستخلص

تسلط هذه الدراسة الضوء على العلاقة بين التمثيل الصوتي (الفونولوجي) للكلمات و العبارات اللغوية والعمليات الصوتية (الفونيه) لهذه الكلمات حسب ما جاء في نظرية جومسكي و هاله في ١٩٦٨ بخصوص القواعد الصوتية- التي تمت مناقشاتها رياضياً بوساطة الرموز. ان ذلك الاجراءالذي تجسد يشكل مرئي في هذا البحث, يكون اكثر فاعلية من العبارات الخبرية لكي يستطيع القارئ التعرف على آليات تلك القواعد المستعملة حتى يتم تفعيل تلك الصور الذهنية للفونيمات مع الادراك الصوتي لهذه القواعد التي تعلمها المواطن الاصلي للغة على الرغم من انها مهمة بالنسبة لدارسي اللغة الانگليزية كلغة اجنبية.

وعلى هذا الاساس , تهدفَ هذه الدراسة الى تزويد اولئلك الذين يدرسون اللغة الانكليزية كلغة اجنبية بخارطة طريق لفهم هذه القواعد واثراؤهم بمعلومات واضحةعن السياق الفونولوجي مقارنة باللغه العربية وقواعدها الصوتية.

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