

Moroccan Arabic morpho-phonology: A moraic approach
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Abstract

In the present paper we demonstrate that an analysis using the mora, which is a prosodic unit that marks syllable weight, can clarify two previously problematic areas in the morpho-phonology of Moroccan Arabic: the canonical difference between CəCC and CCəC monosyllabic words and the shortening of vowels in a specific morphological context. In this respect, we will show the importance of adopting a moraic approach to the syllable to account for phenomena at the phonology-morphology interface.

Keywords: the mora, monosyllables, vowel shortening, prosodic morphology, schwa epenthesis, Moroccan Arabic.

1. Introduction

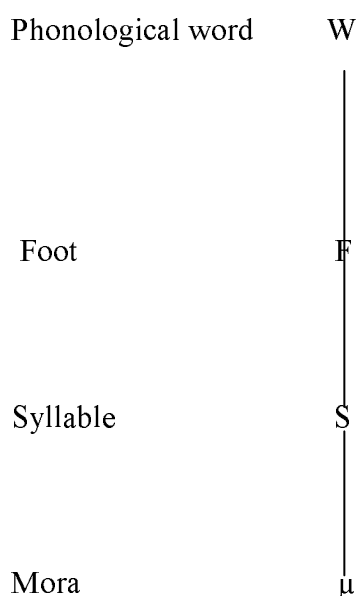
In this paper, we address some fundamental issues in the morpho-phonology of Moroccan Arabic (MA) and argue in favor of adopting a moraic model of the syllable to describe and explain morpho-phonological processes. We will attempt to underscore the role of the mora (Hyman, 1985 among others) in MA syllables by arguing that its implementation helps in explaining two phenomena in MA morpho-phonology, namely the canonical difference between CCəC and CəCC monosyllabic words and the shortening of vowels in a specific morphological context.

2. The Prosodic Model

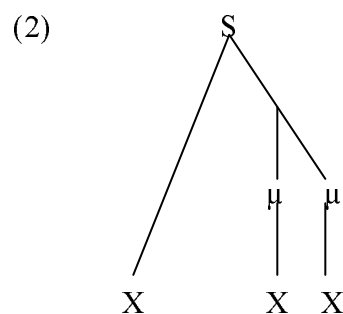
The present study is conducted within prosodic morphology. The outstanding trait of this approach is its assertion that templates of non-linear morphology are characterized in terms of

authentic units of prosody: the mora, the syllable, the foot, and the prosodic word. The hypothesis stipulates that the language of skelata is the same as the language of prosody¹, including stress, syllabification, epenthesis, rhyme, poetic meter, etc. (McCarthy and Prince, 1986). The prosodic constituents are organized in a hierarchy of exhaustive domination (Selkirk, 1980):

(1) Prosodic Hierarchy



The mora, also called a beat, is a unit of phonological weight that measures syllables heaviness or lightness i.e., taking into consideration extraprosodicity, a bimoraic syllable is heavy whereas a monomoraic syllable is light. McCarthy and Prince (1986, 1988) have abandoned the traditional treatment of syllables in terms of the onset/rhyme and have argued in favor of a syllable that consists of an onset and moras.



¹ In optimality theory (McCarthy and Prince, 1993a; Prince and Smolensky, 1993), this is referred to as alignment.

The mora, together with the prosodic categories that dominate it, have been incorporated as an alternative to CV templates in most phonological accounts within a well articulated theory of prosodic phonology and morphology, which has been the starting point of Optimality Theory (Prince and Smolensky, 1993; McCarthy and Prince, 1993a). This theory has revolutionized the whole phonology and morphology enterprise by opening new perspectives for studies of previously problematic areas like reduplicative and root-and-pattern systems.

According to McCarthy and Prince (1986), there are many advantages that ensue from the prosodic treatment of morphological templates as opposed to segment-sized ones. Prosodic categories are independently motivated outside morphology; phonological research has come to accept them as primitives of the theory and their incorporation in morphological theory leads to both uniformity and economy. There is no need to stress the relevance of the syllable and the prosodic word in phonological theory (see McCarthy and Prince, 1988) as these units have been accepted by all scholars as necessary prosodic constituents when dealing with phenomena in suprasegmental phonology. Additionally, metrical phonology posits the categories foot and light/heavy syllables as its primitives, and moras are assigned a prominent role in reduplicative and root-and-pattern systems, and in phonological phenomena like Epenthesis (Ito, 1989) and Compensatory Lengthening (Hayes, 1989).

The moraic model of the syllable, in which some elements (the nucleus and/or the coda) are moraic, whereas the onset is not, seems to be superior to the other syllable theories like onset/rhyme models (Pike and Pike, 1947; Fudge, 1969; Selkirk, 1982) as the mora offers a way to distinguish between light, heavy, and superheavy syllables. In this paper, we will demonstrate that two areas in MA morpho-phonology, the canonical difference between CəCC and CCəC and vowel shortening in a specific morphological context, can be given a straightforward explanation once we include the mora in our analysis.

3. CCC monosyllables²

² To see how the findings exposed in this section are treated within Optimality Theory, we refer you to Bernouss (2007).

In MA, CCC syllables are realized phonetically as CCəC and CəCC i.e., they incorporate an epenthetic schwa to break consonantal clusters. However, whereas all trisegmental verbs, adjectives, and a subset of nouns exhibit a schwa between the last two consonants (CCəC), we find that another subset of trisegmental nouns insert schwas between the first two consonants (CəCC). The following data will illustrate the situation:

(3)

Verbs:

ktəb 'to write', *lbəs*, 'to wear clothes', *dkər* 'to mention', etc.³

Adjectives:

sfər 'yellow', *smək* 'deaf', *kħəl* 'black', etc.

Nouns:

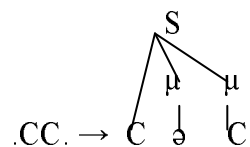
wdən 'an ear', *ʒfən* 'an eyelid', *dfər* 'a nail', *ktəf* 'a shoulder', *sfər* 'traveling', etc.

Nouns like *bənt* 'a girl', *təlʒ* 'snow', *fərg* 'a group', where the schwa is inserted between the first two consonants, are problematic. In its normal application, the schwa epenthesis rule inserts a schwa between every two stranded consonants as the following data show:

- (4) *mktb* → *mək.təb* 'a desk'
n-ktb → *nək.təb* 'I will write'
mdrasa → *məd.ra.sa* 'a school'

This pattern is accounted for by the following rule:

(5) General Epenthesis Rule



What this rule says is that the schwa is inserted to act as a nucleus to every two adjacent and stranded CCs. However, as far as trisegmental forms are concerned, this rule will not help in

³ Similar examples have been used in Bernouss (2007) to account for MA data within Optimality Theory.

determining the locus of the schwa (CəCC or CCəC). In fact, in trisegmental contexts schwa insertion should be regulated by further sub rules. The rule in (5) says that two CCs in CCC structures should be parsed, but it does not specify them.

In our account, the place of the schwa is dictated by the morphological (lexical) category of the base in that it is inserted between the last two consonants in verbs and adjectives, and before the most sonorous consonant or before the last consonant if the last two consonants have the same sonority index in nouns. Hence, the distribution of the schwa is governed by two different rules. The first is the sonority rule in (7) that is active in nouns and the second is the rule in (9), the effect of which is to insert a schwa between the last two consonants:

Nouns like *kəʃ* 'sheep', *dʃə* 'nail', etc. (CəCC/CCəC) have the underlying representation in (6), which consists solely of consonants and which is lexically marked for the morphological feature [+Noun].

(6)

UR: CCC [+Noun]

The rule responsible for epenthesis here may be formalized as in (7)⁴:

(7) Trisegmental Nouns Epenthesis Rule

0 → ə : /a. Ci ---- CiiCiii if Cii > Ciii

/b. CiCii ---- Ciii if Ciii > Cii or if Cii = Ciii (N)

(where > and = refer to superior, and equal in sonority respectively)

In trisegmental verbs and adjectives, on the other hand, the schwa is invariably located between the two last consonants as in *ktəb* 'write', *rkəb* 'ride', *fsə* 'beautiful', etc.(CCəC). Here the underlying representation is also exclusively consonantal, but it is specified for the feature [-Noun] as in (8):

(8)

UR: .CCC. [-Noun]

The output (CCəC) is reached through the application of the rule in (9):

⁴ A similar rule has been formulated by Alghadi (1990).

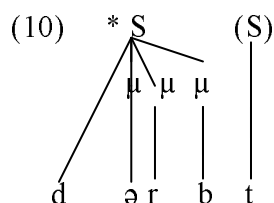
(9) Trisegmental Verbs/Adjectives Epenthesis Rule

0 → ə/ CC---C] Stem Right Edge (V/Adj)

One of the benefits of generating trisegmental verbs, adjectives, and nouns by the application of two rules is that we will not be obliged to consider Ma schwa epenthesis as a general rule to which the class of trisegmentals constitutes an exception and that this class should be listed in the lexicon without further analysis. Besides, by focusing on the specific class of trisegmentals and by dividing it into two further sub-classes that adopt two different rules and two different underlying representations, we give to morphology the importance it deserves (Bernouss, 2007). Morphological information has helped in reaching the linguistically significant finding that the Trisegmental Noun Epenthesis Rule relies on the lexical marking of the underlying representation as a noun and that the Trisegmental Verbs/Adjectives Epenthesis Rule (a rule at the phonology/morphology interface as it aligns the last full syllable with the stem at the right edge) should refer to the categories VERB and ADJECTIVE [-Noun].

4. Reasons behind verbs' violation of sonority

Unlike nouns, verbs invariably insert schwas between the last two consonant without taking into account sonority. The reason behind this cannot be found unless we have recourse to the inflectional paradigm of the verb (Bernouss, 2007). The determining factor is the first person perfective suffix -t. If we concatenate this suffix to a hypothetical verb that has a schwa between the first two consonants like *dərɐb (dɾəb 'to hit'), we will end up with the form *dərɐbt 'I hit', which is ill-formed as it violates the universal constraint against trimoraic structures (three moras on a row) word-internally.



As far as the other persons are concerned, forms with this CəCC stem as a base can be derived without any problem. The hypothetical paradigm in (11) depicts a situation in which we

conjugate a verb that respects the sonority parameter in the perfective. With the exception of the first person singular form **derbt*, all the other forms are well-formed as the third consonant is assigned as an onset of the suffixal vowel (*dər.bu*), as a member of a complex onset (*dər.bna/dər.bti/dər.btu*), as the onset of a schwa by the General Epenthesis Rule in (5) (*dər.bət*), or as a degenerate syllable (*dər.b*) :

(11) Perfective Paradigm (hypothetical):

1st.p.sing.	* <i>dərb-t</i>	1st.p.plu.	<i>dərb-na</i>
2nd.p.sing.	<i>dərb-ti</i>	2nd.p.plur.	<i>dərb-tu</i>
3rd.p.sing.masc.	<i>dərb</i>	3rd.p.plur.	<i>dərb-u</i>
3rd.p.sing.fem.	<i>dərb-ət</i>		

Being one of the most prominent characteristics of inflectional paradigms, leveling compels the first person singular form of the perfective to play the role of the attractor of the other members. Since the form **dərbt* is unacceptable for moraic reasons, MA uses the rule in (9) to freeze all sound trilateral forms (Bernouss, 2007). MA, then, neutralizes general sonority effects in verbs by aligning all sound trilateral verbs' syllables with the right edge of the stem through schwa insertion between the last two consonants. The schwa shifts leftwards in two cases only. First, in the third person plural the schwa moves leftward because the resulting **drəbu* is not acceptable in MA as it violates a powerful constraint that prohibits open syllables with schwas. Second, in the third person singular feminine, the schwa moves leftward because the quadriconsonantal string *drbt* is realized as *dər.bət* by General Epenthesis Rule in (5).

(12) Perfective Paradigm (attested)

1st.p.sing.	<i>drəb-t</i>	1st.p.plu.	<i>drəb-na</i>
2nd.p.sing.	<i>drəb-ti</i>	2nd.p.plur.	<i>drəb-tu</i>
3rd.p.sing.masc.	<i>drəb</i>	3rd.p.plur.	<i>dərb-u</i>
3rd.p.sing.fem.	<i>dərb-ət</i>		

One wonders why we cannot derive the first person singular form by applying the general and productive rule in (5) and derive *dəɾ.bət* from *drb-t* (CCCC → CəC.CəC). The reason is obvious: we will end up with the two homophonous forms **dəɾbət* (1st.p.sing.perf.) and *dəɾbət* (3rd.p.sing.fem.perf.). To avoid this similarity in form, MA violates the general rule to satisfy a higher ranked paradigmatic constraint requiring from members of a given paradigm to be distinct in form⁵. In other words, to avoid phonological merger between the above forms, the special rule in (9) has applied before the general rule in (5), thus prohibiting forms undergoing normal epenthesis from emerging for paradigmatic reasons.

To sum up, in order to account for the canonical difference between CəCC and CCəC, we have to refer to both the moraic structure and the inflectional paradigm of triliteral verbs. The determining factor behind this difference is the fact that it is impossible for triliteral verbs to satisfy the sonority parameter as CəCC can not be concatenated with the *-t* suffix for moraic reasons, and the whole CCCC string can not be parsed as CəCCəC for paradigmatic reasons. Any analysis that does not incorporate the mora as an essential component of the syllable can not reach the findings we have displayed.

5. VOWEL SHORTENING

There is a phonological rule in MA that aims at making the system satisfy the bimoraic requirement of the syllable (Bernouss, to appear). The rule operates especially in the northern dialects of Morocco (e.g. the dialect of Tangier). Consider the data in (13), collected from Asilah (a small town near Tangier)⁶:

(13)

<u>The imperative</u>		<u>The perfective</u>
<u>and the imperfective</u>		
<i>mu:t</i> 'die' (imperat.)	\	<i>mut-t</i> 'I died'
<i>n-qu:l</i> 'I will say' (imperf.)	\	<i>qul-na</i> 'we said'

⁵ In Bernouss (2007), this has been accounted for through the ranking of a Paradigmatic Contrast constraint above a constraint called Parse within the framework of Optimality Theory.

⁶ Bernouss (to appear) uses roughly the same line of argumentation to show that the mora incorporation as a syllabic constituent helps in the analysis of phonological phenomena: vowel shortening, vowel lengthening, stress, and invariable vowel length in MA.

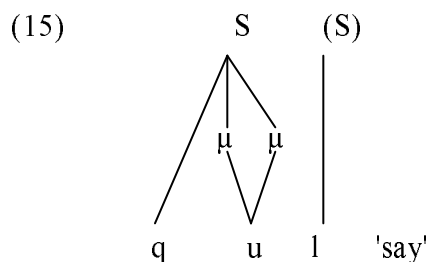
j-fu:z-u 'they win' (imperf.) \ *fuz-ti* 'you won'

The long vowels in concave verbs (verbs that consist of a medial vowel) in the imperative and the imperfective become short in the perfective (except in the third person). This vowel reduction is the result of the following shortening rule (Bernouss, op.cit):

(14) Vowel Shortening Rule:

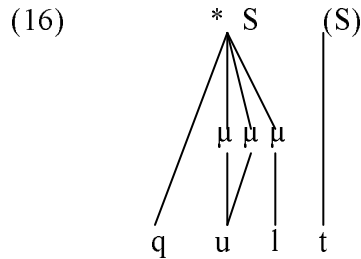
V: → V / ----- CC#
 (concave verbs)
 (perf. 1st – 2nd person)

The Vowel Shortening Rule operates to readjust the prosodic structure of concave verbs like *mu:t* 'die', *qu:l* 'say', etc. when first and second personal affixes are added in the perfective. At the level of description, the rule in (14) is adequate; however, at the level of explanation it does not provide any insight about the real motive behind vowel shortening. According to Bernouss (op.cit), to understand the reason behind this vocalic shift, one needs to adopt a moraic approach to the syllable. After suffixes are introduced, forms like *mu:t-t* and *qu:l-t* will be generated. Words that include a long vowel closed by two consonants can not be considered as well-formed structures because they violate a universal constraint on syllable form, namely the constraint prohibiting superheavy syllables word-internally⁷. Accordingly, long vowels in this context undergo shortening and forms like *mutt* instead of *mu:tt* 'I said' are generated. Non-moraic models, like the onset/rhyme one, can describe the process, but they cannot explain this kind of vocalic reduction. Once we characterize the syllable in terms of moras, this sort of vowel shortening becomes predictable as all instances of superheavy syllables are bound to drop one mora word-internally to satisfy the universal constraint prohibiting trimoraic structures. The shift from *qu:h* 'say' to *qult* 'I said (perf.)' will clarify the whole process (Bernouss op.cit):



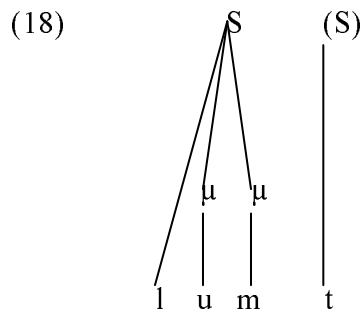
⁷ Sherer (1994) calls these superheavy syllables hypercharacterised syllables

After the addition of the first person suffix in the perfective, the ill-formed configuration in (16) is produced:



As trimoraic structures are prohibited word-internally in MA, the constraint in (17) becomes active and shortens the long vowel through one mora elision to yield the representation in (18):

(17) * $\mu\mu\mu \rightarrow \mu\mu$



As a result of the constraint in (17), the attested form in (18) makes its way to the surface. According to Bernouss (op.cit), postulating the existence of an archiphoneme that may turn into either a short vowel or a long one in different contexts would not explain the process because any chosen vowel in the underlying representation will be realized as short (The Richness of the Base (McCarthy, 2003)).

6. Conclusion

The adoption of a moraic approach to the syllable has helped in the clarification of two areas in MA morpho-phonology. First, we have argued that the canonical difference between CCəC and CəCC, which has never received a satisfactory treatment in the literature, is made clear

once we invoke the active role of two different rules. The first one is Trisegmental Verbs/Adjectives Epenthesis Rule, which fixes the schwa between the last two consonants in verbs and adjectives and the second one is Trisegmental Nouns Epenthesis Rule, which inserts schwas before the most sonorous consonant or between the last two consonants with the same sonority index. Second, we have reached the conclusion that verbs do not respect sonority for moraic and paradigmatic reasons; thus, we have shown that the inflectional paradigm of the verb plays a pivotal role in determining verbal structure. Finally, we have demonstrated that vowel shortening, which takes place after suffixes are added in concave verbs in the perfective, could not be explained unless we incorporate the mora as a syllabic constituent. Thus, we have found that vowel shortening, which cannot be explained within non-moraic models, is a result of mora elision that is universally motivated.

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