

Vowel Alternations in Arabic Phonology

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Abstract. This paper aims at giving a descriptive account of vowel alternations of verbs in a Bedouin Arabic dialect. The paper shows that we can account for the vowel alternations by three phonological processes. These processes are the high vowel deletion, the low vowel deletion, and raising. It also deals with the ordering relationship between these phonological rules.

Data Collection

This paper is part of a research project aimed at giving a description of Bedouin Jordanian dialects. The data on which the research reported on here is based were collected directly from fifteen speakers of this variety of Jordanian Arabic who were students at Mu'tah university between 1985-1987.⁽¹⁾

The data were collected by tape-recording. Informants were invited to talk about themselves, their families, and their problems in life. As a result of this, seven tapes were recorded consisting of stories, natural conversations, and some poems.

Many reasons helped me in collecting the data, for example, I am a friend of my informants and I am a native speaker of another Bedouin Jordanian dialect which is similar to the dialect of my informants with minor differences. Another reason is that I never recorded the speech of any informant alone. Instead I used to meet the informants in a group. Thus, when the speaker started talking the others joined in by asking him questions, commenting on his story, and so on. A third reason is that I never recorded the speech of the informants immediately after meeting them, rather, we

(1) Omar M. Irshied, "Lexical and Phrasal Syncope in Arabic", forthcoming.

used to talk with each other for a while to minimize the tension at the beginning of the conversation. This helped the informants to talk without hesitation.

High Vowel Deletion

There are some instances in BJA in which a high vowel is not deleted in an open syllable when followed by another short vowel.⁽²⁾ An examination of the full paradigm of the Measure I verb *Libis* 'to dress' will show these instances.

(1)	(a) líbis	'he dressed'
	(b) líbsat	'she dressed'
	(c) líbsu	'they (m.) dressed'
	(d) líbsan	'they (f.) dressed'
	(e) libíst	'I dressed'
	(f) libísti	'you (f. s.) dressed'
	(g) libístu	'you (m. pl.) dressed'
	(h) libístan	'you (f. pl.) dressed'
	(i) libísna	'we dressed'

By examining the distribution of the second vowel of the verb *Libis* in the preceding paradigm, we will find that there is a high vowel in the second syllable in (la,e,f,g,h,i). This vowel is missing in the same position in (Ib,c,d). In order to account for the alternation of i- \emptyset in the second syllable of the full paradigm of the Measure I verb *Libis*, we will assume that the CiCiC is the underlying shape since it is the unmarked form of the whole paradigm, i.e. it does not have a subject marker suffix, and we will assume that the CiCC shape arises from the CiCiC by a phonological rule which can be expressed in the following way:

$$(2) \left[\begin{array}{l} + \text{syll.} \\ + \text{high.} \\ - \text{long} \end{array} \right] \rightarrow \emptyset / \text{---C} \downarrow \text{V}$$

Alternatively, one may argue against the underlying form CiCiC and propose CiCC as the underlying form for a verb like *Libis* and account for the alternation of i- \emptyset in the second syllable of a verb like *Libis* by an epenthesis rule which inserts a vowel, namely i, between the first and second consonants when we have a three-consonant cluster in the middle of a word. This rule can be stated in the following way:

(2) Hamza Al-Mozainy, *Vowel Alternation in a Bedouin Hijazi Arabic Dialect: Abstractness and Stress*. Ph.D. dissertation, The University of Texas at Austin, 1981, pp. 52-72.

(3) $\emptyset \rightarrow i \mid C \text{ — } c[\text{ʕ}]$

However, if we accept the formulation of the epenthesis rule given in (3), we will find that this rule is limited to verbs because the rule will not account for nouns that have consonant clusters at the end of the word as the examples below show:

(4)	<i>Verbs</i>	<i>Gloss</i>	<i>Nouns</i>	<i>Gloss</i>
	fihim	'he understand'	fihm	'understanding'
	çirig	'he sweat'	çirg	'branch'
	fisid	'He corrupted'	fisd	'corruption'

From these examples, one can see that it is difficult to claim that CiCC is the underlying form for verbs as well as nouns, because if we do so then we have to restrict the epenthesis rule to verbs in order to derive nouns that have the shape CiCC. With the high vowel deletion stated in (2), no restriction to grammatical categories is needed.

Also, if we consider the stress assignment rule in this dialect, we will not find good motivation for the epenthesis rule stated in (4).

The major word stress in BJA will be found on one of the final three syllables of the word, essentially the rightmost long syllable and otherwise the third last⁽³⁾. Heavy syllables are those containing a long vowel (e.g. CvvC and Cvv) or a short vowel plus consonant(s) (e.g. CvC and CvCC). The only exception being that CvC counts as light at the end of the word. To exemplify the stress patterns in BJA, look at the following examples:

- (5) *Mono Syllabic words*
 mìn 'from'
 jídd 'grand father'
- (6) *Bisyllabic words*
 libíst 'I dressed'
 šáaħib 'friend'
 šibáab 'youth'
- (7) *Trisyllabic words*
 ħíyalu 'his tricks'
 libísti 'you (fem. s.) dressed'

If we consider the stress assignment in BJA, it will be difficult to find good motivation for the epenthesis rule stated in (4) because according to the stress assignment rule⁽⁴⁾, verbs like *Fihim* and *Libis* receive stress on the first syllable. However, when

(3) D. Abdo, *On Stress and Arabic Phonology: A Generative Approach* (Beruit: Khayats, 1969).

(4) Hamza Al-Mozainy, and McCarthy. "Stress and Metrical Structure." Unpublished paper, The University of Texas at Austin, 1984.

these verbs are suffixed by suffixes that start with consonants, the second syllable receives stress as the examples below show:

- (8) (a) *fihímtu* 'you (m.pl.) understood'
 (b) *fihímtan* 'you (f.pl.) understood'
- (9) (a) *libístu* 'you (m.pl.) dressed'
 (b) *libístan* 'you (f.pl.) dressed'

On the other hand, when these verbs are suffixed by suffixes that start with vowels, the stress will be in the first syllable, as the examples below show:

- (10) a) *fíhmu* "they (m.) understood"
 b) *fíhman* "they (f.) understood"
- (11) a) *líbsu* 'they (m.) dressed'
 b) *líbsan* 'they (f.) dressed'

From the preceding examples, one can assume that stress applies before epenthesis and that the epenthesis rule works nicely in deriving the correct forms like *Líbsu* and *Fíhmu*. However, if we propose that CiCC is the underlying form for verbs like *fíhim* and *Líbís*, and we account for the full paradigm of *Líbís* by the epenthesis rule, we will get the right stress when we suffix such a verb by a suffix beginning with a vowel i.e. *Líbsan*, but we will get wrong stress when we suffix the verb by a suffix beginning with a consonant, i.e. **Líbistan*. Therefore, we may conclude here by assuming that the second vowel of verbs like *Líbís* and *Fíhim* is part of the underlying shape, and that CiCiC is the correct underlying form for these verbs. We can then account for the alternation of i-∅ in the second syllable by the high vowel deletion rule stated in (3) above.

Low Vowel Deletion

BJA also provides some examples in which a low vowel is not deleted in an open syllable when it is followed by a syllable which has a low vowel. As an example (of these instances), the full paradigm of the verb *Şanaç* 'to make' is given below:

- (12) (a) *şanaç* 'he made'
 (b) *şnaçat* 'she made'
 (c) *şnaçu* 'they (m.) made'
 (d) *şnaçan* 'they (f.) made'
 (e) *şanaçt* 'you (m. sg.) made'
 (f) *şanaçti* 'you (f.sg.) made'
 (g) *şanaçtu* 'you (m. pL.) made'
 (h) *şanaçtan* 'you (f.pL.) made'
 (i) *şanaçt* 'I (f.pL.) made'
 (j) *şanaçna* 'we made'

By examining the distribution of the first and the second vowels for the preceding paradigm of the verb *šanaç*, we will find the alternation a- \emptyset in the first syllable. We will also find that we have (\emptyset) when the suffixes begin with a vowel and (a) when the suffixes begin with a consonant or when there are no suffixes. In order to account for the alternation of a- \emptyset in the first syllables of the preceding paradigm, one tends to believe that CaCaC is the correct underlying form since it is the unmarked form, i.e. it does not have a subject marker suffix. We can then account for the alternation of a- \emptyset in the first syllable by a phonological rule⁽⁵⁾ that can be expressed in the following way:

$$(13) \left[\begin{array}{l} + \text{syll.} \\ + \text{low} \\ - \text{long} \end{array} \right] \rightarrow \emptyset / \text{--- CVCV}$$

We shall now show that the rule must have the features attributed to it by the statement given in (13) above.⁽⁶⁾ First, only short /a/ deletes; long /a/ never does. This can be shown by the Measure III verb given below:

- (14) saaham 'he participated'
 saahamat 'she participated'
 saahamu 'they (m.) participated'
 saahamt 'you (m.sg.) participated'
 saahamti 'you (f.sg.) participated'
 saahamtan 'they (f. PL.) participated'

Secondly, short /a/ must be in an open syllable. This can be shown by the Measure II verb given below:

- (15) sallam 'he gave'
 sallamat 'she gave'
 sallamu 'they (m.) gave'

Third, /a/ must be followed by the syllables in order to delete; otherwise the /a/ will not be deleted as the examples below show:

(5) Mohammed H. Bakalla, *The Phonology and Morphology of Meccan Arabic: A Generative Phonological Approach*. Ph.D. dissertation, University of London, 1973.
 (6) M. Kenstowicz, ed., *Studies in Arabic Linguistics. Studies in the Linguistic Sciences* 10.2. Urbana, Department of Linguistics, (University of Illinois, Urbana, 1980).

- (16) mara 'woman'
 ġaza 'he invaded'

Fourth, the deleted vowel must be /+ low/. This means that the low vowel deletion does not affect high vowels. This can be shown by looking at the following nominal stems of the shape CiCaC or CuCaC, which happen to be plurals.

(17) Noun	Plural	Your Noun (A1.)	Gloss
nímra	númar	númarak	'number'
ħúfra	ħúfar	ħúfarak	'hole'
ríkba	rúkab	rúkabak	'knee'
líifa	líyaf	líyafak	'saddle blanket'

Finally, the syllable following the deleted vowel must contain a short vowel.⁽⁷⁾ This can be shown by forms that have either the shape CaCaaC or the common internal plural pattern CaCaaCvVC.

- (18) salaah 'praying'
 manaasif a kind of Jordanian food (cf. mansaf)
 manaadiil 'scarves' mandiiil 'scarf'
 şanaadiig 'boxes' şanduug 'box'

The features mentioned above show that we should state the low vowel deletion as below:

- (19) $\left[\begin{array}{l} + \text{syll.} \\ + \text{low} \\ - \text{long} \end{array} \right] \rightarrow \emptyset / \text{--- CVCV}$
 ↓
 +low

The last point that should be mentioned here is the ordering relationship between low vowel deletion and the stress assignment. In order to show this relationship, we can look at the following examples:

- (20) líġaṭ 'he caught'
 lġítaṭ 'she caught'
 ínLigāṭ 'he was caught'
 inlġítaṭ 'she was caught'

(7) T.M. Johnstone, *Eastern Arabic Dialect Studies*. (London: Oxford University Press, 1967).

The form *inlgítat* is interesting. In this form, we see that the stress showing upon the penultimate syllable. If we order stress after the low vowel deletion, then we should get stress on the initial syllable in *inlgítat*. However this is not true as the data in (20) show. This can be explained by assuming that stress precedes the low vowel deletion.⁽⁸⁾ Therefore, I will assume that the underlying form for verbs like *šanaç* 'to make' is CaCaC and we should apply stress before the low vowel deletion to get the forms for these verbs and forms like *inlgítat*.

Raising

In order to give more motivation to the preceding rules and the raising rule that I will discuss in this section, let us take examples in which a high vowel in an open syllable is not deleted when it is followed by a syllable which has a low vowel. As an example of this case, the full paradigm of the verb *Kitab* 'to write' is given below:

- a) Kítab 'he wrote'
- b) Ktíbat 'she wrote'
- c) Ktíbu 'they (m.) wrote'
- d) Ktíban 'they (f.) wrote'
- e) Kitábt 'you (m.s.) wrote'
- f) Kitábtí 'you (f.s.) wrote'
- g) Kitábtu 'you (m.pl.) wrote'
- h) Kitábtan 'you (f.pl.) wrote'
- i) Kitábt 'I wrote'
- j) Kitábna 'we wrote'

It is clear from the preceding paradigm that there is a high vowel in the first syllable in (21a, e, f, g, h, i, and j). This vowel is missing in the same position in (21b, c, and d). On the other hand, the second vowel of the verb *Kitab* is high in (21b, c, and d) while the same vowel is low in (21a, e, f, g, h, i and j). In order to account for the alternation of i-∅ in the first syllable and the alternation of i-a in the second syllable, we will assume that CaCaC is the underlying form for the verb *Kitab*, and by a rule that raises the first vowel of the shape CaCaC to a high vowel we can account for the alternation i-∅ in the first syllable of *Kitab*. This raising rule can be expressed in the following manner.

$$(22) \left[\begin{array}{l} + \text{syll.} \\ + \text{low.} \\ - \text{long} \end{array} \right] \longrightarrow [+ \text{high}] / \text{--- CV}$$

(8) Peter F. Abboud, "The Verb in Northern Najdi Arabic" *BSOAS*, 42, No.3 (1979), 467-99.

On the other hand, we need the low vowel deletion rule stated in (19) above in order to account for the alternation of *i* - *a* in the second syllable. Note that in order for the raising rule given in (22) above to work, it has to be ordered after the low vowel deletion rule as the derivations of *Ktibat* and *Ktiban* below show:

(23) # Katab - at #	# Katab - an #	
Ktab - at	Ktab - an	Low vowel deletion
Ktib - at	Ktib - an	raising
# Ktib - at #	# Ktib - an #	PR

One may argue against the underlying form CaCaC for a verb like *Kitab* and alternatively propose CiCaC as the underlying form for the verb *kitab*, since CiCaC is the unmarked form of the whole paradigm given in (21). Then we can account for the alternations of the vowels in the vowels in the two syllables by two phonological rules.⁽⁹⁾ The first rule is the high vowel deletion given in (2) and the second one is a rule that changes /a/ to /i/ in C — CV, when /a/ is followed by another syllable which has low vowel. In order for this raising rule to work, it has to be ordered before the high vowel deletions as the derivation of *ktibat* below shows

(24) # Kitab - at #	
Kitib - at	Raising
Ktib - at	high vowel deletion
# Ktib - at #	

However, the analysis which considers CiCaC as the correct underlying for a verb like *Kitab*, will lose its value if we take other examples like *Kitab* or *Kitabna*. According to the high vowel deletion we should delete the first vowel in forms like *Kitab* and *Kitabna*. However if we assume that CaCaC is the correct underlying form for these forms and apply the high vowel deletion before the raising rule, we will not delete /i/ in *Kitab* and *Kitabna*. In order to show the way our rules work let us look at the derivations below:

(25) # Katab - tan #	Katab - u #	
_____	_____	high vowel deletion
_____	Ktab - u	Low vowel deletion
Kitab - tan	Ktib - u	Raising
# kitab - tan #	# Ktibu #	PR

From the derivations above, one can see that raising should follow the low vowel

(9) K. Shaaban, *The Phonology of Omani Arabic*. Ph.D. dissertation, The University of Texas at Austin, 1977.

deletion rule. In the following section, I will give the contexts where the raising rule is inhibited.

In BJA the raising rule does not operate when the first or the second consonant of CaCaC is a pharyngeal as the examples in (26) show below:

(26)	hadam	'he destroyed'
	Xabaṭ	'he hit'
	ḥasam	'he stopped'
	ḥaṣad	'he harvested'
	ḡamaz	'he winked'
	ṣabad	'he worshipped'
	ṣazam	'he invited'

However, when the first consonant of CaCaC is /g/, raising operates very well. This means that the velar /g/ should be excluded from the list of gutturals that prevent raising. The following examples illustrate this point

(27)	gitam	'he cut'
	gimaz	'he jumped'
	gisam	'he divided'
	gitan	'he dwelled'

Another case where raising does not operate is when the second consonant of CaCaC is a pharyngeal or one of the sonorants (L,r,n) as the examples below show:

(28)	a) ṣaḥab	'he pulled'
	dahab	'he went'
	daxal	'he entered'
	daṣam	'he hit'
	baḡaḍ	'he hated'
	b) ḍarab	'he hit'
	balas	'he denounced'
	ṣanaḥ	'he hanged'

Again, when the second consonant is (g), the raising rule operates, as the examples below show:

(29)	figad (< fagad)	'he lost'
	digar (< daḡar)	'he hit in an easy way'
	bigar (< baḡar)	'he made a hole'

As we saw above, these are some of the cases in which the raising rule operates. In order to account for the cases where the rule does not apply, we should reformulate the rule in the following way:

$$(30) \left[\begin{array}{c} + \text{syll.} \\ + \text{low.} \\ - \text{long} \end{array} \right] \rightarrow \left[\begin{array}{c} + \text{high} \\ - \text{back} \end{array} \right] / \text{---C1---C2V}$$

Condition: when $C_1 \neq$ pharyngeal and when $C_2 \neq$ pharyngeal or one of the sonorants (l,r,n).

Before we end this part, we should mention that raising should be ordered after the low vowel deletion as we have seen earlier. Raising must also follow high vowel deletion in counter feeding order since raised vowels do not delete even though they are found in presuffixal open syllables. The derivation of *Ktibatū* 'she wrote it' below will illustrate this point:

(31) # ktabatu #	
_____	High vowel deletion
Ktabatu	Low vowel deletion
Ktibatu	Raising
# Ktibatu #	PR

What happens if we apply raising before low vowel deletion:

(32) # Katabatu #	
Ktabatu	Low vowel deletion
Ktibatu	Raising
Ktabatu	High vowel deletion
# Ktabatu #	PR

From the derivations above, one can see that raising should follow low vowel deletion to give us the right form.

We have seen earlier that stress rule precedes the low vowel deletion. The question that should be addressed here is related to the ordering relationship between stress and high vowel deletion. In order to answer this question, compare the following examples.

(33) *CaCaC Verb*

ŷáçar 'he felt'
 ŷčárat 'she felt'
 ŷčarátu 'she made him feel'

CiCiC Verb

símiç 'he heard'
 símçat 'she heard'
 símçatu 'she heard him'

In order to explain why *símçatu* has the initial syllable with stress, we must assume that high vowel deletion precedes stress assignment. The derivation of *Simçatu* below illustrates this point:-

(34) # simiç – at – u

simç – at – u	high vowel deletion
símç – at – u	stress assignment
# símçatu #	PR

If the opposite order occurred, then we expect stress on /-at/ and we would end up with *simçáti* which is ungrammatical. The derivation below illustrates this point:

#	Simiç – at – u	#
	Simiç – át – u	stress assignment
	Simç – át – u	high vowel deletion
#	Simçatu	# PR

I, therefore, conclude that high vowel deletion precedes stress assignment, and the ordering of the four major rules of BJA introduced in this paper is the following:-

- 36) a. high vowel deletion.
 b. stress assignment
 c. low vowel deletion
 d. Raising

Conclusion

In this paper, I have shown that *CiCiC* and *CaCaC*, respectively are the best underlying forms for Measure I verbs like *Libis* and *Kitab* (< *Katab*), respectively. Then, (I argued that) in order to account for vowel alternations in BJA, we need three phonological rules, i.e high vowel deletion, low vowel deletion, and raising. Finally, I have shown that stress should be ordered with other phonological rules.

تبادل الأصوات في نظام الأصوات العربية

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ملخص البحث . تهدف هذه الدراسة إلى وصف مظاهر الصوائت والمتحركات في الأفعال المستخدمة في إحدى اللهجات البدوية العربية وتحليلها . وتبين أننا نستطيع أن نعلل هذا الاختلاف في الصوائت والمتحركات باستخدام ثلاثة قوانين صرفية . كما تهتم هذه الدراسة بترتيب القوانين الصرفية وفق نظام معين من أجل تعليل أسباب الصوائت والمتحركات في هذه اللهجة .