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A Proposed Model of Optimality Theory for Jordanian Arabic Broken Plurals

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Abstract

One of the most challenging, but rather interesting, topics in the literature of Arabic phonology and morphology is the broken plurals (BP). The most widely acceptable account of Arabic BP, as far as I know, is McCarthy (1982) within the framework of Autosegmental Phonology. This paper presents and discusses the model of McCarthy (1982) and shows that it is unsatisfactory for providing a plausible account for Jordanian Arabic BP, as it suffers from a number of exceptions that McCarthy found hard to account for. The emergence of Optimality Theory (OT) in the 1990s has opened the door for further perspectives of treating different phonological problems. This paper shows that there are three major issues that constitute a challenge to McCarthy's Model of Arabic BP within the framework of Autosegmental Phonology. They include dialectal variation, the existence of more than one surface plural form for the same input, and the difference in the outputs of BP forms with the same underlying form. It also cannot account for the diverse shape of similar forms. As an alternative, this paper proposes a model within the framework of Optimality Theory that can account for and solve all the challenging problems for McCarthy's model in a satisfactory and straightforward manner.

Keywords: Arabic phonology, Arabic broken plurals, Arabic and Optimality Theory, Arabic Linguistics

1. Introduction

Broken plurals in Arabic have been undertaken by a number of researchers. Abd-il 'al (1977), McCarthy (1982, 2011), Hammond (1988), and McCarthy and prince (1990), are just a few examples. It is strongly believed that the above researches have failed to offer a satisfactory account of broken plurals in Arabic within the framework of traditional morphology. Russell (1995: 104) admits that traditional morphology cannot address issues, such as, how the right allomorph is chosen for each context and what determines the order of morphemes in a word. Indeed, linguists have never had unanimous agreement on any questions concerning morphology (Ibid: 104). Russell adds that classical morphology failed to meet the following challenges. The first challenge is that "the chances that phonological rules made to uderlying representations are not random." (p. 106). One instance on this challenge is the English plural. The second challenge constitutes the idea that words are composed of well-defined pieces called morphemes. An example relevant to this point is the root-and –pattern or templatic morphology of Semitic languages .The third challenge involves the way classical morphology relates uderlying representations to the surface structures by a series of virtual rather than real time sequence of changes. One example in mind is reduplication (see Russell 1995: 106–107).

The main purpose of the present paper is to show that BP can better be treated and accounted for within the framework of Optimality Theory. (Note 1) It also endeavors to offer reasonable solutions to the points that McCarthy (1982) dubbed "problematic" in BP. For instance, he mentioned that there are reasons in Arabic broken plural he does not understand (P.191). He also adds that the phenomenon of vowel insertion is poorly understood (p. 192). More importantly, McCarthy's model and analysis suffer from a number of exceptions that violate his analysis. One instance of such exceptions is that some nouns have more than one BP, such as /bayt/ 'house, verse', which is realized as /byūt/ 'houses' or /'abyāt/ 'lines of verse'. Within the traditional model, there is no explanation why /bayt/ has two different surface broken plurals.

2. Arabic Broken Plurals

Arabic plurals constitute three general types; masculine plural, feminine plural, and broken plural. The last type

is traditionally defined as a plural form which indicates more than three and shares with its singular form its meaning and origin (Abd – il ‘al, 1977; 27). Forming the broken plural involves vowel change, (Note 2) such as [’asad] 'lion' [’usūd] or [’asād] 'lions', and [kabīr], [kibār] 'large ones'. The number that any BP indicates ranges between three and ten only. The most common canonical structures in this regard are:

(1)

[’af‘ilah]	[’adwiyah]	'medicine'
[’af‘ul]	[’alsun]	'tongues'
[fi‘lah]	[ṣibyah]	'boys'
[’af‘āl]	[’asyāf]	'swords'

Arabic broken plural comes in five types. The first type is called "ğam‘u-l-qilleh" 'the plural of the diminutive'. This type of BP covers all numbers that range between three and ten. One example is [riğl] > [’arğul] 'feet'. The second type is "ğam‘u-l-kaθra" 'the plural of multiplation' as for instance the case with [kitāb] > [kutub] 'books'. The third type of BP is "muntaha-l-ğumū‘" 'the ultimate plural'. One instance is [’iṣba‘] > [’aṣābi‘] 'fingers'. The fourth type is "ğam‘u-l- ğami‘" 'plural of the plural'. One example is [nādi] > [nawādi] 'clubs'. The fifth and last type of BP includes all of the forms, such as 'the noun of the plural: [nağm] > [nuğūm] 'stars', the gender noun of the plural: [rūmi] 'Roman' > [rūm] 'Romans', and the plural of compounds: [’ibn ‘abbās] 'Abbas son' > [’abnā ’ ‘abbās] 'Abbas' sons'.

What makes the picture more complex is that in each of the above five forms there are various cannonical forms. For instance, in the case of the ultimate plural, there are four different cannonical forms as shown below:

(2) [cvcvvcvc] < [cvccvc] as in [’aṣābi‘] 'fingers' < [’iṣba‘] 'finger'.

[cvcvvcvc] < [cvccvc] as in [masāğid] 'mosques' < [masğid] 'mosque'.

[cvcvvcvvc] < [cvccvvcvc] as in [’aḍābīr] 'files' < [’iḍbārah] 'file'.

[cvcvvcvvc] < [cvvcvvc] as in [mawāθīq] 'agreements' < [mīθāq] 'agreement'.

Abdel-‘āl (1977: 35) argues that the canonical forms of Arabic BP are numerous. They reach thirty forms. This number refers to all BP forms whether they are regular or irregular. Also Al-Daḥdāḥ (1987: 59-61) expresses this diversity of BP canonical forms in several charts.

3. McCarthy (1982)

To explain the difficult and un-predictable formation of Arabic BP, McCarthy (1982) stipulates some rules for certain cases and leaves several examples without analyizing. The following are the most important cases:

1. Quadriliteral Noun Redundancy [cvccv<v> c]singular ----> [cvcvvcv<v>c] plural. Note that <v> is long iff it is so in the singular. However, McCarthy found some exceptions to this rule. The first exception is [‘anākib] 'spiders', the plural of [‘ankabūt], where the singular form has five consonant slots. The second exception is the sporadic form [mafāṭir], the plural of [mufṭir] 'fast broker'. The third exception is [qayāṣir], the plural form of [qayṣar] 'emperor'. Based on his discussion of quadrilateral forms and their exception, McCarthy (1982: 188) claims that such forms are not derived from their singular forms but rather have their separate prosodic templates.

2. Nouns that have [cvcvvc] pattern. These nouns form their plural in this manner: [cvcvvc] singular ---> [cvcvvcvc] plural. While this rule applies to [ḍamīr] > [ḍamā’ir] 'pronouns', it fails to explain why the underlying pattern /’amīr/ 'prince' surfaces as [’umarā ’], but not

[’amā ’ir], as expected.

3. Feminine nouns that have [cvc(v)c] pattern. McCarthy (1982: 193) fails to give a rule to describe the formation of the plural of this class of broken nouns. Examples include /qamar/ 'moon" > [’aqmār], but /bint/ 'girl', which has the same underlying pattern, takes the different surface pattern [banāt], but not [’abnāt] as expected.

4. Nouns that have this pattern [cvvcvc] to express active participles. The broken plural rule is: [cvvcvc] singular -----> [cvccvc] plural, as in [sāğid] > [suğğad] 'prostrating oneself'. But notice here that this rule does not apply to other nouns that have the same underlying form, as in [ğāhi] > [ğuhhāl] 'ignorant', not [ğuhhal] as the rule expects.

5. Nouns that have [cvcvvc] pattern to express masculine gender. In this regard, McCarthy fails to give a rule and to include other alternations such as the use of the glottal stop [’]. Compare [ḍamīr] > [ḍamā’ir] 'pronouns' and

[ǧamūs] > [ǧawāmīs] not [ǧamā'is] 'buffalo'.

McCarthy's analysis is rather insightful and revealing compared with the traditional theory of transformational rules. His account has successfully eliminated many rules that were assumed to be necessary. However, McCarthy's model suffers from a number of gaps and problems that were not tackled or solved by him. The first gap is that the stipulated rules are inadequate and face exceptions. It's also clear that the untreatedd examples constitute a challenge to both McCarthy's analysis and the traditional theory. This is evident from his statements (p. 191) that there are "reasons I don't understand" and "…..though with some poorly understood vowel insertion phenomena". Such statements are not haphazard. Rather they follow from the difficulty of the phenomenon under question and the inadequacy of the given analysis.

4. The Problems

One serious shortcoming of McCarthy's analysis is the existence of several exceptions to his account. Such exceptions follow from the fact that McCarthy's analysis is basically descriptive. That is, it just gives illustration to the internal structure of a surface broken plural form and then collects all such structures in what he calls later (2002: 13) "template of templates", which is stated as follows:

(3) "Template of templates for Classical Arabic Verbs"

$$(c)\left\{\begin{array}{c}cv\\cvc\\cvv\end{array}\right\}\ cvc$$

McCarthy (2002: 13) states that this template of templates generalizes over the templates of all conjugations, showing that they have a great deal in common. According to this template, differences between verbal and nominal stems of Arabic indicate that verb stems end in cvc], but noun stems are not so restricted, and that verb stems can begin with [cv or cvc], but noun stems always begin with a single consonant. Thus, these two points establish a difference between the templates of verbs and nouns.

While describing some BP surface forms, this template doesn't account for a number of existing facts. First, the fact that certain underlying nominal forms that are similar in structure vary in their BP surface forms. It also fails to explain how such variation exists. This is evident from the following examples:

(4)

CaCaC	Surface forms		CaCiC	Surface forms	
baṭal	'abṭāl	'heroes'	ḥimil	'aḥmāl	'loads'
Ǧabal	Ǧibāl	'mountains'	ḫaṣim	ḫuṣūm	'opponents'
'aṭaš	'aṭša	'thirsty'	ṣa'ib	ṣi'āb	'difficult'
CaCiiC			CaaCiC		
Šarīf	'ašrāf	'nobles'	ḥāmil	ḥawāmil	'pregenants'
Karīm	kirām/kuramā	'generous'	'āmil	'ummāl	'workers'
Qatīl	Qatlā	'dead'	sāǧid	suǧǧad	'worshippers'

The examples in (4) argue clearly that nouns that have the same underlying canonical structure vary in their surface forms, which is unpredictable. Therefore, following McCarthy (1982) in stipulating constraints to account for the different surface forms of the same underlying nominal stems is irrelevant. Rather it is both the underlying and surface canonical or templatic structures that matter. In other words, the above examples argue for linking underlying templates with possible surface templates. That is, as will be shown, I assume that the relation between underlying and surface forms is template driven, i.e., templates govern both underlying and surface forms.

The second instance of such exceptions is the fact that certain nouns may have two different broken plurals. Again, the examples in (5), below, pose another challenge to the traditional theory. The same noun has two different BP surface forms. This fact, in turn, argues that the relation between underlying and surface forms cannot be explained by a single rule that produces a single output. In other words, the used rule must allow the production of more than one output, a fact that traditional theory does not allow. That is, variation in the output calls for the neccessity of using a thoery that allows producing more than one surface form for the same input:

(5)

/bayt/	‘house’	[byūt]	‘houses’	[’abyāt]	‘lines of verse’
/‘ağal/	‘wheel’	[‘ğāl]	‘wheels’	[‘ağalāt]	‘wheels’
/baṣalah/	‘onion’	[baṣal]	‘onions’	[baṣalāt]	‘onions’
/wādī/	‘valley’	[widyān]	‘valleys’	[’awdiya]	‘valleys’
/bāb/	‘door’	[bwāb]	‘doors’	[bībān]	‘doors’
/ḫazanah/	‘cupboard’	[ḫazāyin]	‘cupboards’	[ḫazanāt]	‘cupboards’
/šağarah/	‘tree’	[šğār], [šağar]	‘trees’	[šağarāt]	‘trees’
/sallah/	‘basket’	[slaal]	‘baskets’	[sallāt]	‘baskets’
/nādī/	‘club’	[nawādi]	‘clubs’	[’andiyah]	‘clubs’
/lu‘bah/	‘toy’	[lu‘ab]	‘toys’	[’al‘āb]	‘toys’

The third serious problem follows from the differences among Arabic dialects regarding the formation of BP. Examples include the rural Jordanian dialect (RD) and ‘Abady Arabic (AA), all spoken in Jordan, as it is obvious from the following examples:

(6)

	RD	*AA*	
/bāb/	*[bwāb]*	*[bībān]*	*'door'*
/fās/	*[fūs]*	*[fīsān]*	*'axe'*
/bint/	*[banāt]*	*[bnitta]*	*'girl'*
/balad/	*[blād]*	*[bildān]*	*'country'*
/raġīf/	*[riġfih]*	*[riġfān]*	*'loaves of bread'*

It is clear from the examples in (6) that an underlying form has two different surface represenations in two different Arabic dialects and may have other forms in other Arabic dialects. This fact again calls for a model that allows the production of more than one surface form for the same input.

5. The New Model

To account for the above gaps in McCarthy’s model, a new model should be proposed. This model which follows the lines of Optimality Theory must provide an account for the following facts:

1. Nominal stems that have the same underlying form may have different surface forms.

2. The same nominal stem may have different BP forms.

3. BP may vary from one dialect to another.

Given these requirements and based on the OT framework, I propose the following model, which I may call the Broken Plural Model (BPM):

(7) The broken plural model (BPM)

Table 1.

Templates Generator (TG)	Subtemplates Generator (STG)	Candidates Generator (CG)
Possible Templates	Possible Subtemplates	Possible Candidates

The above model assumes that there are three types of generators: Templates Generator (TG), Subtemplates Generator (STG), and Candidates Generator (CG). The first produces all possible templates, the second generates the possible subtemplates, and the third produces all possible candidates. It should be pointed out here that major templates include all possible templates as stated in Al-Daḥdāḥ (1987: 59-61) for Classical Arabic BP. Subtemplates include all possible forms that can be derived from a single major template. For example, if the major template for the BP form of an underlying CaCaC is CiCaaC, then the possible subtemplates would be something like ’aCCaaC, CuCCaaC, CaCCaaC….etc.

Five constraints must associate this model:

Constraint (A): only optimal candidate matches optimal templates. Here, the context, innate knowledge,

morphological competence, and what the speaker wants to say determine this candidate. I call this Candidate-Template Constraint; CTC.

Constraint (B): Fixed Template Constraint (FTC); for x noun there is y template called major template.

Constraint (C): Sub-Template Constraint (STC), for a major template y, there are subtemplates y1, y2, y3, y4….etc.

Constraint (D): Template Dominance Constraint (TDC), a major template dominates its subtemplates.

Constraint (E): Ranking Component (RC). Possible candidates are ranked heirarchically. The most optimal one is highly ranked, then the lower-ranked ones follow.

Given the above constraints, the model in (7) would have the following form:

(8) The structure of BPM

Table 2.

Input	TG	STG	CG	CTC	RC	Output
X	Possible Templates	Possible Subtemplates	Possible Candidates	Correct candidate matches correct template	X1	X1
	Ya	ya1, ya2, ya3, etc	X1		X3	
	Yb	yb1, yb2, yb3, etc	X2		X2	
	Yc	yc1, yc2, yc3, etc	X3			

To account for a given output, TG would generate all possible major templates; Ya, Yb, Yc,...Yn. STG in turn would produce all possible subtemplates for each template, and, then, CG produces all possible candidates for the generated templates and subtempaltes. CTC would eventually match the right candidate with the right template and then its correct subtemplate.

To illustrate, a given noun X would have TG generate several templates, Y1, Y2, Y3, …Yn. STG would produce all possible subtemplates for each major tempalte; Y1a, Y1b, Y1c…Yxn; Y2a, Y2b, Y2c...etc. CG would produce all possible candidates based on the available templates and subtemplates, say X1, X2, X3, etc. CTC would match the right candidate, say X1, with the right major template, say Y1. CTC would also match X1with the right subtemplate; say Y1a. Finally, the right output would result, say X1, which matches the underlying templat, Y1, and the underlying subtemplate, Y1a.

(9) Illustrating how BPM works

Table 3.

Input	TG	STG	CG	CTC	RC	Output
X	Y1	Y1a, Y1b, Y1c,…., Y1n	X1	X1 = Y1a	X1	X1
	Y2	Y2a, Y2b, Y2c,…., Y2n	**X2**	X2 = Y2c	X3	
	Y3	Y3a, Y3b, Y3c,…., Y3n	**X3**	X3 = Y3b	X2	
	……	…..	**X...**	.....	....	
	Yn	Yna, Ynb,Ync, …., Ynn	**Xn**	Xn = Ynn	Xn	

6. BPM and the Problematic Data

The above model explains the gaps in the analysis of McCarthy (1982; 2011). Dialectal variation, the existence of more than one surface plural form for a singular nominal stem, and the difference in the surface forms of stems with the same underlying canonical form, are all explained within the framework of this model by virtue of the Ranking Component (RC). As will be shown below, RC explains why X dialect uses A BP form, but Y dialect uses B form. It also explains the presence of several BP forms for the same underlying input. Furthermore, it accounts for the variation of surface BP forms of nouns that share an identical underlying canonical structure.

6.1 BPM and Dialectal Variation

The question why ‘Abady Arabic (AA) uses different BP forms from those of the Rural Jordanian dialect (RD) can be explained easily by BPM. To illustrate, the underlying noun /bāb/ 'door' is realized in AA as [bībān], but [bwāb] in RD. BMP explains the existence of these two different surface forms and their use in the two dialects as follows:

(10) BPM and dialectal variation

Table 4.

Input	TG	STG	CG	CTC	RC	Output
Bāb	**CCāC**	**CwāC**	**bwāb**	**bwāb = Cwāb**	**bwāb**	**bwāb**
		wCāC	**wbāb**		**bībān**	
		CāwC	**bāwb**		**babāt**	
	CaCāC	**CaCāt**	**babāt**	**babāt = CaCāt**		
		CtāC	**btāb**			
		taCāC	**tabāb**			
	CiCāC	**CīCān**	**bībān**	**bībān = CīCān**		
		CīnāC	**bīnāb**			
		CCān	**bbān**			

In (10), TG assigns the major templatic forms, while STG specifies the details for each template. These details include the insertion of prefixes, suffixes, or infixes like /t/, /'/, /st/…..et. Such details are considered "problematic" in McCarthy (1982: 191-192).

CG produces candidates that match the canonical structure of each subtemplate. Therefore, the number of generated candidates is restricted to the available number of the produced canonical structures of subtemplates. Accordingly, this restriction reduces the number of possible candidates and makes the process of candidates production more specified in terms of following a strict mechanism.

For CTC, all candidates that violate the common and well know canonical structures of Arabic BP, as listed in Al-Daḥdāḥ (1987: 59-61), are ignored. That is, only acceptable candidates proceed to RC. Thus, only three surface BP forms are possible for CTC; [bwāb], [bībān], and [babāt], which match the templates Cwāb, CeCān, and CaCāt, respectively. RC, in turn, would rank [bībān] above any other output in AA, but for RD, [bwāb] would outrank [bībān].

It is important to point out here that treating this difference in the output in the two different dialects in terms of a difference in syllabification is irrelevant. Although the two dialects vary in their syllable structures, the use of both [bwāb] and [bebān] is acceptable in both dialects. Preference of one form to another is a matter of output ranking.

The new model can also account for other BP forms variation between AA and RD. For instance, the singular form /raġīf/ 'loaf of bread' is realized as [riġfih] in RD, but as [riġfān] in AA. TG can generate a number of templates such as [cvccvc], [cvccvc], [cvcvvcvc]...etc. STG would generate the following out of the these templates: CiCCiC, CiCCeC, CaCayiC, ...etc. STG notices that the various templates here are associated with the length of the vowel(s), the doubling of consonants in initial position, or the variation among [i] and [e] in the final syllable. CG would then provide candidates based on the canonical structure of these subtemplates, such as[riġfih], [riġfeh], [raġayif]...etc. CTC will match the candidates with the possible templates and choose the optimal ones. The difference between the favored forms in RD and AA is accounted for by the different rankings of the candidates by virtue of RC. For instance, in the case of RD [riġfih] outranks [riġfān] and all the other candidates. Thus the optimal output in the case of RD will be [riġfih] only, while in AA it will only be [riġfān]. See the table below:

(11) The different outputs of RD and AA for the underlying noun /raġīf/.

Table 5.

Input	TG	STG	CG	CTC	RC	Output
Raġīf	**CVCCVC**	**CiCCiC**	**riġfih**	**Riġfih**	**riġfih**	**riġfih**
		CaCCiC	**raġfih**		**riġfān**	
		CiCCaC	**riġfah**		**reġfah**	
	CVCCVVC	**CiCCāC**	**riġfān**	**Riġfān**		
		CeCCāC	**reġfān**			
		CiCCVC	**riġfan**			
	CVCCVC	**CeCCaC**	**reġfah**	**Reġfah**		
		CaCCeC	**raġfeh**			
		CiCCaC	**riġfah**			

6.2 BPM and Multi Surface BP Forms

The second case where there is more than one BP form for the same input is also explained by BPM in a plausibile way. The broken plural forms of /bayt/ 'house' are [byūt] [’abyāt], and [betāt]. BPM generates these forms as follows:

(12) BPM and multi surface BP form

Table 6.

Input	TG	STG	CG	CTC	RC	Output
bayt	**CCVVC**	**CyūC**	**byūt**	**Byūt**	**byūt**	**Byūt**
		CyīC	**byīt**		**’abyāt**	
		CyāC	**byāt**		**betāt**	
	CVCCVVC	**’aCCāt**	**’abyāt**	**ʔabyāt**		
		’aCCīt	**’abyīt**			
		’aCCūt	**’abyūt**			
	CVCVVC	**CeCāt**	**betāt**	**Betāt**		
		CuCāt	**butāt**			
		CaCāt	**batāt**			

In (12), above, CG provides several candidates. CTC selects three possible candidates, and RC ranks them according to what an Arabic speaker wants to use as the best and most appropriate output for this underlying nominal stem.

In the above table, it is noticed that the BP form [byūt] and [’abyāt] are based on the singular form [bayt]. These forms may also carry another meaning, namely 'lines of verses'. The BP form that carries this latter meaning has to be marked in the input as [bayt (v)], where (v) stands for 'verse'. In reality, Arabic speakers use and understand three outputs for this specific input. For BPM, the production of such outputs is plausible, but for McCarthy (1982) and traditional theory only one output form is acceptable, but the other two forms are exceptions, contrary to facts.

6.3 BPM and the Different Outputs of Similar Underlying BP Forms

Similarily, in the case of similar uderlying inputs which have different output forms, RC would highly rank the most optimal output after CTC matches the right candidate with the right subtemplate. That is, as shown below, CTC selects three possible outputs for the underlying singular noun /ḥamil/ 'load'. They are [’aḥmāl], [ḥumūl], and [ḥamlāt] . RC, in turn, ranks them according to the speaker's preference. With this view in mind, there is no need to be restricted to the generalization that similar underlying inputs should have a similar surface form, as shown in (13). Rather, a single input could have more than two outputs that are acceptable by BPM, the speaker, and reality.

(13) BPM and the different outputs of similar underlying BP forms

Table 7.

Input	TG	STG	CG	CTC	RC	Output
ḥamil	**CVCCVVC**	**’aCCāC**	**’aḥmāl**	**’aḥmāl**	**’aḥmāl**	**’aḥmāl**
		’aCCīC	**’aḥmīl**		**ḥumūl**	
		’uCCāC	**’uḥmāl**		**ḥamlāt**	
	CVCVVC	**CuCūC**	**ḥumūl**	**ḥumūl**		
		CaCūC	**ḥamūl**			
		CiCūC	**ḥimūl**			
	CVCCVVC	**CaCCāC**	**ḥamlāt**	**ḥamlāt**		
		CiCCāC	**ḥimlāt**			
		CeCCāC	**ḥemlāt**			

7. Conclusion

In addition to the numerous exceptions cited, there are three major issues that constitute a challenge to McCarthy's Model of Arabic BP within the framework of Autosegmental Phonology: Dialectal variation, the existence of more than one surface plural form for the same input, and the difference in the outputs of BP forms with the same underlying form. All of these problems argue clearly that such a model is neither adequate nor plausible to account for the challenging broken plurals of Arabic. The proposed model within the framework of

Optimality Theory in this research shows clearly that a nominal stem can have more than one BP forms as acceptable outputs. Selection of the optimal output is determined by a dialect/speaker by virtue of the ranking component, RC.

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Note

Note 1. Optimality Theory has provided plausible accounts for other phonological phenomena in Jordanian Arabic. For further details, see Mobaidin (1999) and Btosh (2006).

Note 2. Throughout this paper, the following symbols with their Arabic equivalents will be used; ’ ء, d د, ḍ ض, k ك, b ب, d ذ, ṭ ط, l ل, t ت, r ر, ẓ ظ, m م, t ث, z ز, ‘ ع, n ن, ǧ ج, s س, ġ غ, h ه, ḥ ح, š ش, f ف, w و, ḫ خ, ṣ ص, q ق, y ي