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Morphological Causatives in Moroccan Arabic: Word-based or Root-based?*

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Cet article examine le statut de la racine comme base de dérivation dans la morphologie verbale en arabe marocain. Il fournit un ensemble d'arguments théoriques qui motivent la fonction morphologique de la racine. La preuve provient de la formation des verbes causatifs en arabe marocain. On fait valoir qu'une approche à base de racines évite les problèmes de l'incohérence de la base, de la non-conformité de la base et de l'indisponibilité de la base. Cependant, une approche à base de mots fait face à ces problèmes. Plus précisément, lorsqu'une approche à base de mots est adoptée, on démontre que a) le causatif peut être dérivé de façon incohérente de la forme verbale du parfait ou de l'imparfait, b) certains causatifs perdent de façon aléatoire une partie du matériel phonologique de leurs bases et c) certains causatifs n'ont pas de base correspondante.

Keywords: root, word, causative, Moroccan Arabic, morphology

1. Introduction

The morphological role of the root has been called into question, not only in Arabic (Ratcliffe, 1998; Benmamoun, 1999) but in other Semitic languages as well, such as Hebrew (Bat-El, 1994; Ussishkin, 1999b). It has been shown that roots are inadequate to explain all cases of word formation, and that sometimes reference has to be made to other derived words as bases of derivation. Under this view, roots could exist only in abstraction whereby rules of word formation apply to them redundantly rather than generatively.

This paper attempts to motivate a root-based approach to Moroccan Arabic (MA) causatives. We argue that the derivation of the causative verb in Moroccan Arabic

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lends further support to the morphological status of the root. However, this paper is by no means an attempt to dismiss the fact that some derivational processes in Arabic have to be word-based as is the case with the broken plural in Classical Arabic (McCarthy and Prince, 1990).

In fact, our main goal is to show the way in which a word-based approach to MA proves inadequate and a root-based approach emerges as a better alternative. The inadequacy of the word is justified by problems related to correspondence between the designated word forms and the derived causatives, mainly the inconsistent choice of the aspectual form of base verbs, the loss of vocalic material of some nouns and the lack of base forms for certain causatives. A theory of roots, however, has the following advantages: (i) roots are not specified for aspectuality (ii) all root material appears in the derived forms, and (iii) every causative can have some root.

In what follows, a terse description of Arabic morphology under the auspices of Prosodic Morphology is provided (section 2). In Section 3, we describe the causative data and give a succinct Optimality-theoretic analysis of morphological causatives. Section 4 highlights the inadequacies posed by a word-based approach to causatives (section 4.1) and argues for a root-based approach as an alternative (section 4.2). In section 5, the issue of the status of vowels in MA roots is addressed. Section 6 concludes.

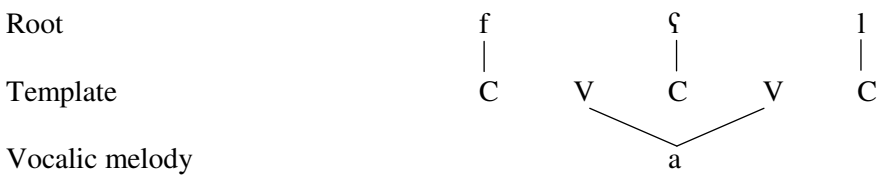
2. Setting the scene

Morphological models can be distinguished based on their units of analysis and the way they relate morphological forms to each other (Blevins, 2006). As a result, a major distinction is made between word-based systems and morpheme-based ones. In a word-based model, the grammatical word is viewed as the minimal unit of morphological analysis, while from the perspective of a morpheme-based model, a word is a combination of smaller meaningful sub-constituents (i.e. morphemes). Advocates of a word-based approach to morphology argue that morphological structure is much more diverse than simply putting morphemes together, in the sense that morphological meanings can be carried out by various other processes such as base modification, subtraction, metathesis, conversion and so on. Proponents of the morphemic approach, on the other hand, maintain that morpheme combination is cross-linguistically more common and allows for a restrictive architecture of description that unites morphology and syntax.

Arabic morphology has often been described as being nonconcatenative (McCarthy 1979, 1981). That is, words are not constructed solely through linear combination of discrete morphemes (e.g. English un-avoid-able), but also, and to a large extent, via interleaving discontinuous morphological forms (e.g. Arabic k-a-t-a-b). At the heart of this approach to Arabic morphology are the theoretical concepts of root and pattern (Cantineau, 1950). While the root, which is essentially tri-consonantal

in nature[1], carries the basic lexical meaning of the word, the pattern expresses the grammatical meaning through a close-ended set of prosodic templates and vocalic melodies. For this, every Arabic word would ideally comprise three types of morpheme: the root, the template and the vocalic melody. Such a characterization of Arabic morphology has become possible thanks to the representational mechanism of Autosegmental Phonology (Goldsmith, 1976), later developed by McCarthy (1979) for morphological systems, whereby features and morphemes can have independent lives on distinct tiers. The non-linear representation in (1) illustrates how Arabic words are represented under the purview of the Autosegmental framework:

(1) Autosegmental representation of Arabic words



The above representation demonstrates the independence ascribed to each morpheme on its own tier. The root and the vocalic melody are then associated to the prosodic template. Later, the three morphemic levels are conflated into one linearly ordered string of segments to form the word 'faʕal'. The citation root √fʕl 'do' stands for all the possible trilateral roots in Arabic (e.g. √ktb 'write' √ʃrb 'drink' √ɦrb 'flee'…). The word form 'faʕal' is the simple perfective active verb form. Any change at the level of the template and/or the vocalic melody would yield a different word form. For instance, the vocalic melody u-i would yield the perfective passive form 'fuʕil', and the prosodic template CVCCVC would produce the causative form 'faʕʕal. The verb forms 'faʕal', 'fuʕil' and 'faʕʕal' are semantically related as they share the same root, √fʕl.

As it stands, the root in Arabic morphology is attributed a pivotal morphological role as a morpheme upon which a multitude of grammatical constituents can be built. It isconceived of as the minimal meaningful lexical unit of word formation. Under this conception of the root, one could assume a lexicon that consistsprimarily of discontinuous roots, bearing a general meaning shaped and constrained by the patterns they associate with. (2) provides a specific example of the function of the root in Arabic, the case of the root √ktb in MA:

[1]Arabic Roots are mostly triliteral; however, there also exist biliteral or quadriliteral roots.

(2) Some derivatives of the root √ktb in MA

Form	*Gloss*
a. ktəb	'write'
b. kəttəb	'make write'
c. ktab	'book'
d. ktuba	'books'
e. katib	'writer'
f. məktub	'written'
g. məktəb	'office'
h. məktaba	'library'

Despite being of different shapes and categories, there is no denying the fact that the forms in (2) share the lexical meaning of 'writing'. The root √ktb remains unscathed in every form of the paradigm.

3. Causatives in Moroccan Arabic

The literature has identified different types of causative constructions, namely analytic causatives, lexical causatives and morphological causatives (Comrie, 1981; Lehmann, 2005). The first category of causatives, also referred to as the periphrastic causative, is characterized by being a complex phrase as it consists of two predicates, one expressing the cause (i.e. the cause predicate) and the other indicating the effect (i.e. the base predicate). This can be illustrated in (3a) from MA.

The second type, lexical causatives, consists of only one predicate, which is that of the main verb. Being mono-clausal and morphologically unmarked, lexical causatives are seen to inherently express the meaning of causativity. An example is provided in (3b) below. The third category of causatives is distinguished by morphological stem modification. They are the result of the morphological affixation of some causative morpheme which semantically communicates the concept of causativity and syntactically changes the valency frame through adding a structural element. By way of illustration, consider the example in (3c).

(3) Types of causative constructions

(a) xəllit Adam jfiṛəb
made-I Adam escape
I made Adam escape

(b) Ali qtəl ṣaħbu
Ali killed friend-his
Ali killed his friend

(c) Ali ħəṛṛəb Adam
Ali CAUSE-escape Adam
Ali made Adam escape

In this paper, the focus is on morphological causatives. We show that this category of verbs favors a root-based approach to derivation.

3.1. Description

Morphological causatives are characterized by being morphologically complex. They are built on some base form and interpreted as verbs with a composed meaning. The first meaning is that of the base and the second meaning is attributed by the causative affix attached to it. Here, the causative affix is realized by means of lengthening the second segment of the base. The examples in (4) are illustrative items of morphological causatives in MA:

(4)

Base form		Causative Form
ktəb	'to write'	kəttəb
ħṛəb	'to run away'	ħəṛṛəb
ʃṛəb	'to drink'	ʃəṛṛəb
xrəʒ	'to go out'	xərrəʒ
dxəl	'to get in'	dəxxəl
kmi	'to smoke'	kəmmi
xwi	'to empty'	xəwwi
duṛ	'to revolve'	dəwwəṛ

To further illustrate, the causative verb [kəttəb] consists of two different morphemes. First, the base morpheme [ktəb] has the form of a simple verb and indicates the action of writing, "to write". Second, the causative morpheme contributes the meaning of causativity and is encoded in the form of a geminate [-tt-].

In MA, each and every morphological causative verb falls into one of the following patterns: CəCCəC or CəCCV- where C and V indicate a consonant and a full vowel, respectively, as shown in (5):

(5) Causative patterns:

a. *CəCCəC*		b. *CəCCV*	
bəjjəḍ	'to whiten'	ləwwi	'to twist'
məṛṛəḍ	'to sicken'	qəṛṛi	'to teach'
zərrəb	'to speed up'	dəffi	'to warm'
fəjjəq	'to waken up'	nəqqi	'to clean'
məlləs	'to smooth'	wərri	'to show'

Since we hold the assumption that these causative patterns are derived, instead of being underlying, the difference in their shape is believed to follow from the shape of their base forms. Therefore, the difference between the items in (5a) and those in (5b) stems from the fact that they are derived from distinct base shapes. The CəCCV pattern includes those causative verbs that are based on final-weak triliteral verbs, where a full vowel appears at the end of the verb. The CəCCəC pattern, however, incorporates causative verbs that are derived from strong and middle-weak triliteral base forms. The latter pattern happens to be more productive and subsumes the majority of causative verbs in MA. Despite having two patterns, it will be shown in the following section, all causatives are essentially derived by the same standards.

3.2. Analysis

In this section, we provide a succinct and thorough analysis of morphological causatives using the constraint-based framework of Optimality Theory (OT) [2] (Prince and Smolensky, 1993/2004). Our main assumption is that the causative formation in MA is achieved via the affixation of a consonantal mora to the base form, which translates into a geminate word-medially. This approach has already been adopted to account for other cases of morphological gemination (Lombardi and McCarthy, 1991; Samek-Lodovici, 1993; Bensoukas, 2001). More specifically, we claim that the designated mora is initially prefixed to the root, and then it gets infixed under the pressure of certain phonological requirements, namely the privileged status of the initial root consonant (see Noamane (2014) for details)[3].

In OT terms, we postulate that there is an alignment constraint which stipulates that a mora should be left-aligned to the left edge of the root, hence Align-L (μc, Rt). Being of abstract prosodic nature, the realization of the causative affix in the output is further ensured by a Realize Morpheme constraint (RM) whose role is to induce some phonological change in output forms, in this case, in accordance with the material provided by the Alignment constraint. These two constraints interact respectively with two different instantiations of feature identity faithfulness constraints. The alignment constraint is believed to be outranked by a faithfulness constraint against the alteration of the featural make-up of the initial root consonant, such a constraint is written as IDENT-RtC1 (Weight). This very specific ranking forces the aligned mora not to attach to the initial root consonant and affect the second root consonant instead. The Realize Morpheme constraint, on the other

[2]OT is an output-oriented theory of constraints. At its heart is the idea that languages are governed by universal constraints while language variation emanates from language specific rankings of the constraint set (see Kager, 1999; McCarthy, 2002, 2008 for good introductions)

[3] Noamane (2014) provides arguments for the moraic analysis of causatives as well as the privileged status of the initial root consonant. In this paper, we try to focus on the nature of the base form of morphological causatives.

hand, dominates a faithfulness constraint which demands that corresponding input and output segments have matching weight specifications (i.e. Ident-IO (weight)). This way, output forms would emerge phonologically different from their corresponding inputs.

(6) Constraints responsible for deriving morphological causatives in MA:

a. ALIGN- (μc, Left, Root, Left): The left edge of the causative morpheme must coincide with the left edge of the root.

b. RM: Some phonological exponent must appear in the output form.

c. IDENT-RtC1 (Weight): The featural specification for the weight of the root's first radical element must be preserved in the input/output mapping.

d. IDENT-IO (Weight): Output segments and Input segments must be featurally identical for weight.

These constraints work together to give us morphological causatives as they appear in the language. The interaction of the constraints and the selection of the optimal form are illustrated in the following tableau:

(7) RM, IDENT-RtC1 (Weight) >> Align-L (μc, Rt), IDENT-IO (Weight)[4]

Input: √ktb	RM	IDENT-RtC1 (Weight)	Align-L (μc, Rt)	IDENT-IO (Weight)
☞a. kəttəb			*	*
b. ktəb	*!		*	
c. kktəb		*!		*
d. ktəbb			**!	*

Candidate (a) is morpho-phonologically unfaithful to the input, hence satisfying the high-ranked constraint RM. The same candidate obeys the demand made by the other equally high-ranked constraint, IDENT-RtC1 (Weight), by preserving the feature specification for weight of the input's initial segment. Candidate (b), on the other hand, incurs a fatal violation of RM since it includes no phonological exponence to realize the causative morpheme, and thus fails to surface as an output form. As for candidate (c), it is excluded by IDENT-RtC1 (Weight) as it fatally violates the positional faithfulness requirement made by it. In particular, candidate (c) has an initial geminate that does not correspond with the original initial singleton in the root. Finally, candidate (d) ties with the optimal output at the level

[4]The constraints responsible for causative syllabification are left out since the focus is on deriving the causative templates CCCC or CCCV. The schwas that appear in the output are driven by a markedness constraint against consonant clusters (i.e. Parse-segment) dominating the faithfulness constraint against epenthesis (i.e. Dep-IO).

of the high-ranked constraints. In this case, we are required to go down the hierarchy and look for a possible constraint to untie these candidates.

In the process of doing so, we notice that both candidates incur some violation of the remaining constraints: Align-L (µc, Rt) and IDENT-IO (Weight). By resorting to gradient assessment, which alignment constraints allow, we can break such a deadlock. Candidate (d) incurs multiple violations of ALIGN-L (µc, Rt), and hence fares worse than the optimal candidate on this constraint. Therefore, candidate (d) is ruled out, and candidate (a) wins out.

Having shown that morphological causatives in MA can be accounted for simply by affixing a mora to a root, it is believed that any other approach with additional alternations would be less favorable.

4. Root-based vs. word-based approaches

As far as deriving morphological causatives is concerned, the choice of the base form remains a recalcitrant issue. The main controversy revolves around whether morphological rules apply to words or roots. Two possible hypotheses suggest themselves. Under one hypothesis, causative verbs in MA are derived directly from roots whose syntactic categories and morpho-phonological information are not specified yet, hence the name the root-based hypothesis. Under the other hypothesis, the base forms of causatives are fully specified words for their syntactic categories and morpho-phonological information such as verbs, nouns and adjectives. Here, we argue in favor of the root-based approach.

4.1. Word-based approach

In a purely word-based approach, causative verbs in MA would be derived from simple verbs, nouns, adjectives and sometimes comparative forms. As Aronoff (1976:21) suggests, "all regular word formation processes are word-based. A new word is formed by applying a regular rule to a single already existing word. Both the new and the existing one are members of major lexical categories". Building on this idea, the larger portion of causatives would derive from verbs. Each verb belongs to one of the following three major classes of segmental shape: strong tri-literal verb bases (e.g. ʃṛəb 'to drink', xdəm 'to work'), middle-weak tri-literal verb bases (e.g. fiq 'to wake up', gul 'to say') and final-weak tri-literal verb bases (e.g. ʒri 'to run', mʃi 'to walk').

Verbs of the first class are characterized by containing only consonants and no vowels. Some examples are provided in (8), where schwa is phonologically motivated to break up impermissible consonant clusters both in the base and the derived form (Benhallam 1989/1990; Boudlal, 2001; Bensoukas and Boudlal, 2012a-b):

(8) The verb base form: the strong triliteral bases

Base form		*Causative verb*
zʕəm	'to have courage'	zəʕʕəm
ṛħəl	'to leave'	ṛəħħəl
fzəg	'to get wet'	fəzzəg
nʒəħ	'to succeed'	nəʒʒəħ
wṣəl	'to arrive'	wəṣṣəl
rbəħ	'to win'	rəbbəħ
nʕəs	'to sleep'	nəʕʕəs
sfiəṛ	'to stay up late'	səfifiəṛ
nʃəf	'to get dry'	nəʃʃəf
xdəm	'to work'	xəddəm

Verbs of the second class are marked by containing one of the full vowels /i/ or /u/ in the imperfective form, and the vowel /a/ in the perfective, in the middle of the verb, as shown in (9) below:

(9) Middle-weak triliteral bases

	Base form		*Causative verb*
a.	fiq	'to wake up'	fəjjəq
	ṭiħ	'to fall down'	ṭəjjəħ
	ṭir	'to fly'	ṭəjjər
	mil	'to lean'	məjjəl
	ʕif	'to get disgusted'	ʕəjjəf
b.	nuḍ	'to get up'	nəwwəḍ
	ɡul	'to say'	ɡəwwəl
	dux	'to feel dizzy'	dəwwəx
	ʕum	'to swim'	ʕəwwəm

What is unique about the group of items in (9) is the alternation between the high vowels /-i-/ and /-u-/ in the base and the geminate glides /-jj-/ and /-ww-/ in the derived causative. That is, deriving the causative here is not limited to lengthening the second segment of the base, but in addition, there is a change at the level of sonority, where a vowel becomes less sonorant by turning into a geminate glide. A fact like this can be straightforwardly explained since it is widely acknowledged that the high vowels /i/ and /u/ alternate with their glide counterparts /j/ and /w/, respectively, in many languages of the world (Rosenthall, 1994; Padgett, 2008). We account for this by assuming that the causative morpheme is a consonantal mora that turns any high vowel it attaches to into a corresponding geminate glide.

4.1.1. Base inconsistency

The third class, however, involves verbs that end with one of the vowels /a/ or /i/.[5] Causatives derived from these verbs have in common the pattern CəCCV. This is put in evidence by the following examples:

(10) Final-weak tri-literal verb base

	Base form		*Causative verb*
a.	qra	'to read'	qəṛṛi
	dfa	'to become warm'	dəffi
	nsa	'to forget'	nəssi
	ʕja	'to get tired'	ʕəjji
	wʕa	'to get conscious'	wəʕʕi
b.	ɣli	'to become boiled'	ɣəlli
	ʒri	'to run'	ʒərri
	mʃi	'to leave'	məʃʃi
	bki	'to cry'	bəkki

The base verbs in (10) are all in the imperfective aspectual form as those in (9). In addition to the singleton-geminate alternation between them and their corresponding causative forms, one can also notice that the vowel /a/ in the base verbs of (10a) alternates with the vowel /i/ in causatives. The base verbs in (10b), however, all end with the vowel /i/, which is preserved in the derived causatives. Such a problem arises as we try to be consistent in positing the imperfective aspectual form as the basic form of derivation across all the above-mentioned verb categories. One way to go around this in a word-based approach is to make all the base verbs in (10) in the perfective form in which case they would all end with /a/ as would their corresponding causatives.

In this case, we can establish a perfect correspondence between vowels, but the produced causatives would appear in a different aspectual form from the causatives in (9) since those would be in the imperfective form to maintain the correspondence between the vowels /i/ and /u/ in their bases and the corresponding glides. This brings to the fore the question of what the right aspectual verb form is that would yield the appropriate correspondence between the base and the derived form, and which should be a form that would cause the least possible random alternations.

To address this issue, a holistic view of the data treated should be taken. First, all the base verbs listed in (8), (9) and (10) are consistently given in the imperfective, and as a result, the derived causatives also occur in the imperfective form. We

[5] Verbs ending in /u/ are unattested in MA. Hence, we assume that this is a lexical gap in the grammar of the language.

could have posited the perfective form instead as basic; hence we would have no problem in accounting for the /a/-/i/ alternation that shows in (10), because then all the base verbs in (10) would have the vowel /a/ at the end, and the causatives would appear with the same vowel, as illustrated below:

(11) The perfective choice:

Base form		*Causative verb*
qɾa	'to read'	qəɾɾa
dfa	'to become warm'	dəffa
ʒra	'to run'	ʒərra
mʃa	'to leave'	məʃʃa

However, if we pursue this option, by assuming that base verbs and causative verbs alike should take the perfective form, another problem would emerge. In this case, it would be hard to account for the alternation between the vowels of middle-weak verbs and the glides of causative verbs in (9) since the base forms would all appear with the vowel /a/ and the causatives would have glides with unknown origin. For more clarity, consider the items in (12):

(12) The perfective choice

Base form		*Causative verb*
faq	'to wake up'	fəjjəq
ṭaħ	'to fall down'	ṭəjjəħ
naḍ	'to get up'	nəwwəḍ
ɡal	'to say'	ɡəwwəl

In effect, the reason the imperfective is chosen as basic in the first place is basically motivated by the items in (9), where an alternation between high vowels and glides takes place, for it is more natural and cross-linguistically common to have such an alternation.

4.1.2. Base-to-output nonconformity

In addition to verbs, causatives in MA can also get derived from nouns and adjectives. This is referred to as denomination, whereby nouns and adjectives become verb forms. Being the base form in this case, nouns and adjectives would function as the causee-event in the causative structure. In this respect, a given causative verb whose base form is a noun or an adjective would have the meaning "to cause someone/something to become Noun/Adjective", or simply to cause that noun or adjective directly, i.e. "to cause N/Adj". By way of illustration, a number of examples are listed in (13) for nouns and (14) for adjectives:

(13) The noun base form

Base form		*Causative verb*
ħməq	'crazy person'	ħəmməq
təlʒ	'ice'	təlləʒ
kəħt	'misery'	kəħħət
məṛqa	'broth'	məṛṛəq
kuṛa	'ball'	kəwwəṛ
duṛa	'circle'	dəwwəṛ
rwina	'mess'	rəwwən
slaħ	'weapon'	səlləħ
ɣlaf	'cover'	ɣəlləf
ṭlaq	'divorce'	ṭəlləq
dlala	'auction'	dəllәl
ʕadab	'torture'	ʕəddəb
ɣawt	'screaming'	ɣəwwət
ħəlwa	'candy'	ħəlli
jtim	'orphan'	jəttəm
ṣabun	'soap'	ṣəbbən
fʃuʃ	'pampering'	fəʃʃəʃ

(14) The adjective base form

Base form		*Causative verb*
ṣʕib	'difficult'	ṣəʕʕəb
ṣɣir	'small'	ṣəɣɣər
wasəʕ	'wide'	wəssəʕ
ʕwəʒ	'curved'	ʕəwwəʒ
rṭəb	'smooth'	rəṭṭəb
kħəl	'black'	kəħħəl
ħməṛ	'red'	ħəmməṛ
qwi	'strong'	qəwwi
nqi	'clean'	nəqqi
ṣafi	'clear'	ṣəffi
ħafi	'blunt'	ħəffi
saħi	'sober'	səħħi

Once again, the problem of vowel alternation between the base forms and the derived forms comes to the surface. In this context, not only do some vowels alternate with others, but there are base forms whose vowels do not appear in the causative form. For example, the causative verbs [kəwwəṛ] 'to ball', [rəwwən] 'to cause a mess', [jəttəm] 'to orphan', [ṣəʕʕəb] 'to make difficult' and [ħəffi] 'to make blunt' from the nouns and adjectives [kuṛ**a**] 'a ball', [rw**i**n**a**] 'a mess', [jt**i**m]

'orphan', [ṣʕ**i**b] 'difficult' and [ħ**a**fi] 'blunt', respectively, do not preserve the vowels of their bases. In this case, we would need additional ad-hoc (i.e. unnatural) rules to account for these deletions. For adjectives, however, a word-based approach can resort to the comparative form to minimize the scale of alternation between some base forms and causative verbs, as shown in (15):

(15) The comparative base form

	Base form		*Causative verb*
a.	ṣʕəb	'difficult'	ṣəʕʕəb
	ṣɣər	'small'	ṣəɣɣər
	wsəʕ	'wide'	wəssəʕ
b.	ṣfa	'clear'	ṣəffi
	ħfa	'blunt'	ħəffi
	sħa	'sober'	səħħi

Nevertheless, the issue of random vowel alternations persists, as illustrated in (15b), where it is the vowel /a/ of the comparative forms that corresponds with the vowel /i/ of the causatives. The comparatives in (15b) are posited to substitute the adjectives [safi], [ħafi] and [saħi] as base forms whose internal vowel does not show up in their corresponding causatives. Yet, both forms seem to be inadequate.

4.1.3. Base unavailability

To cap it all, there are causative verbs that do not seem to have any corresponding base word forms. If a word-based approach were enforced, these causatives would remain baseless and treated as underived items. The mere fact of being baseless means that causatives are derived from some forms other than complete words. If a root-based approach is advanced, a unified and consistent view will be shared by all the morphologically derived causatives. Some examples are provided in (16):

(16) Baseless causative verbs:

xəbbi	'to hide'
ʕəlləq	'to hang up'
wərri	'to show'
bəddəl	'to change'
ṣəwwəṛ	'to take a photo'

On this basis, it is assumed that causatives are derived from a variety of forms, including verbs, nouns and adjectives. However, in the subsequent section, we will be capitalizing on the above-mentioned irregularities to defend a root-based approach to deriving the causative.

4.2. Root-based approach

The root has been defined as a semantic minimal core element "which remains invariant when all identifiable morphological formatives have been abstracted away" (Acquaviva, 2009). It is characterized by being lexically non-decomposable and phonologically abstract. When combined with phonological and morpho-syntactic features, roots build up larger constituents like words (Arad, 2005). As noted by Ussishkin (2006), linguistic theory would favor an economic view in which the lexicon stores only roots. A root-based approach means that storage would be limited to abstract, idiosyncratic and non-redundant information. As for the burden of explaining the alternations between roots and surface forms, it remains the task of the grammar. Put differently, the human capacity for acquiring a Semitic language like MA would be much simpler if word derivation were based on roots.

As noted earlier, it has long been observed that Semitic languages display different linguistic traits in comparison with the Indo-European languages. In Semitic languages, words are not formed on the basis of isolable strings of segments that are linearly concatenated. Rather, they consist of consonantal roots indicating their lexical meaning and vocalic patterns, which signify grammatical categories. This entails that consonantal roots constitute the basic ground upon which words are derived. Change in form or category is due to the insertion of vocalic patterns or the affixation of some consonantal material which either modifies or expands the basic meaning contributed by the root.

Adding to this general property of Semitic languages, the motivation for a root-based approach to causatives in MAis further corroborated by the irregularities that are shown by a word-based approach and that a root-based approach eschews. As we have already noted, a word-based approach towards causatives is laden with random variation and inconsistency between the relevant word forms and the derived causatives, which weakens the prospectof such an approach.

To start with, it is worth stating that the root in MA is not a pure abstraction. In fact, the dominant pattern of word forms, verbs in particular, is one where the only material present is the consonantal root as is the case with most triliteral verbs. The interesting point is that it is only in this category of base verbs and their causative counterparts where none of the problems discussed earlier are posed. Thisshows that the causative is derived simply by lengthening the second segment of the base without any further vocalic alternations or deletions.For convenience, this is schematized as follows:

(17) Deriving causatives from strong triliteral roots

Base	*Mora affixation*	*Misalignment*	*Output form*
√ktb	μ+ktb	kμ+tb	kəttəb

In an attempt to limit the irregular alternations between certain word forms and their corresponding causatives in a word-based approach, Bennis (1992) suggests "la condition de généralisation variée" *-the condition of varied generalization-*, whereby all the segments of the base form should have corresponding elements in the derived form. According to Bennis (ibid.), this condition allows a word-based approach to choose the appropriate base form, regardless of its grammatical category, to control any possible unnatural alternations.

For example, in (18) below, the base form chosen is one whose segments completely correspond with the segments of the derived causatives. That is, if an adjective contains a vowel that does not show up in the output, it should be discarded from being the base form and instead the comparative form is posited as basic. The same applies to verbs. The base verb can be in the imperfective for medial weak verbs or the perfective for final weak verbs.

(18) a. wsaʕ (V)/ wasəʕ (Adj)/ wsəʕ (Adj.Comp)→ wəssəʕ

b. rṭab (V)/ rṭəb (Adj)/ rṭəb (Adj.Comp)→rəṭṭəb

c. naḍ (perf.) /nuḍ (imperf.)/ → nəwwəḍ

d. mʃi (imperf.)/mʃa (perf.) → məʃʃi

e. nsa (imperf.)/ nsa (perf.) → nəssa

However, this means that the data will be presented in a random and inconsistent way, in the sense that the causative verbs will be derived from the perfective form, only when there is a need for maintaining the vowel /a/ as a common segment between the base and the causative. Otherwise, causatives are derived from the imperfective form so as to establish the high vowels' alternation with glides. For example, the word-based treatment of Bennis (1992) posits perfective verbs like [nsa] 'to forget' as the base form to get causatives of the form [nəssa] 'to cause to forget', as opposed to [nəssi]. In other instances, the imperfective forms like [nuḍ] 'to get up' are postulated instead as the base form to get causatives of the form [nəwwəḍ] 'to cause to get up'; what we do not know is whether it is going to re-express its base and be imperfective as well, or to express the aspectual form of the other causative forms and thus be perfective.

For the sake of consistency, a word-based approach should either posit all the base forms in the perfective, and face the /a/-glide alternation in cases like [naḍ]→ [nəwwəḍ], or maintain that the base forms are all imperfective and give us imperfective causatives, hence face the /a/- /i/ alternation in cases like [nsa]→ [nəssi]. Instead, such an approach keeps moving from one grammatical form to another in order to shun those problematic alternations in every way possible. As it stands, this condition seems to be far from being psychologically and cognitively economical since it means that the derivational mechanism should simultaneously consider a couple of possible base forms and then look for the most appropriate one.

4.2.1. Underspecified roots

In a theory of roots, however, we propose that all causatives are derived from roots whose aspectuality is not specified yet. This way every medial weak root will appear with one of the underlying vowels /i/ or /u/. The causatives derived from this category of roots will have corresponding geminate glides /jj/ or /ww/. As for final weak roots, we purport that they all end with the vowel /i/. The causatives derived from these will have a corresponding vowel /i/ as well. For illustration, consider the following examples:

(19)

	Root	*Imperfective*	*Perfective*	*Causative*	
a.	√ṭir	ṭir	ṭar	ṭəjjər	'fall'
	√gul	gul	gal	gəwwəl	'say'
b.	√ʃri	ʃri	ʃra	ʃərri	'buy'
	√mʃi	mʃi	mʃa	məʃʃi	'go'
c.	√nsi	nsa	nsa	nəssi	'forget'
	√qṛi	qṛa	qṛa	qəṛṛi	'teach'

In a word-based approach, the starting point of causative derivation is either the imperfective form or the perfective one, depending on the correspondence to be maintained. A theory of roots allows us to go back further and posit underspecified roots, which can guarantee us a systematic correspondence without causing any inconsistency. The verbs in (19c) appear with the low vowel /a/ both in the perfective and imperfective. This vowel is believed to be strictly related to perfective forms in (19a) and (19b) verbs. Nonetheless, a closer look at the derivatives of the problematic items in (19c) shows us that the underlying vowel is in fact the high vowel /i/:

(20)

Verb	*Causative*	*Agent Noun*	*Action Noun*	*1sPST*	*Root*
nsa	nəss**i**	nəssa**j**	nəss**j**an	ns**it**→	√nsi
qṛa	qəṛṛ**i**	qəṛṛa**j**	qṛa**j**a	qṛ**i**t →	√qri

On the basis of this, it is safe to say that the verbs [nsa] and [qṛa] have roots that end with /i/ since the latter appears in other derived forms, though sometimes as the glide /j/. The /a/ in the agent and action nouns is specific to their structure and has nothing to do with the /a/ that appears in [nsa] and [qṛa].

Accordingly, roots would be underspecified for aspectuality. When verbs are derived, they then get inflected for the imperfective or the perfective. We assume that the imperfective marker in MA is a zero morpheme. Thus, verbs in the imperfective happen to be identical to the roots they are derived from. When it comes to deriving the perfective form, however, we believe that it is morphologically marked by the vocalic feature [-high], which changes the high vowels of both medial weak roots and final weak roots into the low vowel /a/. As for strong triliteral roots, they have no vowels that can carry this feature, hence the perfective form of their corresponding verbs is interpreted as a zero morpheme as well.

4.2.2. Minimal roots

In response to the problem of vowel loss that characterizes causatives derived from certain nouns in a word-based approach, we propose to consider minimal roots that contain only segments that are consistently carried over by the derived causatives. By doing so, the vowels that mark the feminine or nominal forms in the relevant nouns are left out and only the segments that appear in the causative form (and other derived forms) are sustained in the shape of a root.

(21)

Root		*Causative*
√mṛq	'broth'	məṛṛəq
√kuṛ	'ball'	kəwwəṛ
√duṛ	'circle'	dəwwəṛ
√rwn	'mess'	rəwwən
√slḥ	'weapon'	səlləḥ
√ɣlf	'cover'	ɣəlləf
√ṭlq	'divorce'	ṭəlləq
√dll	'auction'	dəlləl
√ʕdb	'torture'	ʕəddəb
√ɣwt	'screaming'	ɣəwwət
√ħli	'candy'	ħəlli
√jtm	'orphan'	jəttəm
√ṣbn	'soap'	ṣəbbən
√fʃʃ	'pampering'	fəʃʃəʃ

The result is that the causative derivation becomes simpler. It all boils down to affixing a consonantal mora to an underspecified minimal root without having to account for the deleted vowels.

As for the irregularity between some adjectives and their causative counterparts, a word-based approach resorts desperately to the comparative form, as a new base of

derivation, to overcome those types of alternations illustrated in (14). This means that the lexicon has to store more word forms and mark them as [+causative]. Obviously, it does not seem to be an economical strategy to postulate more word forms as bases to avoid alternations that we are not obliged to avoid if roots are regarded as base forms instead.

To extend this argument, sometimes, it appears that causative verbs can be derived from two different possible base forms, say, a noun and an adjective. For example, the causative [ħəmmərˌ] 'to make red' can be said to be derived from the noun [ħmərˌ] 'red' or the comparative form [ħmərˌ] 'redder', which happen to homophonous. This means that the human computational system would get confused upon which form the relevant causative is derived from. In the case of roots, no such anomaly is expected to occur since there is only one base form that supplies all the possible surface forms. Therefore, it seems to be more feasible to claim that the causative [ħəmmərˌ], along with the comparative [ħmərˌ] and the noun [ħmərˌ], is derived from the root √ħmṛ as a unique and non-redundant form.

4.2.3. Abstract roots

The third advantage of a theory of roots is that every word form can be said to have a minimal abstract core. For those causatives that lack base word forms, the root comes in handy to function as an ultimate base form. In a word-based approach, it could be argued that the structure of such causatives is base-generated. However, when you look at derivatives related to them, you notice that the geminate they contain appears as a singleton elsewhere, which suggests that those geminates must have been derived as well via morphological lengthening.

(22)

Causative		*Action Noun*	*Root*
xəbbi	'to hide'	txəbja	√xbi
ʕəlləq	'to hang up'	tʕlaq	√ʕlq
wərri	'to show'	twərja	√wri
bəddəl	'to change'	tbdal	√bdl
ṣəwwəṛ	'to take a photo'	tṣwaṛ	√ṣwṛ

As a result, our main claim is that no derivational relation holds between word forms and thecausatives that are semantically related to them. In fact, all word forms in MA are most likely to be derived directly from invariant roots that are abstract and underspecified, unless proven otherwise. Hence, any material in surface forms is not the result of an alternation of some other material; however, it is the outcome of the derivational system which generates forms directly from roots.

After having argued for a root-based approach to causative derivation, we now comment on some of the arguments that were advanced against such an approach. It has been shown elsewhere (Imouzaz, 1991), cited in Bennis (1992), that the root

hypothesis displays an excessive generative power, in the sense that non-attested forms could be produced from roots, like the case of /qtl/ 'kill'→*[qəttəl]. Still, the question is whether a word-based hypothesis gives a better account since nothing prevents the form *[qəttəl] to be derived from the verb [qtəl]. In both cases, there is a need for a [+causative] feature to mark off those base forms that give rise to causatives from those that do not.

In addition, a variety of other arguments were meant to refute the root-based approach to causative derivation, without posing any serious problems to this view. This includes the following (see Bennis, 1992:84):

(i) The root cannot predict whether it can be geminated for causatives or not.

(ii) Predictable properties such as [+verb], [+noun], [+adjective] and [+causative] cannot be predicted by the root.

(iii) The root does not allow a distinction between causatives derived from verbs and causatives derived from nouns and adjectives.

Again, all these statements pose no embarrassment for a root-based hypothesis since it is taken for granted that the root should not predict any of the above-stated facts. It has already been assumed that the lexicon stores only abstract and idiosyncratic information whereas the derivational system accounts for whatever appears in the output forms. For these reasons, the hypothesis proposed in this study is that morphological causatives in MA are derived directly from the root via geminating the second radical element.

5. The status of vowels in the root

In MA, Harrell (1962) identifies three basic root types, namely triliteral, quadriliteral, and atypical. This typology is based on the number of constituent segments that each root incorporates. For triliteral roots, the number is limited to three constituent elements, for example √ḍrb 'hit', √fiṛb 'escape' and so on. Second, quadriliteral roots consist of four constituent elements such as in √ṭrʒm 'translate'. Finally, atypical roots have more than four or less than three constituent elements, as in the word √ma 'water' or √ʒa 'come'. Each of the aforementioned root types can be either strong or weak. Strong roots comprise only consonants, whereas weak ones may include a vowel or a glide.

Traditionally, roots in Semitic languages are assumed to be consonantal. That is, roots are seen as a sequence of discontinuous consonants with a specific lexical meaning. Vowels, on the other hand, add grammatical meaning. Nevertheless, we posit that roots in MA could be made up of consonants and vowels alike, as has been shown for other Semitic languages like Amazigh (Bensoukas, 2001). This can be based on the observation that certain vowels are consistently carried over by derived word forms sharing the same root. Generally, roots in MA contain no more

than one single vowel. These vowels may occur either root-medially or root-finally, as shown in (23) below, where the following abbreviations apply: Imp= imperative; Impf= imperfective; Pf= perfective; Pv= passive; Caus= causative; AcN= action noun, AN= Agent noun; IN= instrument noun.

(23)[6]

I. Final vowels paradigm

a. Verb morphology

Imp	*Impf*	*Pf*	*Pv*	*Caus*
bk**i**	bk**i**	bk**a**	təbk**a**	bəkk**i**
ʃr**i**	ʃr**i**	ʃr**a**	təʃr**a**	ʃərr**i**
mʃ**i**	mʃ**i**	mʃ**a**	təmʃ**a**	məʃʃ**i**

b. Noun morphology

AcN	AN	IN
bəkjan	bəkkaj	_
ʃərjan	ʃərraj	_
məʃjan	məʃʃaj	məʃʃaja

II. Middle vowels paradigm

a. Verb morphology

Imp	*Impf*	*Pf*	*Pv*	*Caus*
fiq	fiq	faq	_	fəjjəq
ʕum	ʕum	ʕam	tʕam	ʕəwwəm
dir	dir	dar	tdar	_

b. Noun morphology

AcN	*AN*	*IN*
fiqan	fəjjaq	_
ʕuman	ʕəwwam	_
djar	_	_

[6] For lack of space, glosses will be given here: bki ‘cry’; ʃri ‘buy’; mʃi ‘walk’; fiq ‘wake up’; ʕum ‘swim’; dir ‘do’

In these two paradigms, it is observed that the relevant verbal and nominal morphological classes share and retain certain vocalic material. The latter is believed to be part of a minimal root from which all these forms are derived. We maintain that some roots have medial vowels, while others have final ones. More specifically, both the high vowels /i/ and /u/ can occur root-medially whereas only the front high vowel /i/ can appear root-finally. The low vowel /a/, however, is never a part of roots. The quality of root vowels changes due to various morphological or phonological processes. For instance, they may turn into a vowel /a/ to mark the perfective form for verbs or to a corresponding geminate glide to derive causatives or agent nouns. They may also alternate with glides to improve syllable structure (e.g. resolving a hiatus).

With this in mind, one could claim that causative verbs in MA are derived directly from the root. In particular, causatives are derived from tri-segmental roots, which can be strong or weak. Accordingly, the data here is assumed to fall into the following categories:

(24)

a. Strong roots

√fzg	'wet'	fəzzəg
√nʕs	'sleep'	nəʕʕəs
√mṛq	'broth'	məṛṛəq
√tlʒ	'snow'	təlləʒ
√wsʕ	'wide'	wəssəʕ
√ħmṛ	'red'	ħəmməṛ

b. Final weak roots

√kmi	'smoke'	kəmmi
√bki	'cry'	bəkki
√xwi	'emptiness'	xəwwi
√ɣli	'boil'	ɣəlli

c. Middle weak roots

√fiq	'wake up'	fəjjəq
√ṭir	'fly'	ṭəjjər
√dux	'feel dizzy'	dəwwəx
√ʕum	'swim'	ʕəwwəm

To sum up, it has been shown that a word-based approach to causatives is inadequate, in that it faces many challenges related to correspondence between

word forms and their corresponding causatives. Alternatively, a root-based approach has been defended. A theory of roots has allowed us to rid the data from any random and unnatural alternations by positing underspecified, minimal and abstract roots as bases of derivation. These roots have been shown to be of two main categories: strong or weak.

6. Conclusion

In this paper, we have argued that the derivation of causative verbs is better accounted for if roots are taken as base forms. A theory of roots holds that only idiosyncratic information should be listed in the lexicon, while alternations in derivatives are taken care of by the computational system. Under this conception, causatives are derived directly from their corresponding roots in the lexicon, instead of other surface forms. We have shown that a word-based approach poses issues related to (i) the inconsistent choice of the aspectual form of verb base forms (ii) the random alternation of vowels, and (iii) the lack of base forms for certain causatives. In response to these, we have demonstrated that a root-based approach allows for a simpler analysis of causatives that is limited to affixing a mora to the root.

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