Emphasis Spread in Qassimi Arabic Within the Underspecification Theory

Bader Alharbi[1] & Ammar Alammar[2]

[1] Department of English Language & Translation, College of Arabic Language & Social Studies, Qassim University, Buraidah, Saudi Arabia

[2] Department of English, Zulfi College of Education, Majmaah University, Majmaah, Saudi Arabia

Correspondence: Bader Alharbi, Department of English Language & Translation, College of Arabic Language & Social Studies, Qassim University, Buraidah, Saudi Arabia.

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Abstract

In Qassimi Arabic, the emphatic segments /tˤ, sˤ, ðˤ, rˤ/ spread their emphasis feature to the neighboring vowels turning the front feature of the vowels /ɪ,æ,æː/ into back. However, the front vowels /iː,eː/ are not affected by this process and consequently maintain their front feature in the adjacency of the emphatic segments. In this work, we provide a theoretical analysis of Emphasis Spread in the dialect of Qassimi Arabic within the underspecification theory. It has been concluded that the vowels /ɪ,æ,æː/ are underlying underspecified for the back feature, whereas the vowels /iː,eː/ are underlyingly specified for the back feature. The emphatic segments spread their secondary feature [Dorso-Pharyngeal] to the adjacent underspecified vowels and thus make them back. However, they fail to spread their secondary feature to the vowels /iː,eː/ because they have an underlying back feature. Therefore, unlike many other phonological theories, the underspecification theory can provide a more straightforward and precise analysis of Emphasis Spread. As a result, that would allow us to account for the various effects of emphatics examined in the different Arabic dialects, on the one hand, or, more broadly, any similar assimilation process in other languages, on the other.

Keywords: autosegmental phonology, emphasis spread, emphatics, Qassimi Arabic, underspecification theory

1. Introduction

Emphasis Spread (ES) (Note 1) is one of the interesting phonological processes in the Arabic language and its dialects in which emphatic segments, /tˤ, sˤ, dˤ, ðˤ, rˤ/, spread their emphasis feature to neighboring segments (Al-Ani 1970; Card 1983; Davis 1993, 1995; Watson 1999, 2002; Zawaydeh 1998, 1999; among others). It has been proved that in some Arabic varieties, such as Palestinian Arabic (PA), (Davis 1993, 1995; Hoberman 1989; Younes 1993; Zawaydeh 1998, 1999), and Cairene Arabic (CA), (Younes 1993; Yousef 2014), the emphatic segments affect, with minor variations, all of the adjacent segments (consonants or vowels) within the word or across word boundaries. This is what is known as "Long Distance Spread". Unlike many other Arabic varieties, the emphatic segments in Qassimi Arabic (QA), a local Arabic dialect spoken in the region of Qassim, spread their emphasis feature only to the exact adjacent segments in both directions. However, the ES does not go beyond the exact neighboring segments in QA creating what is known as "Short Distance Spread". The primary result of this process is changing the quality of the adjacent vowels by rendering the front feature into back. However, some front vowels are not affected by this process of ES and hence retain their front feature in the contiguity of the emphatic segments. This paper accounts for the effect of the ES process in QA within the theory of underspecification. Prior to that, an examination of the phonological features of the emphatic segments and the QA vowel phonemes, as well as their allophones, are presented. Seven informants from Harb tribe (Note 2) living in the region of Qassim, four men and three women, provided the data on which the generalizations in this study are based.

The investigation of this phonological phenomenon in QA is significant for a number of reasons. First, the phonology of QA in general and the process of ES in particular deserve deep investigation because they are less researched comparing to the Modern Standard Arabic (MSA) and other Arabic dialects. Second, the process of ES in QA patterns differently from the ES in the MSA and many other Arabic varieties in which it affects only the neighboring segments within the syllable in QA, whereas it affects all of the segments in the adjacent and non-adjacent syllables

in dialects such as CA (Watson 2002; Younes 1993; Yousef 2014) and PA (Davis 1993, 1995; Hoberman 1989; Younes 1993; Zawaydeh 1998, 1999). Third, the investigation of this process of ES leads to the exploration of other interesting phonological phenomena in QA such as the de-emphasis of /rˤ/. Finally, the use of underspecification theory accounts straightforwardly for this process of ES in QA and could be extended to other Arabic dialects and similar assimilation processes in other languages, as well.

The rest of the paper proceeds as follows. Section (2) provides an overview of the QA phonological system. Section (3) reviews the relevant literature on the process of ES in various Arabic varieties. Section (4) discusses the phonological features of the emphatic segments. Section (5) lays out our analysis for the ES in QA within the underspecification theory. Section (6) concludes the work.

2. The Phonological System of QA

In this section, we provide an overview of the QA phonological system with a special focus on the emphatic segments as this may help better understand the phonological process of the ES in QA.

2.1 QA Consonants

The consonantal system of QA, as shown in Table 1, is less different from the consonantal system of MSA. Whereas MSA has twenty eight consonants, QA has twenty seven consonantal phonemes.

Table 1. The inventory of QA consonants with the emphatics in bold

Manner/Place	Labial	Dental	Alveolar	Alveopalatal	Velar	Pharyngeal	Glottal
Stop	b		t / d **tˤ**		k / g		ʔ
Fricative	f	θ / ð **ðˤ**	s / z **sˤ**	ʃ	x / ɣ	ħ / ʕ	h
Affricate				dʒ			
Nasal	m		n				
Lateral			l				
Trill			**rˤ**				
Glide	w			j			

As can be seen in Table (1), the dialect of QA includes four emphatic segments. These four emphatic segments are ***/tˤ, sˤ, ðˤ, rˤ/***, as illustrated in (1). Their non-emphatic counterparts are ***/t, s, ð, r/*** respectively (Note 3). Descriptively speaking, QA lost the MSA emphatic segment /dˤ/, which has been merged with the emphatic segment /ðˤ/. As pointed out by Ingham (1994), the merger of /dˤ/ with /ðˤ/ is one of the Najdi Arabic (NA) (Note 4) phonological characteristics. The examples in (2.b) represent the articulation of QA native speakers of the MSA words in (2.a) where they use the emphatic /ðˤ/ instead of the MSA /dˤ/.

(1) /bɪ**sˤ**æl/ ‘onions’ /bæ**tˤ**ɪn/ ‘abdomen’

/beː**ðˤ**/ ‘eggs’ /θoː**rˤ**/ ‘bull’

(2)

a) /**dˤ**arˤab/ ‘he beat’ /**dˤ**aħak/ ‘he laughed’

/**dˤ**abatˤ/ ‘he adjusted’ /bay**dˤ**/ ‘eggs’

b) /**ðˤ**ærˤæb/ ‘he beat’ /**ðˤ**æħæk/ ‘he laughed’

/**ðˤ**ɪbætˤ/ ‘he adjusted’ /beː**ðˤ**/ ‘eggs’

Furthermore, the QA dialect no longer has any uvular sound in its phonemic inventory. The MSA uvular stop /q/ does not exist in QA except in the loan words from Classical Arabic or MSA. The QA speakers use the velar /g/, as in ***/ga:l/*** ‘*he said*’, instead of the MSA uvular /q/, as in ***/qa:l/*** ‘*he said*’. The MSA fricative uvular sounds /χ/ and /ʁ/, as in ***/χa:liq/*** ‘*creator*’ and ***/ʁalatˤ/*** ‘*error*’, are also replaced in QA with the fricative velar sounds /x/ and /ɣ/ respectively, as in ***/xæ:lɪg/*** ‘*creator*’ and ***/ɣælætˤ/*** ‘*error*’. In the following subsection, we discuss the vocalic system in QA.

2.2 QA Vowels

The variety of QA is similar to the variety of MSA in which they both have short and long vowel phonemes, but differ with respect to the number and nature of these vowel phonemes. Al-Ani (1970) reports that MSA has three short vowel phonemes, /i, a, u/, three long vowel phonemes, /i:, a:, u:/, and two diphthongs, /ay, aw/. Unlike MSA, QA has only four short vowel phonemes, /ɪ, æ, u, o/, and five long vowel phonemes, /i:, æ:, e:, u:, o:/, as demonstrated in Table (2).

Table 2. Short and long vowels in QA

	Front	Back
High	iː **ɪ**	u / uː
Mid	eː	o / oː
Low	æ / æː	

In the rest of this subsection, we discuss the allophones of QA front vowels because the ES rule appears to affect the quality of only some of QA front vowels. At first, the vowel phoneme /ɪ/ has three allophones [ɨ], [i], and [ɪ] that have different specific environments. The first allophone [ɨ] occurs only in the contiguity of an emphatic consonant, as shown in (3), the second allophone [i] occurs only word finally, as illustrated in (4), and the last allophone [ɪ] is the elsewhere case of the phoneme /ɪ/ in QA, as shown in (5).

(3) /ðˤæːbɪtˤ/ [ðˤaːbɨtˤ] 'police officer' /bætˤɪn/ [batˤɨn] 'abdomen'
/mɪtˤærˤ/ [mɨtˤarˤ] 'rain' /ðˤɪdd/ [ðˤɨdd] 'against'
/sˤɪdg/ [sˤɨdg] 'truth'

(4) /θæːnɪ/ [θæːni] 'second' /ʕæːlɪ/ [ʕæːli] 'high'

(5) /bɪss/ [bɪss] 'cat' /sɪm/ [sɪm] 'poison'

In QA, the phoneme /æ/ has two allophones [a] and [æ]. The former allophone occurs only when it is adjacent to an emphatic consonant, as shown in (6), whereas the latter is the elsewhere allophone as illustrated in (7).

(6) /ʕæðˤiːm/ [ʕaðˤiːm] 'great' /rˤæmɪ/ [rˤami] 'shooting'
/bɪsˤæl/ [bɨsˤal] 'onions' /sˤæħiː ħ/ [sˤaħiː ħ] 'right'
/mɪtˤærˤ/ [mɨtˤarˤ] 'rain'

(7) /bælæd/ [bælæd] 'town' /ʃækk/ [ʃækk] 'doubt'

In addition to those two short front vowels, QA has three long front vowels /iː, æː, eː/ in its phonemic inventory. Each of the phonemes /iː/ and /eː/ (Note 5) has only one allophone, which are [iː] and [eː] respectively. These allophones occur everywhere even if they are adjacent to an emphatic consonant, as shown in (8) and (9). In other words, the process of ES does not have any effect on the quality of these specific vowels.

(8) /ʕæsˤiːrˤ/ [ʕasˤiːr] 'juice' /ʕæsiːrˤ/ [ʕæsiːr] 'Asir, City in KSA'
/tˤiːn/ [tˤiːn] 'mud' /tiːn/ [tiːn] 'figs'
/siːm/ [siːm] 'iron cord' /mɪrˤiː ðˤ/ [mɪriː ðˤ] 'sick'

(9) /seːrˤ/ [seːr] 'engine belt' /seːf/ [seːf] 'sword'
/beːn/ [beːn] 'between' /ðeːl/ [ðeːl] 'tail'
/sˤeːf/ [sˤeːf] 'summer' /beː ðˤ/ [beː ðˤ] 'eggs'
/tˤeːrˤ/ [tˤeːr] 'bird' /ħeː ðˤ/ [ħeː ðˤ] 'menstruation'

Lastly, the QA vowel /æː/ has two allophones [aː] and [æː]. The first allophone [aː] occurs in the contiguity of an emphatic consonant, as illustrated in (10.a). This is the only long vowel in QA that is affected by the adjacency of emphatic segments. The second allophone [æː] is the elsewhere allophone, as shown in (10.b).

(10)

a) /ðˤæːbɪtˤ/ [ðˤaːbɨtˤ] 'police officer' /sˤæːm/ [sˤaːm] 'he fasted'
/mɪtˤæːrˤ/ [mɨtˤaːrˤ] 'airport' /sˤæːrˤ/ [sˤaːrˤ] 'became'

b) /bæːn/ [bæːn] 'it appeared' /tæːbb/ [tæːbb] 'he repented'
/sæːm/ [sæːm] 'poisonous' /ʃæːb/ [ʃæːb] 'young'

In summary, this section provides an overview of the QA consonantal and vocalic systems. It has been shown that although QA retains most of the MSA consonants, a very small number of the MSA consonants are no longer used in QA. It also has been shown that the emphatic segments affect the quality of only some of QA front vowels, i.e., /ɪ, æ, æː/, but do not have any effect on the quality of the front vowels /iː, eː/.

3. Literature Review

Although the phonological process of ES in QA has been largely overlooked, there are a number of studies that have examined this process in other related Arabic varieties. For example, Hoberman (1989) provides an analysis for the pharyngealization (i.e., the ES) in the dialect of PA. The main tenets of his analysis can be summarized as follows (as cited in Davis, 1995).

(11)

(i) Pharyngealization involves the spread of the feature [+CP] (i.e., Constricted Pharynx) that the emphatics have.

(ii) The phonemes /i, y, ʃ/ are underlyingly specified for the feature [-CP], whereas the other phonemes do not have underlyingly the feature [CP].

(iii) The emphatic segments spread their feature [+CP] bidirectionally onto adjacent segments. The opaque segments, which are specified for the feature [-CP], block the spread of the emphatic feature [+CP] to both directions.

Davis (1995) argues that the opaque phonemes cannot be underlyingly specified for the feature [-CP] because they do not have a pharyngeal node. In other words, since they are not pronounced in the back part of the vocal tract, they cannot be underlyingly specified for the feature [-CP]. In addition to Davis's counterargument, it is not obvious under Hoberman's analysis what prevents the true pharyngeals /ħ, ʕ/, which also have the feature [+CP], from participating in the process of ES.

In his analysis of the ES in the dialect of Southern Palestinian Arabic (SPA), Davis (1993) argues that the tongue height feature, i.e., retracted tongue root [+RTR], underlyingly characterizes the emphatic phonemes in SPA. This feature represents the emphatics' secondary articulation while the feature [+coronal] represents their primary articulation. It is the secondary feature [+RTR] that the emphatics spread rightward, and it is blocked by specific segments. Davis points out that the emphatic phonemes do not have an underlyingly pharyngeal feature for two phonological arguments. First, the co-occurrence restriction, which accounts for the opaque segments in SPA, suggests that the features [+high], the feature that represents the opaque segments, and [+RTR] should be both considered as tongue height features. Second, the fact that in SPA the emphatics can co-occur in the same root with the true pharyngeal segments while the pharyngeal segments cannot co-occur with one another also suggests that emphatics lack an underlyingly pharyngeal feature. To account for the leftward ES in SPA where there is no any opaque segment, Davis suggests that it is not the [+RTR] feature that spreads leftward, but it is the secondary place pharynx node, which is redundantly specified for any consonant that has the [+RTR] feature. Unlike SPA, the opaque segments in QA occur to both directions of the emphatic segments (i.e., rightward and leftward). Thus, we need a single feature that can spread to both directions and at the same time account for the opaque segments in QA.

Younes (1993) examines the process of ES in two Arabic varieties: Northern PA and CA. He concludes that in both dialects, the process of ES is subjected to a set of factors, which vary from one dialect to another. These factors include the identity of both the emphatic segment and the neighboring segment, the morpheme boundaries, and the domain of the ES. He also concludes that no vowel blocks the ES in CA while the non-low vowels block the rightward ES in Northern PA. The process of ES in QA differs from that in these two varieties of Arabic. As stated earlier, in QA some certain vocalic segments block the ES and not all of the non-low vowels block the ES rule.

In another substantial work, Davis (1995) also examines the ES in the dialects of Southern and Northern PA. In both dialects, the leftward ES is unrestricted (i.e., it starts from the emphatic segment and extends to the beginning of the word, and optionally to affixes in the Northern dialect). No phoneme is observed to block the leftward ES. However, in both dialects, the process of the rightward ES is blocked by certain phonemes. Actually, the two dialects differ in terms of the extent of the rightward ES and the exact nature of the opaque segments. In the Southern dialect, the phonemes /i, j, ʃ, dʒ/ block the rightward ES. In contrast, the pattern of the rightward ES in the Northern dialect is more complicated and restricted. Two different rules account for the facts of the rightward ES in the Northern dialect. First, the rightward ES extends as far as a following low vowel and does not go beyond, as in */sˁ**A**baaħ/* '*morning*' where the emphatic /sˁ/ spreads its emphasis feature only to the adjacent vowel /a/. The phonemes /i, j, ʃ, w, u/ block this process of ES, as in */sˁ**i**ħħa/* '*health*'. Second, the low vowel, which becomes pharyngealized as a result of the first process of the rightward ES, also spreads its pharyngealization rightward to any phoneme of the class of pharyngeals, laryngeals, or low vowels, as in */sˁ**AħA**n/* '*he ground*'. Any other segment that is not from the class of pharyngeals, laryngeals, or low vowels blocks this rule of ES, as in */sˁ**Aħ**n-ak/* '*your plate*'. Following the approach of Anderson (1974) and Broselow (1979), Davis suggests that the feature [RTR] represents the secondary articulation of the pharyngealized segments in Arabic. In order to account for these patterns of ES in the two dialects of PA, he

proposes his analysis within the framework of grounded phonology. For the leftward ES, the emphatic feature [RTR] spreads leftward from the emphatic segment to the beginning of the word. The grounded path conditions on the target, which are feature co-occurrence restrictions motivated on phonetic criteria, account for the patterns of the rightward ES in both dialects. For the rightward ES in the Southern dialect of PA, the path conditions RTR/HI and RTR/FR prevent the feature [RTR] of the emphatics from spreading onto the opaque phonemes, /i, j, ʃ, ʤ/, which are all [+high, +front]. For the first rule of the rightward ES in the Northern dialect of PA, the path condition RTR/HI prevents the feature [RTR] of the emphatics from spreading onto the opaque phonemes, /i, j, ʃ, w, u/, which are all [+high] regardless of whether the opaque phoneme is a consonant or a vowel. For the second rule of the rightward ES in the Northern dialect of PA, the path condition RTR/Lower VT (Vocal Tract) allows the feature [RTR], which the low vowel /a/ receives from the emphatic segment, to spread onto a phoneme with a lower vocal tract (i.e., the pharyngeals, laryngeals, and lower vowels). These path conditions are phonetically grounded in which the path condition RTR/HI is a condition on antagonistic features, whereas the condition RTR/Lower VT is a condition on sympathetic features. These grounded path conditions pertain to individual processes not to the language as a whole. The rule of the rightward ES contains grounded path conditions on the target phonemes, whereas the rule of the leftward ES does not do so because no phoneme has been observed to block the rule of the leftward ES. This proposal of Davis cannot be used for the ES in QA because in QA it is not always the case that the high phonemes block the rule of ES. The vowel /ɪ/, which is [+high], does not block the process of the ES in QA.

In her study on the ES in Sanaani Arabic (SA), a local dialect spoken in Yemen, Watson (1999) suggests that in SA the feature [+RTR] of the emphatics spreads freely from right to left. According to her analysis, the emphatic segments have also a labialization constriction; this [labial] feature, not the [+RTR] feature, spreads from left to right. This latter spread rule is not free, but it is restricted by certain segments. The key conclusion of Watson's work is that there exist four patterns for the process of ES, as shown in (12), and only the firs three patterns can occur in languages. Given the phonological facts from QA reported in this work, the process of ES in QA falls within the third pattern in which it is bounded rightward and leftward.

(12)

(a) Unbounded leftward spread, unbounded rightward spread.

(b) Unbounded leftward spread, bounded rightward spread.

(c) Bounded leftward spread, bounded rightward spread.

(d) Bounded leftward spread, unbounded rightward spread.

Lastly, Yousef (2014) provides an analysis for the ES in CA within the feature geometry and autosegmental phonology. According to his proposal, the feature [coronal] represents the emphatic segments' primary articulation while the feature [dorsal] represents their secondary articulation. Yousef adds that the emphatic /rˤ/ has also the feature [sonorant], and the vowels /i, i:, e:/, which trigger the de-emphasis of /rˤ/, have the feature [coronal]. The feature [dorsal] of the emphatics spreads freely to both directions within the syllable and within word and across word boundaries. This proposal indicates that there is no any opaque segment to the ES in CA. Consequently, the affected segments would be emphaticized as in */**tˤ**iːˤnˤ/* '*mud*' and */ʕˤaˤbˤaˤ**tˤ**aˤ/* '*idiots*'. In contrast, the feature [dorsal] of the emphatic /rˤ/ is delinked due to the adjacency restriction against the feature [coronal] of the triggering vowels next to the features {[dorsal] + [sonorant]} of the emphatic /rˤ/ in the syllable domain. To demonstrate, the emphatic /rˤ/, as in */**r**ˤaˤjjˤiˤsˤ-nˤaˤ/* '*our president*' and */sˤuˤfˤaˤ**r**ˤ-aˤ/* '*ambassadors*', becomes a plain /r/, as in */**r**ija:s-a/* '*presidency*' and */safi:**r**/* '*ambassador*', respectively, because it is in the same syllable of the vowels /i, i:/. Unlike CA, the ES in QA, as will be shown in section (5) below, is restricted only to the neighboring segments and is blocked by certain segments.

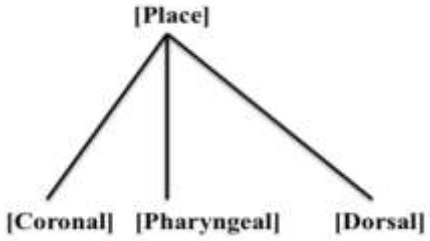
This section discusses a number of phonological analyses proposed for the ES in various Arabic varieties. We have shown that these analyses run into some issues, and thus cannot be used to explain the rule of ES in QA.

4. Phonological Features of Emphatic Segments

Almost all researchers, who have investigated the features of the emphatic segments and the ES rule in Arabic and its various varieties (e.g., Davis 1993, 1995; Kenstowicz 1994; McCarthy 1994; Yousef 2014), agree on the fact that the feature [coronal] represents the primary articulation of the emphatics. They also agree on the fact that it is the feature that represents the secondary articulation of the emphatics that they spread. They, however, differ with respect to the nature of the feature that represents this secondary articulation. For instance, Davis (1993, 1995), in his analysis for the ES in the dialects of PA, suggests that the feature [RTR] represents the secondary articulation of the emphatics; it is this feature that the emphatic segments spread. The emphatic segments do not have an underlyingly pharyngeal

feature. Davis suggests this feature in order to account for the opaque segments in these dialects, which they all have the feature [+high]. This analysis of Davis cannot be used for the ES in QA because the vowel /ɪ/, which has the feature [+high], does not block the ES in any direction. In contrast, Yousef (2014) proposes that the feature [dorsal] represents the secondary articulation of the emphatic segments in CA; it is this feature that the emphatics spread. This proposal of Yousef is problematic because in QA the true velar (dorsal) segments (i.e., */k, g, x, ɣ/*) do not participate at all in the process of ES as pointed out earlier. Furthermore, Hoberman (1989) proposes that the feature [+Constricted Pharynx] underlyingly specified for the emphatic segments in PA; it is this feature that the emphatics spread bidirectionally. The issue associated with this proposal is that the true pharyngeals /ħ, ʕ/, which also have this feature, do not play any role in the process of ES in QA, as illustrated below in this section. Lastly, McCarthy (1994) provides the structure in (13) to illustrate the phonological features of Arabic emphatic (or pharyngealized) (Note 6) consonants. The coronal feature represents their primary articulation, whereas the pharyngeal feature, which has a redundant feature [dorsal], represents their secondary articulation. Kenstowicz (1994) explains this secondary articulation and states that "the emphatic consonants have a secondary constriction in the upper oropharynx and thus take the [dorsal] and [pharyngeal] features as a secondary articulation" (p. 459). McCarthy adds that this class of dorso-pharyngeal has a crucial role in the complex phenomenon of ES in Arabic.

(13)



This proposal of McCarthy will be used in our proposed analysis of the ES in QA for a number of reasons. First, this proposal is in line with the other analyses in that it is the feature that represents the emphatics' secondary articulation, rather than the feature of the primary articulation, that spreads. Next, the feature [dorso-pharyngeal] (Note 7) distinguishes the emphatics */tˁ, sˁ, ðˁ, rˁ/* from other segments in QA (e.g., the true pharyngeals /ħ, ʕ/). In other words, the feature [dorso-pharyngeal] excludes the pharyngeal and velar segments from playing any role in the backing of vowels in QA. Lastly, the feature [dorso-pharyngeal] explains the backing of vowels in the contiguity of an emphatic segment in QA. By adopting this proposal of McCarthy, the consonant-vowel assimilation can be clearly observed where both of the emphatic consonant and the vowel are dorsal.

Before turning to our proposed analysis in the subsequent section, we want to make a couple of comments on why the true pharyngeals /ħ, ʕ/, which have the feature [pharyngeal], do not participate in the ES in QA. The initial answer is that none of the researchers, who examined the ES in Arabic and its various varieties (e.g., Davis 1993, 1995; Hoberman 1989; Yousef 2014), has reported such effect. The examples in (14) illustrate that the QA pharyngeals /ħ, ʕ/ have no evident effect on the backness of adjacent vowels.

(14)	/ʕɪʃ/	[ʕɪʃ]	'nest'	/ħækiːm/	[ħækiːm]	'wise'
	/ʕælm/	[ʕælm]	'flag'	/ħæːd/	[ħæːd]	'sharp'
	/sæʕiːd/	[sæʕiːd]	'happy'	/rˁiːħ/	[riːħ]	'wind'

In the literature, it has been pointed out that the Arabic pharyngeal segments differ from their emphatic counterparts both phonetically and phonologically. On the basis of articulatory evidence, the pharyngeals have a constriction in the lower pharynx, whereas the emphatics have a constriction in the upper pharynx (Davis 1995; McCarthy 1994). McCarthy adds that the main articulator in the production of the pharyngeals is the tongue root (i.e., the tongue body is not back in the production of the pharyngeals), whereas it is the tongue body in the production of the emphatics. Alsolami (2013) points out that with the exception of the tongue root, no any movement of other parts of the tongue is observed in the production of the pharyngeals, and no independent tongue root movement is observed in the production of the emphatics, but it is a result of the tongue body movement. The conclusion to be drawn from this articulatory evidence is that the tongue gesture in the production of the emphatics is longer than the tongue gesture in the production of the pharyngeals. Since the tongue gesture for the emphatics starts from the tongue body and the dorsal vowels articulated from the tongue body, this evidence explains the consonant-vowel assimilation in the

backness feature.

On the basis of acoustic evidence, the pharyngeals are associated with a high F1 in the adjacent vowel, whereas the emphatics are associated with a low F2 in the adjacent vowel (Al-Ani 1970; McCarthy 1994). McCarthy (1994) also adds that the Arabic pharyngeals play a significant role in vowel lowering, whereas the Arabic emphatics play a significant role in vowel backing. These acoustic facts provide robust evidence for the effect of the emphatics, not the pharyngeals, on the backness of adjacent vowels.

Although both of the emphatics and pharyngeals are articulated with a constriction in the pharynx (i.e., both have the feature [pharyngeal]), they differ with respect to numerous phonological processes in Arabic. For example, McCarthy (1994) provides one phonological constraint and one phonological rule associated only with the Arabic guttural sounds (i.e., the laryngeal sounds /h, ʔ/, the pharyngeal sounds /ħ, ʕ/, and the uvular sounds /χ, ʁ/). We use these phonological processes, suggested by McCarthy, to further explain the distinction between the QA pharyngeals and emphatics from a phonological standpoint. First, the co-occurrence restriction states that no Arabic root contains two pharyngeals */*ħʕ/* or contains any of the pharyngeals with any guttural segment. However, in QA, it is possible to have roots that contain more than one emphatic segment, as in [***ðˤibatˤ***] '*He adjusted*'. It is also possible to have roots in QA that contain both emphatic and pharyngeal segments, as in [***tˤamma:ʕ***] '*Greedy*' and [***sˤa:ħ***] '*He cried*'.

Second, as pointed out by Johnstone (1967), in the dialect of Anaiza Arabic (AA), a local dialect spoken in Saudi Arabia, there is a rule of *vowel raising* in an open syllable, as illustrated in (15.a-b). This rule of vowel raising also occurs in QA, as shown in (15.c) where the low vowel /æ/ is raised to /ɪ/ in an open syllable.

(15)

a) /a/ → /i/ [C ____]$_{\sigma}$

b) /k**a**tab/ → /k**i**tab/ 'He wrote'

/b**a**gar/ → /b**i**gar/ 'Cows'

(McCarthy 1994, p. 219)

c) /k**æ**tæb/ → /k**ɪ**tæb/ 'He wrote'

/b**æ**gærˤ/ → /b**ɪ**gærˤ/ 'Cows'

Johnstone argues that this rule of vowel raising is blocked in AA if the vowel occurs after the pharyngeals /ħ, ʕ/. The examples in (16.a) show that the vowel retains its low feature in AA. Similarly, in QA, this rule of vowel raising is blocked if the vowel occurs in the adjacency of the pharyngeals, as illustrated in (16.b).

(16)

a) /ʕ**a**zam/ 'He invited' /ħ**a**riːm/ 'Women' (McCarthy 1994, p. 220)

b) /sm**æ**ʕæt/ 'She heard' /m**æ**ħæl/ 'Store'

/ʕ**æ**zæm/ 'He invited' /ħ**æ**riːm/ 'Women'

It is worth noting that the emphatics are similar to the other segments in QA in which they do not block the rule of vowel raising, as illustrated in (17).

(17) /sˤ**ɪ**dæm/ 'He crashed'

/ðˤ**ɪ**bætˤ/ 'He adjusted'

/m**ɪ**sˤæʕ/ 'He pulled'

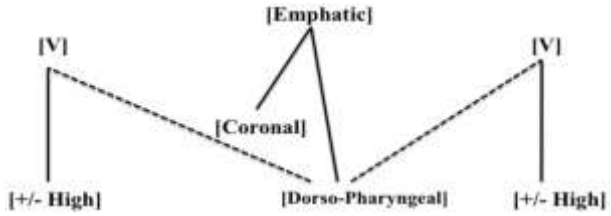
To summarize, we assume, following McCarthy's (1994) proposal, that the feature [coronal] represents the primary articulation of the QA emphatics, whereas the feature [Dorso-Pharyngeal] represents their secondary articulation. As will be demonstrated in section (5), it is the secondary feature that the emphatic segments spread to their neighboring vowels. It also has been shown that the true pharyngeal segments /ħ, ʕ/ do not participate in the ES in QA and that they differ from the emphatic segments both phonetically and phonologically.

5. Analysis of ES in QA

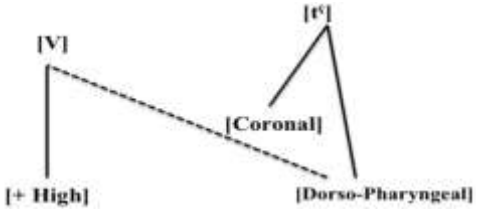
Based on the data reported in section (2.2), it appears that the only vowels in QA that are affected by the contiguity of emphatic segments are /ɪ ,æ , æ : /. As a result, these three front vowels become back, [ɨ], [a], and [a:], respectively. Following the *Underspecification Theory* (see e.g., Archangeli 1988; Mester & Ito 1989; Pulleyblank 1988), we first assume that the height feature of these three vowels is underlyingly specified, but their backness feature is underlyingly underspecified. The assumption of underspecified backness feature follows from the proposal of Inkelas

(1994), which suggests that the underspecification is used only for alternating structures. Since these vowels have two alternating forms, one in the contiguity of emphatic segments and the other in the contiguity of non-emphatic segments, the underspecification is used here. The length feature is underlyingly specified for the long vowel /æ:/, as well as for the other long vowels in QA. However, the length feature of the other vowels in QA is also underspecified because it is a redundant feature. Mester and Ito (1989) point out that redundant feature values should be underspecified. To account for the effect of emphatic segments, we suggest that when the three vowels /ɪ, æ, æ:/ occur in the adjacency of emphatics, the emphatics' secondary feature [Dorso-Pharyngeal] spreads to these vowels, and thus renders them [+dorsal] because they do not have an underlying back feature. In other words, these three specific vowels obtain their backness feature from the adjacent emphatic segments. Consider the rules suggested in (18-21). The rule in (18) demonstrates how the ES typically occurs in QA, the rule in (19) shows how the emphatic segment /tˤ/ spreads its secondary feature [Dorso-Pharyngeal] leftward to the vowel /ɪ/, as in /ðˤæ:b**ɪ**tˤ/ [ðˤa:b**i**tˤ] '*police officer*', the rule in (20) illustrates how the emphatic segment /tˤ/ spreads its secondary feature rightward to the vowel /æ:/, as in /tˤ**æ**:bb/ [tˤ**a**:bb] '*he healed*', and the rule in (21) illustrates how the emphatic segment /sˤ/ spreads its secondary feature bidirectionally to the vowels /æ/ and /ɪ/, as in /b**ɪ**sˤ**æ**l/ [b**i**sˤ**a**l] '*onions*'.

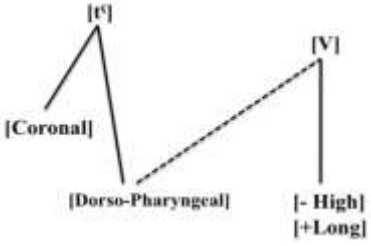
(18)



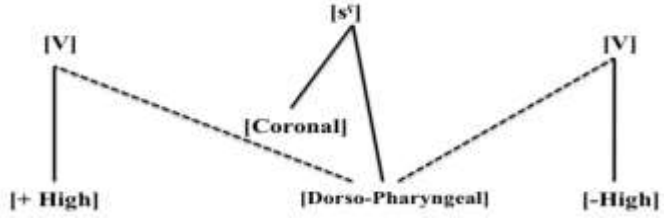
(19)



(20)



(21)



Although this proposal accounts for the effect of the emphatic segments on the three vowels /ɪ, æ, æ:/, it raises another issue. In particular, this proposal does not explain how these three vowels obtain their backness feature in the

contiguity of non-emphatic segments. The examples in (22) show that these vowels are [-dorsal] when they occur in the contiguity of non-emphatic segments.

(22)	/bɪss/	[b**ɪ**ss]	'cat'	/dʒɪn/	[dʒ**ɪ**n]	'jinn'
	/ʃækk/	[ʃ**æ**kk]	'doubt'	/bælæd/	[bælæd]	'town'
	/bæːn/	[b**æɪ**n]	'it appeared'	/ʃæːb/	[ʃ**æɪ**b]	'young'

The redundancy rule, shown in (23.a), can be used to account for the backness feature of the QA vowels /ɪ , æ , æ : / in the contiguity of non-emphatic segments. This redundancy rule was first suggested by Pulleyblank (1988) so as to obtain the fully specified representations for Yoruba vowels. As pointed out by Pulleyblank, this redundancy rule is one of the universal default rules. QA has also another redundancy rule, as shown in (23.b), which is required to account for the underspecified redundant feature value [-long] on the non-long vowels. This latter rule is a language-particular redundancy rule. Both of these two redundancy rules follow the ES rule, as illustrated in the derivations (24) for [ʃ**æ**kk] '*doubt*', [sˤ**a**ħiːħ] '*right*', [b**æ**ːn] '*it appeared*', and [tˤ**a**ːbb] '*he healed*'. Pulleyblank states "redundancy rules are delayed in their application until the last component possible, but once they begin to apply, they apply wherever and whenever they can" pp. (259-260).

(23) Redundancy rules:

a) **RR1**: [ ] → [-dorsal]

A vowel must be [-dorsal] if it does not have an underlying dorsal feature.

b) **RR2**: [ ] → [-long]

A vowel must be [-long] if it does not have an underlying long feature.

(24)

UR:	**[ʃVkk] 'doubt'**	**[sˤVhiːħ] 'right'**	**[bVn] 'it appeared'**	**[tˤVbb] 'he healed'**
	[-High]	**[-High]**	**[-High] [+Long]**	**[-High] [+Long]**
ES:	**NA**	**[-High] [+Dorsal]**	**NA**	**[-High] [+Long] [+Dorsal]**
RR1:	**[-High] [-Dorsal]**	**NA**	**[-High] [+Long] [-Dorsal]**	**NA**
RR2:	**[-High] [-Dorsal] [-Long]**	**[-High] [+Dorsal] [-Long]**	**NA**	**NA**
SR:	**[ʃækk]**	**[sˤaħiːħ]**	**[bæːn]**	**[tˤaːbb]**

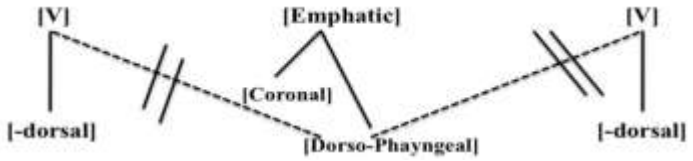
In contrast, the examples in (8&9), repeated in (25) for convenience, show that the QA vowels /i:, e:/ are never affected by the contiguous emphatic segments. That is, they always have the feature [-dorsal] even if the contiguous segment is emphatic. This interesting phonological fact distinguishes the ES rule in QA from its counterpart in the other Arabic varieties discussed in section (3), such as PA and CA.

(25)	/ʕæsˤiːrˤ/	[ʕasˤ**iɪ**r]	'juice'	/mɪrˤiː ðˤ/	[m**ɪriɪ** ðˤ]	'sick'
	/beː ðˤ/	[b**eɪ** ðˤ]	'eggs'	/sˤeːd/	[sˤ**eɪ**d]	'hunting'

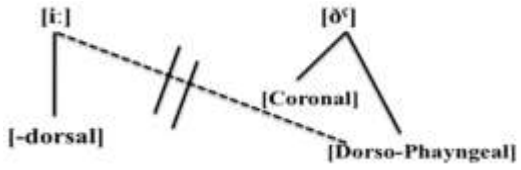
To explain this interesting fact, we assume that in QA the two vowels /i:, e:/ differ from the other vowels in that their backness feature, as well as their other features, are underlyingly specified. In particular, the vowel /i:/ is underlyingly specified for the features [+high, -dorsal, +long], and the vowel /e:/ is underlyingly specified for the features [-high, -dorsal, +long]. As suggested by Inkelas (1994), the full specification is used for nonalternating structures. Since these two vowels have no alternating forms (i.e., their forms do not change in the adjacency of

emphatic segments), the full specification is used for them. Accordingly, the adjacent emphatic segments cannot spread their secondary feature [Dorso-Pharyngeal] to these specific vowels because they already have an underlying dorsal feature, which essentially prevents the rule of ES. Consider the rule in (26), which explains the failure of ES to vowels with a [-dorsal] feature, and the rules in (27) and (28), which explain the failure of ES to the particular adjacent vowels /i:/ and /e:/, as in [mɪr**i**:ðˤ] '*sick*' and [sˤ**e**:d] '*hunting*', respectively. Both of the two redundancy rules, given in (23), are not required since these two vowels are underlyingly specified for the length and backness features.

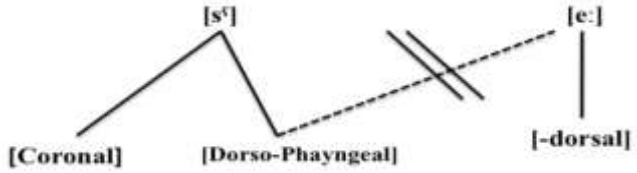
(26)



(27)



(28)



Based on this analysis, it is not obvious what makes the vowels /i:, e:/ different from the other vowels in QA, particularly the vowels /ɪ, æ, æ:/. In other words, one may ask why these two vowels /i:, e:/ are underlyingly specified for the dorsal feature while the other vowels /ɪ, æ, æ:/ are not. In QA, there is phonological evidence showing that the vowels /i:, e:/ sometimes behave differently from the other vowels. To demonstrate, the emphatic /rˤ/ in QA is a phoneme that has two allophones: the plain [r], or the de-emphaticized [r], which occurs only in the adjacency of the vowels /i:, e:/, as shown in (29.a), and the emphatic [rˤ], which occurs elsewhere, as shown in (29.b).

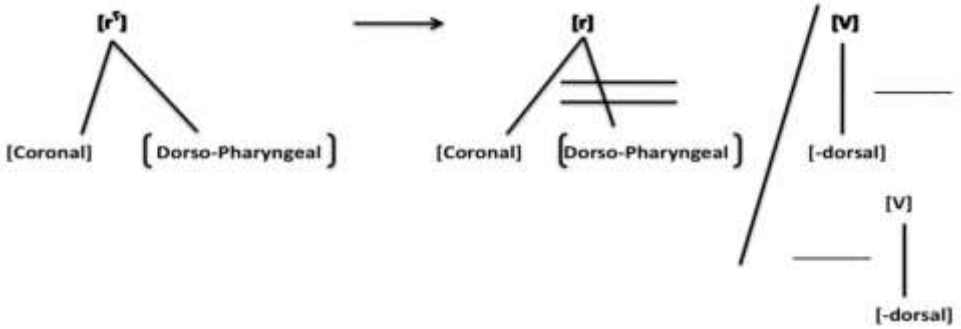
(29)

a) /rˤiːm/	[**r**iːm]	'Reem, proper N'	/rˤiːħ/	[**r**iːħ]	'wind'
/tˤeːrˤ/	[tˤeː**r**]	'bird'	/sæ f iːrˤ/	[sæ f iː**r**]	'ambassador'
/xeːrˤ/	[xeː**r**]	'righteous'	/seːrˤ/	[seː**r**]	'belt'
b) /bæ d ɪ rˤ/	[bæ d ɨ**r**ˤ]	'Bader, proper N'	/rˤæ m ɪ l /	[**r**ˤa m ɪ l]	'sand'
/ħɪ rˤmæ h /	[ħɨ**r**ˤmæ h]	'woman'	/rˤæːs/	[**r**ˤaːs]	'head'
/dʒæːrˤ/	[dʒaː**r**ˤ]	'neighbor'	/kɪ f ærˤ/	[kɪ f a**r**ˤ]	'tires'
/θoːrˤ/	[θoː**r**ˤ]	'bull'	/rˤuːħ/	[**r**ˤuːħ]	'soul'

The conclusion to be drawn from this phonological evidence in QA is that the vowels /i:, e:/ have an underlying [-dorsal] feature. This feature makes the emphatic /rˤ/ lose its secondary feature [Dorso-Pharyngeal], and thus becomes a plain coronal /r/, as demonstrated in (30). None of the other vocalic segments in QA can de-emphaticize the emphatic /rˤ/, as shown in (29.b). Yousef (2014) argues that the de-emphasis of the emphatic /rˤ/ in CA is resulted from the adjacency restriction against the [coronal] feature of the vowels /i:, e:/ next to the [sonorant] manner feature and the [dorsal] secondary feature of the emphatic /rˤ/ in the syllable domain. Likewise, we assume that in QA there

is an adjacency restriction against the [-dorsal] feature of the vowels /i:, e:/ next to the [sonorant] manner feature and the [Dorso-Pharyngeal] secondary feature of the emphatic /rˤ/. The [sonorant] manner feature of the emphatic /rˤ/ distinguishes it from the other emphatics in QA. Therefore, it can be concluded that the QA vowels /i:, e:/ do not only prevent the ES, but they also make the emphatic /rˤ/ lose its secondary feature, and hence becomes a plain coronal /r/.

(30)



In summary, this section lays out our analysis for the rule of ES in QA within the theory of underspecification. On the one hand, it has been suggested that the backness feature of the QA vowels /ɪ, æ, æ:/, which are typically affected by the contiguous emphatic segments, is underlyingly underspecified. The contiguous emphatic segments spread their secondary feature [Dorso-Pharyngeal] to these vowels, and thus make them back. However, in the contiguity of non-emphatic segments, these vowels obtain their backness feature through a redundancy rule, which assumed to apply after the ES rule. On the other hand, it has been proposed that the backness feature of the QA vowels /i:, e:/, which are never affected by the emphatic segments, is underlyingly specified. The ES rule is blocked here because these vowels are already associated with a backness feature. Lastly, it has been argued that the QA vowels /i:, e:/ do not only block the ES, but they also make the emphatic /rˤ/ lose its secondary feature, and hence becomes a plain coronal /r/.

6. Conclusion

This paper examined the phonological process of ES in the dialect of QA based on the data provided by the seven informants from Harb tribe living in the region of Qassim. It has been shown that in QA, the emphatic segments /tˤ, sˤ, ðˤ, rˤ/ affect the quality of the neighboring vowels /ɪ,æ,æː/ by rendering the front feature of the vowels into back. However, these emphatics do not affect at all the quality of the front vowels /iː, eː/. To account for what has been described in QA, the underspecification theory was used. Based on this theory, the vowels /ɪ,æ,æː/ are analyzed as being underlyingly underspecified for the backness feature, whereas the vowels /iː, eː/ are underlyingly specified for the backness feature. As a result, the emphatic segments spread their secondary feature [Dorso-Pharyngeal] to the adjacent underspecified vowels and thus make them back. They, however, cannot spread their secondary feature to the vowels /iː,eː/ because these vowels are already associated with the backness feature. As a result, using the underspecification theory gave us a more straightforward account of the effects of emphatics examined in QA. The theory can be extended to any assimilation process similar to ES in other languages as well.

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Notes

Note 1. The following abbreviations are used in this paper: AA = Anaiza Arabic, CA = Cairene Arabic, CP = constricted pharynx, ES = emphasis spread, FR = front, HI = high, MSA = Modern Standard Arabic, N = noun, NA = Najdi Arabic, PA = Palestinian Arabic, QA = Qassimi Arabic, RTR = retracted tongue root, SA = Sanaani Arabic, SPA = Southern Palestinian Arabic, VT = vocal tract.

Note 2. Harb tribe is one of the largest tribes in the region of Qassim.

Note 3. In section (4), we discuss the phonological features of these four emphatics.

Note 4. It should be noted that QA is one of the subdialects of Najdi Arabic, which is widely spoken in the central parts of Saudi Arabia.

Note 5. The QA phoneme /e:/ corresponds to the MSA diphthong /ay/, as in /ʕayn/ ‘eye’.

Note 6. They are called pharyngealized consonants because the pharyngeal feature is not their primary articulation.

Note 7. We slightly modified McCarthy’s characterization by combining the two features [dorsal] and [pharyngeal] as [Dorso-Pharyngeal] and by positioning these two features under one node, as will be shown in section (5).