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Paradigmatic Contrast and Moroccan Arabic Verb Inflection

Abstract

The present paper addresses the way inflectional paradigms of Moroccan Arabic trilateral verbs solve the problem that occurs when two phonologically similar members are driven to be phonetically identical. In this case, a Paradigmatic Contrast constraint prevents one item from being totally identical with the base in order to avoid fusion with another member of the paradigm. This is accomplished through ranking the Paradigmatic Contrast constraint above the crucial identity constraint O-O ANCHOR (σ , σ , Initial), which demands that a syllable-initial segment belonging to S2 must correspond to a syllable-initial segment belonging to S1. The main purpose of the study is to show the determinant role of contrast in the articulation of the inflectional system of Moroccan Arabic within the framework of Optimality Theory and to consider the dynamic nature of inflectional paradigms that abide by some of the most stimulating properties of language, among which the ability to keep similar phonological forms apart at the phonetic level.

1. Introduction

In an attempt to account for the perfective paradigm of Moroccan Arabic (MA) trilateral verbs within Optimality Theory (OT), the paper adduces morpho-phonological evidence to confirm the existence of a Paradigmatic Contrast constraint (PC), which is ranked above the faithfulness constraint Output-Output (O-O) ANCHOR. Such ranking results in blocking total identity between a paradigm member and the base/output (the base). Specifically, it prevents the third person singular feminine (3 sg. fem.) form from being totally identical with the base in order to drive two paradigm members (the first person singular (1 sg.) and the 3 sg. fem. forms), which have the same underlying representation (CCC+t), to be distinct in form. Generally, our data reveal an interesting feature of inflectional paradigms that strive to regulate themselves in amazing ways and underscore the role

of PC in compelling a paradigm member to avoid fusion with another member. First, we will expose the problem by showing that the dialect under investigation exhibits a perfective inflectional paradigm where two members have the same underlying representation: a stem and a *-t* suffix. Second, we will review the relevant literature on analogy and contrast within Correspondence Theory (CT). Finally, we will derive the 1 sg. and the 3 sg. fem. forms by invoking the crucial role of PC.

2. The problem

In the perfective inflectional paradigm of trilateral sound verbs, the 3 sg. fem. suffix is realized in three different ways according to regional varieties; thus, we can delimit three dialects. The first one consists exclusively of *-at* as in *kətb-at* ‘she wrote’ (e.g., the dialect of Casablanca); the second one includes both *-at* and the reduced form *-ət* interchangeably (e.g., the dialect of Fes); and the third one has only the *-ət* suffix (e.g., many dialects in the rural areas of the western plains of Morocco, like the ones near Sidi Kacem). We will be concerned with the Sidi Kacem variety because it raises important questions related to the way language manages to avoid fusion when two words have the same phonological underlying representation (the 3 sg. and the 1 sg. forms). It should be noted that I originate from this area and that I have already described similar data in a previous non-concatenative analysis of MA verb morphology within the prosodic model (Bernouss 1995). The perfective paradigm in (1) introduces the problem:

(1) Trilateral sound verbs: *ktəb* ‘to write’

Perfective

| | | | | | |
|-------------|---------------|-------------|-------|---------------|--------------|
| 1 sg. | <i>ktəbt</i> | ‘I wrote’ | 1 pl. | <i>ktəbna</i> | ‘we wrote’ |
| 2 sg. | <i>ktəbti</i> | ‘you wrote’ | 2 pl. | <i>ktəbtu</i> | ‘you wrote’ |
| 3 sg. masc. | <i>ktəb</i> | ‘he wrote’ | 3 pl. | <i>kətbu</i> | ‘they wrote’ |
| 3 sg. fem. | <i>kətbət</i> | ‘she wrote’ | | | |

We consider that the 1 sg. and the 3 sg. fem. *ktəbt* and *kətbət* have the same phonological underlying representation /ktb+t/ because of three main reasons. First, schwa epenthesis is nearly fully predictable in this dialect; therefore, its inclusion in the underlying representation would be detrimental to the economy parameter at the lexical level. Second, there is no *-a* with which the schwa alternates as a result of vowel reduction;

therefore, we cannot have recourse to an underlying full vowel /a/ to differentiate the two representations as there is no trace of this suffixal vowel in the synchronic grammar of this variety. Finally, contrary to some dialects like the one of Oujda (Kenstowitz 2005), where 3 sg. fem. forms substitute the schwa with an *-a* when the verb is concatenated with an object clitic, e.g., *rəfdət* ‘she carried’ / *rəfdatu* ‘she carried it’, although there is no *rəfdat* as such, in the schwa variety under scrutiny (the dialect of Sidi Kacem), the *-t* suffix is geminated when an object clitic is added, e.g., *rəfdattu* ‘she carried it’. In other words, there is no trace of the *-a* here either. It is needless to point out that although the suffix *-t* of the 1 sg. form and the suffix *-t* of the 3 sg. fem. form are phonologically similar, they are morphologically different as they signal different inflectional information.

In the paradigm in (1), the stem *ktəb* ‘write’ remains unchanged in all persons except in the third person where it undergoes reshuffling as a result of the addition of the suffixes *-t* and *-u*. In addition to this, whereas the majority of inflected forms can be easily generated, there is the problematic case of the first person singular of sound trilateral verbs like *ktəbt* ‘I wrote’, which should be derived under the normal syllabification algorithm of MA as *kətbət*, and which have been dealt with as ensuing from a cyclic derivation (Benhallam 1990). In fact, sound trilateral forms like *ktəb* ‘write’, when inflected in the first person singular, yield under a non-cyclic syllabification framework the unattested forms **kətbət*, as schwa insertion operates from right to left between every two adjacent and unparsed consonants (consonants which are not attached as onsets to already existing nuclei). The items in (2) provide a succinct view about schwa distribution in MA:

| | | | | |
|-----|---------------|---|-----------------|-------------|
| (2) | <i>ktb-t</i> | → | <i>kətbət</i> | ‘she wrote’ |
| | <i>mktb</i> | → | <i>məktəb</i> | ‘a desk’ |
| | <i>mɗrasa</i> | → | <i>məɗrasa</i> | ‘a school’ |
| | <i>mkrkb</i> | → | <i>məkərkəb</i> | ‘rolled’ |

In other words, if we follow this pattern, we will have two homophonous forms /*ktb-t*/ > **kətbət* (1 sg.) and /*ktb-t*/ > *kətbət* (3 sg. fem.). To solve this puzzle, Benhallam (1990) hypothesized, before OT, that syllabification has to apply cyclically. For him, the cycles in (3) have to be respected if the 1 sg. form *ktəbt* ‘I wrote’ is to be adequately generated (the 3 sg. fem. form

is derived according to the normal syllabification process exemplified in the items in (2) above).

- (3) Input: [[ktb]t]
First cycle
 Syllabification: *ktəb*
Second Cycle
 Affixation: *ktəb-t*
 Syllabification: *ktəbt*
 Output: [ktəbt] ‘I wrote’

(Benhallam 1990: 186–187)

Syllabification first applies to the innermost bracketed items in the first cycle and reapplies in the second cycle after affixation to link the stranded *-t* as a postmargin to the preceding syllable to yield the output *ktəbt* ‘I wrote’.

In the present paper, we argue that once we account for inflectional paradigms like the one in (1) within an O-O model, irregularity shifts from the 1 sg. form to the 3 sg. fem. It will be shown that the 3 sg. fem. form fails to be identical with the base for purely paradigmatic reasons.

3. Correspondence Theory

3.1 General background

In OT (Prince & Smolensky 1993; McCarthy & Prince 1993a) and more specifically in CT (McCarthy & Prince 1999), candidates are accompanied with correspondence relations between elements in related strings within the framework of the correspondence theory of faithfulness (McCarthy & Prince 1994a, 1994b, 1995, 1999). The definition in (4) offers a formal account of the relationship between these elements:

- (4) Correspondence:

Given two related strings S1 and S2, correspondence is a relation between elements of S1 and S2. Segment α (an element of S1) and segment β (an element of S2) are referred to as correspondents of one another if $\alpha R \beta$ (McCarthy & Prince 1995: 15).

Correspondence is a relation between segments in a pair of strings; it governs all types of linguistic relations – S1 and S2 of the definition in (4)

may be related as an input-output, as a base-reduplicant, or as a pair of output words. Each variable dimension of the representation is governed separately by a separate faithfulness constraint. Strings are governed by the constraints in (5), which demand complete and exclusive correspondence between their elements. For instance, Max requires every segment in the base S1 to have a correspondent in the related S2 (it prohibits deletion), and Dep penalizes insertion (any segment in S2 without a correspondent in S1 violates Dep) (McCarthy & Prince 1995: 123–125).

- (5) - Maximality (Max):
 Every element of S1 has a correspondent in S2.
- Dependence (Dep):
 Every element of S2 has a correspondent in S1.
- Identity-F:
 Correspondent segments in S1 and S2 have identical values for feature F.
- {Right,Left}-ANCHOR (S1, S2):
 Any element at the designated periphery of S1 has a correspondent at the designated periphery of S2.

In addition to the families cited in (5), there are additional ones: (a) Linearity (no metathesis), (b) Uniformity (no coalescence), and (c) Integrity (no breaking). Such constraint families constitute the backbone of CT as they foreground the different relationships that link together different components in IO, base-reduplicant and O-O strings; thus they generalize the range and the effect of faithfulness constraints within a more general and more explanatory framework.

3.2 Analogy/contrast in OT

Traditional ideas of analogy and contrast between the members of a paradigm have been revived in OT within different submodels. The overall purpose has been to explain surface similarities and differences across the members of a paradigm. Kenstowicz (1996) was among the first to handle the issue of paradigm uniformity by proposing two different constraints: Base-Identity and Uniform exponence. Base-Identity explains cases where

an immediate constituent – the base or the word – exerts pressure over its derived form or over its occurrence in a sentence, motivating either the underapplication or the overapplication of a process; Uniform exponence accounts for cases where there is no base that exerts pressure, or cases where it is the base form that is modified due to the pressure of a derived form. Base-Identity is applicable in derivational morphology, where the base has priority over the derived forms. Uniform exponence, on the other hand, is relevant to inflectional morphology, where it is difficult to delimit the base which has priority over the rest of the members of the paradigm.

In the same spirit, Benua's (1997) Transderivational Correspondence Theory (TCT) has also tried to approach derivational morphology. In this module, the relation between the words subjected to uniformity is expected to be asymmetrical since there is a base to which the derived forms are faithful. The opposite direction, the pressure of the derived form over the base, is banned due to base priority. In order to express the pressure that the base exerts over its derived form or its occurrence in the sentence, a set of Output-Output faithfulness constraints that emulate the Input-Output ones is invoked.

In his treatment of inflectional morphology, McCarthy (2005) has argued that the possibility is confined to symmetric relations between the members of a paradigm since any form of the inflectional paradigm can be the one which exerts the pressure. McCarthy has introduced what he named the Optimal Paradigms model (OP), where candidates consist of entire inflectional paradigms whose members undergo evaluation of markedness and Input-Output faithfulness constraints. Here, the stem of each paradigm member also stands in a surface correspondence with the stem in every other paradigm member; this correspondence is articulated by a set of O-O faithfulness constraints. McCarthy (2005) has introduced a new way of formalizing surface resemblance through shared paradigm membership within OT and CT. Faithfulness constraints on this intraparadigmatic output-output correspondence relation resist alternation within the paradigm. Through interaction with markedness and other faithfulness constraints, they account for surface resemblance and failure of resemblance among members of a paradigm. Among the typological predictions that the OP model makes is the potential for majority-rules effects where the pattern that is most common in a paradigm acts as an attractor to other paradigm members. In the OP model, in contrast to TCT, the pressure is multidirectional as all the members of the paradigm are

equal in their potential to influence the surface phonology of other members of the paradigm.

Paradigmatic pressures can also achieve homophony avoidance or contrast. Contrast within a paradigm has been formalized by Crosswhite (1999), who has also introduced an Anti-Ident constraint (defined in 6), blocking vowel reduction in a dialect of Bulgarian and in Standard Russian when it would create homophone words within a paradigm (*op. cit.*, p. 8).

(6) Anti-Ident:

For two forms, S1 and S2, where $S1 \neq S2$, $\exists \alpha$, $\alpha \in S1$, such that $\alpha \neq R(\alpha)$.

Given two forms, S1 and S2, there must be some segment belonging to S1 such that is not identical to its correspondent in S2. Here, the forms subjected to Anti-Ident (S1 and S2) must be different. The correspondence relation is evaluated, not by faithfulness constraints, but by anti-faithfulness constraints. It should be noted that the members subjected to the Anti-Ident constraints are not the same underlyingly.

Similarly, for Alderete (1999), in addition to markedness and faithfulness constraints, Universal Grammar contains a set of anti-faithfulness constraints that evaluate pairs of morphologically related words and require a phonological difference between them. Such constraints result in phonological alternations between members of the same paradigm and frequently imply a violation of faithfulness constraints.

On another scale, Kenstowicz (2005) proposes an analysis where he formulates a Paradigmatic Contrast constraint, which ensures that two phonologically distinct members of a paradigm must remain phonetically distinct. The formulation is a very strong statement, as we can easily find morphologically different but phonologically identical representations. It remains, however, that his analysis is the closest to the present one. The paradigms in (7), which show the 3 sg. masc., 3 sg. fem. and 1 sg. bases amplified by the object suffixes, constitute part of the data (from the Moroccan dialect of Oujda) on the basis of which Kenstowicz (2005) argues in favor of positing PC, a constraint which makes it impossible for the candidate **rfədtu* (3 sg. fem) to emerge as optimal. A brief summary of his argument will clarify the point:

(7) *rfəd* ‘to carry’

| | | | |
|-------------|------------------|--------------------|-------------------|
| base | r f ə d | r əfd-et | r fəd-t |
| 1 sg. | <i>rfəd#ni</i> | <i>rəfd-ət#ni</i> | <i>rfəd-t#ni</i> |
| 2 sg. | <i>rəfd#ək</i> | <i>rəfd-at#ək</i> | <i>rfəd-t#ək</i> |
| 3 sg. masc. | <i>rəfd#u</i> | <i>rəfd-at#u</i> | <i>rfəd-t#u</i> |
| 3 sg. fem. | <i>rfəd#ha</i> | <i>rəfd-ət#ha</i> | <i>rfəd-t#ha</i> |
| 1 pl. | <i>rfəd#na</i> | <i>rəfd-ət#na</i> | <i>rfəd-t#na</i> |
| 2 pl. | <i>rfəd#kum</i> | <i>rəfd-ət#kum</i> | <i>rfəd-t#kum</i> |
| 3 pl. | <i>rfəd#hum</i> | <i>rəfd-ət#hum</i> | <i>rfəd-t#hum</i> |
| | ‘he carried pro’ | ‘she carried pro’ | ‘I carried pro’ |

(Kenstowicz 2005: 163)

Kenstowicz (2005) observed that the CCəC stem appears as CəCC before the vowel-initial object suffixes #ək and #u. The object suffixes thus syncopate the base just as the subject suffixes do. The 3 sg. fem. suffix -ət is changed to -at when the following object suffix begins with a vowel: *rəfd-at#ək* ‘she carried you’, *rəfd-at#u* ‘she carried him’. This allomorphy is a strategy the grammar adopts to block the reshuffling of the stem’s syllable structure in order to avoid open syllable schwa (*ə). Such an output would be identical to the 1 sg. In other words, the normal phonology should transform /rəfəd-ət#u/ into *rfəd-t#u*, but this shape is identical to the 1 sg. form *rfəd-t#u* ‘I carried him’. Getting -ət replaced by -at blocks syncope and keeps the 3 sg. fem. and the 1 sg. forms phonetically distinct.

The tableau in (8) summarizes the proposed analysis. The constraint of PC is ranked above faithfulness in vowel height (Ident-[low]); thus, it allows an otherwise unmotivated lowering of the schwa in the suffix (Kenstowicz 2005: 164).

(8) *ə >> PC >> Ident-[low]

| /refed-et#u/ | *ə | PC | Ident-[low] |
|--------------|-----|----|-------------|
| 1 - rfədətu | *!* | | |
| 2 - rəfdətu | *! | | |
| 3 - rfədtu | | *! | |
| 4 - ↵rəfdatu | | | * |

In addition to the problem of the formulation of PC mentioned above, there is the problem of the base which is represented as CəCəC. Similar forms

are not attested in MA because of the same open syllable schwa ban Kenstowicz (2005) formulated. He has motivated this choice by relying on data from other Arabic dialects (e.g., Damascene Arabic) where there are similar forms (e.g., *lābās* ‘he wore’). Mechanisms like schwa syncope in unstressed syllables (*lbāstu* ‘you wore’) do not exist in MA because initially there are no schwas in open syllables: the postulation of two schwas in trilateral stems negates the systematic character of schwa epenthesis in MA. With very few exceptions that need analyses within paradigms (like the 1 sg. form of trilateral sound verbs and the 1 sg, 3 sg. fem. and 3 pl. forms of quadrilateral verbs), schwa epenthesis is nearly totally predictable. Incorporating schwas in the base that may or may not surface is detrimental to lexical economy. With the problem exposed and the relevant literature reviewed, we can proceed at this juncture to account for the problematic case of the the 3 sg. fem. and the 1 sg. forms.

4. Derivation of trilateral sound verbs

In this section, we derive the two problematic items, *ktābt* ‘I wrote’ and *kātbāt* ‘she wrote’, from the paradigm of *ktāb* within an O-O framework and spot the reason behind the idiosyncrasy of the 3 sg. fem. form *kātbāt*. The objective is to argue that paradigms have special properties that need exploration.

Boudlal (2001) has already noted that the form *ktābt* is closer to the base *ktāb* than *kātbāt* is, in as far as the initial segments of the stem syllables are concerned. Faithfulness to some designated periphery of a prosodic category has been captured in the literature by invoking an O-O constraint, namely the constraint O-ANCHOR-POS (McCarthy 1997: 12):

(9) O-ANCHOR-POS S1-S2 (Cat1, Cat2, P):

If ζ_1 Cat1 \in S1
 ζ_2 Cat2 \in S2
 ζ_1 R ζ_2 , and
 ζ_2 stands in position P of Cat2
 then ζ_1 stands in position P of Cat1.

In our case, Correspondence has to refer to the initial position of the syllable in the derived output form and its related base output form in order

to account for the difference between *ktəbt* and *kətbət*. The constraint in (10) is a specific instance of the general constraint in (9):

(10) O-O ANCHOR (σ , σ , Initial):

Where two strings S1 and S2 are in an O-O correspondence relation and S1 is the base and S2 the affiliate of that correspondence relation, a syllable-initial segment belonging to S2 must correspond to a syllable-initial segment belonging to S1.

Additionally, the form *ktəbt* ‘I wrote’ points to a case of conflict between two main constraints: the O-O faithfulness constraint O-O ANCHOR (σ , σ , Initial) and the alignment constraint Align-R., which is an instance of a more general constraint referred to in the literature as Generalized Alignment:

(11) Generalized Alignment:

Align(Cat1, Edge1, Cat2, Edge2) =def
 \forall Cat1 \exists Cat2 such that Edge1 of Cat1 and Edge2 of Cat2 coincide.
 Where
 Cat1, Cat2 \in PCat \cup GCat
 Edge1, Edge2 \in {Right, Left}

(McCarthy & Prince 1993a, 1993b)

The specific constraint in (12) militates to align the right edge of a full syllable with the right edge of the suffix:

(12) Align-R. (Suf, R; σ , R):

The right edge of the suffix is aligned with the right edge of a syllable.

Specifically, the form *ktəbt* violates the above constraint as the suffix *-t* is aligned with a minor syllable at the right edge, since MA does not tolerate complex onsets and codas. Violation of the above constraint in MA monosyllables is not only incurred to secure the supremacy of *Compl., which prohibits complex onsets and codas, but also emerges as a consequence of the prosodic make up of the language that reassigns stray consonants at peripheral edges as onsets or codas to syllables at subsequent levels. Items in (13) illustrate how peripheral elements become onsets or codas at other levels.

- (13) *ba.s* ‘he kissed’ *ba.su* ‘they kissed’
k.tab ‘a book’ *lək.tab* ‘the book’
k.təb.t ‘I wrote’ *k.təb.tu* ‘I wrote it’

To respect *Compl. and conserve consonants at the periphery, the constraint *Min-syll (in 14), which is a constraint that militates against the assignment of consonants at the periphery to degenerate or minor syllables, should be ranked under *Compl.

- (14) *Min-syll:
 Minor syllables are prohibited.

As we said before, the violation of Align-R. (and *Min-syll) has no effect on the identity between *ktəbt* and the base *ktəb* because Align-R. is ranked below the faithfulness constraint O-O ANCHOR; in other words, it is more important for the 1 sg. form to keep the left edges of the stem when the suffix is added than to align the suffixed form with a syllable. The table in (15) shows that *ktəbt* is the optimal candidate because total identity with the base is respected.

- (15) O-O ANCHOR *Compl. >> Align-R. *Min-syll

| /ktb-t/ 1 sg. Base: [k.təb] | O-O ANCHOR (σ, σ, Initial) | *Compl. | Align-R. | *Min-syll |
|--------------------------------|-------------------------------|---------|----------|-----------|
| 1 - \curvearrowright k.təb.t | | | * | ** |
| 2 - kət.bət | *!* | | | |
| 3 - ktəbt | | *!* | | |

In *ktəbt*, the initial segment of the syllable corresponds to the initial segment of the syllable in the base form (i.e., the segment *-t*). In *kətəbət*, the initial segment of the first syllable in the affixed form (i.e., the segment *-k*) does not correspond to the initial segment of the syllable in the base form (i.e., *-t*), and the initial segment of the second syllable in the derived form (i.e., *-b*) does not have a correspondent in the base form.

The problematic member of the perfective paradigm *kətbət* (3 sg. fem.) constitutes a challenge in this model since the form *ktəbt* will emerge as optimal if the constraint O-O ANCHOR is ranked at the top of the hierarchy above Align-R. If we reverse the order of the two constraints, *kətbət* ‘she wrote’ will be generated. In other words, the formal difference between *kətbət* (the 3 sg. fem. form) and *ktəbt* (the 1 sg. form) is determined by the ranking of either O-O ANCHOR or Align-R. at the top of the hierarchy. This is a solution that is clearly explanatorily deficient because the two outputs cannot be accounted for by a simple permutation of the two constraints in the same hierarchy.

Alternatively, we hold the view that *kətbət* ‘she wrote’ depicts a case of partial identity that is paradigmatically driven: /ktb-t/ fails to surface as *ktəbt* (which should be the normal case) because this outcome is homophonous with the 1 sg. form; thus the real output *kətbət* satisfies PC (defined in 16) in order to avoid phonological merger with the 1 sg. form.

(16) Paradigmatic Contrast (PC):

Paradigm members are distinct in form.

The ranking in table (17), where PC outranks O-O ANCHOR, accounts for the derivation of *kətbət* ‘she wrote’:

(17) PC >> O-O ANCHOR >> Align-R. *Min-syll

| /ktb-t/ 3 sg. fem. Base: [ktəb] | PC | O-O ANCHOR (σ, σ, Initial) | Align-R. | *Min-syll |
|------------------------------------|----------|-------------------------------|----------|-----------|
| 1 - <i>kətbət</i> | | ** | | |
| 2 - <i>k.təb.t</i> | *! 1 sg. | | * | ** |

Since PC militates against form fusion between members of paradigms, we think that it is a good idea to highlight fatal violation and show the form that is prohibited from optimization (in our example the 1 sg. form).

As far as the other dialects are concerned, in the one of Casablanca, the problem discussed does not arise because of the form of the suffix *-at* which is necessarily attached to the last consonant that plays the role of the onset in accordance with ONS (see 18), a constraint which is higher in rank than O-O ANCHOR in table (19):

(18) ONS:

Syllables have onsets.

(19) ONS >> O-O ANCHOR >> Align-R. *Min-syll

| /ktb-at/ 3 sg. fem. Base: [ktəb] | ONS | O-O ANCHOR (σ, σ, Initial) | Align-R. | *Min-syll |
|-------------------------------------|-----|-------------------------------|----------|-----------|
| 1 - ڪət.ba.t | | ** | | * |
| 2 - k.təb.a.t | *! | | * | ** |

Here, the role of ONS has been decisive since the suffix *-at* needs an onset, a position occupied by the last root consonant of the base.

The dialect of Fes, where the 3 sg. fem. form has two variants (one form with *-a* and another one with a schwa), has two tables. On the one hand, table (20) is similar to (19).

(20) ONS >> O-O ANCHOR >> Align-R. *Min-syll

| /ktb-at/ 3 sg. fem. Base: [ktəb] | ONS | O-O ANCHOR (σ, σ, Initial) | Align-R. | *Min-syll |
|-------------------------------------|-----|-------------------------------|----------|-----------|
| 1 - ڪət.ba.t | | ** | | * |
| 2 - k.təb.a.t | *! | | * | ** |

On the other hand, table (21) depicts a situation where the identity between the suffixal melody of the base and the one of the output is violated in order to satisfy Align-R. and *Min-syll.

(21) ONS >> O-O ANCHOR >> Align-R. *Min-syll >> Ident-High

| /ktb-at/ 3 sg. fem. Base: [ktəb] | ONS | O-O ANCHOR (σ, σ, Initial) | Align- R. | *Min- syll | Ident- High |
|--|-----|-------------------------------|--------------|---------------|----------------|
| 1 - kət.ba.t | | ** | *! | * | |
| 2 - k.təb.a.t | *! | | * | ** | |
| 3 - ↻kət.bət | | ** | | | * |

By occupying a low rank in the hierarchy, Ident-High violation is minimal and *kətbət* emerges as optimal.

The problematic cases we have displayed show that paradigms, which seem to have logic of their own, exhibit special characteristics that should be dealt with in novel ways. Unfortunately, this kind of peculiarity has not been given the importance it deserves despite the increasing attempts in the last few years. From an organizational angle, the paradigm displays a sort of uniformity that is made explicit by the way it comprises two domains. As suggested by an anonymous reviewer, the first domain (D1) consists of 1st and 2nd person members and the second domain (D2) is made of 3rd person ones, a distinction commonly drawn in morphology in terms of [±participant]. The paradigm in (1) is not only optimal because all its members are distinct in form, but also because its two domains (D1 and D2) include elements that are nearly uniform in form. This paradigmatic distinction is formulated in (22) as a domain uniformity constraint:

(22) Domain Uniformity (DU):

Domain members are uniform.

This constraint, which is part of the more general uniformity constraint (Paradigmatic Uniformity) in (23), militates to keep elements in specific domains as similar in forms as possible.

(23) Paradigmatic Uniformity (PU):

Paradigm members are identical in form.

Before developing this notion of domain uniformity and its impact on the structure of the whole paradigm, let us first examine the full range of

possibilities available to the perfective paradigm of trilateral verbs in tables (24)–(27):

(24) Trilateral sound verbs: *ktāb* ‘to write’ (see 1)

Perfective

| | | | | | |
|-------------|----------------------|-------------|-------|---------------|--------------|
| 1 sg. | <i>ktābt</i> | ‘I wrote’ | 1 pl. | <i>ktābna</i> | ‘we wrote’ |
| 2 sg. | <i>ktābti</i> | ‘you wrote’ | 2 pl. | <i>ktābtu</i> | ‘you wrote’ |
| 3 sg. masc. | <i>ktāb</i> | ‘he wrote’ | 3 pl. | <i>kātbu</i> | ‘they wrote’ |
| 3 sg. fem. | <i>kātbāt</i> | ‘she wrote’ | | | |

(25) Trilateral sound verbs: *ktāb* ‘to write’

Perfective

| | | | | | |
|-------------|----------------------|-------------|-------|---------------|--------------|
| 1 sg. | <i>ktābt</i> | ‘I wrote’ | 1 pl. | <i>ktābna</i> | ‘we wrote’ |
| 2 sg. | <i>ktābti</i> | ‘you wrote’ | 2 pl. | <i>ktābtu</i> | ‘you wrote’ |
| 3 sg. masc. | <i>ktāb</i> | ‘he wrote’ | 3 pl. | <i>ktābu</i> | ‘they wrote’ |
| 3 sg. fem. | <i>kātbāt</i> | ‘she wrote’ | | | |

(26) Trilateral sound verbs: *ktāb* ‘to write’

Perfective

| | | | | | |
|-------------|----------------------|-------------|-------|---------------|--------------|
| 1 sg. | <i>kātb</i> | ‘I wrote’ | 1 pl. | <i>kātbna</i> | ‘we wrote’ |
| 2 sg. | <i>kābti</i> | ‘you wrote’ | 2 pl. | <i>kābtu</i> | ‘you wrote’ |
| 3 sg. masc. | <i>kātb</i> | ‘he wrote’ | 3 pl. | <i>kātbu</i> | ‘they wrote’ |
| 3 sg. fem. | <i>kātbāt</i> | ‘she wrote’ | | | |

(27) Trilateral sound verbs: *ktāb* ‘to write’

Perfective

| | | | | | |
|-------------|----------------------|-------------|-------|---------------|--------------|
| 1 sg. | <i>kātbāt</i> | ‘I wrote’ | 1 pl. | <i>ktābna</i> | ‘we wrote’ |
| 2 sg. | <i>ktābti</i> | ‘you wrote’ | 2 pl. | <i>ktābtu</i> | ‘you wrote’ |
| 3 sg. masc. | <i>ktāb</i> | ‘he wrote’ | 3 pl. | <i>kātbu</i> | ‘they wrote’ |
| 3 sg. fem. | <i>ktābt</i> | ‘she wrote’ | | | |

The paradigm in (25) is not acceptable in MA because a total respect of PU in (23) is impossible as this satisfaction entails a direct violation of an unviolable markedness constraint in MA, which is *ə (formulated in 28), and which militates to prevent open schwa syllables from making their way to the surface:

(28) *ə:

Schwa syllables are closed.

Both **ktəbət* and **ktəbu* violate this last constraint.

On the other hand, the paradigm in (26) where all members have a schwa between the first and the second consonant cannot be optimal because a total satisfaction of PU is impossible due to the ungrammaticality of the 1 sg. and the 3 sg. masc. The former violates * $\mu\mu\mu$ defined in (29):

(29) * $\mu\mu\mu$:

Syllables are maximally bimoraic.

(Sherer 1994: 10)

The form *kətbət* ‘I wrote’ violates * $\mu\mu\mu$ because the concatenation of three moras on a row is unacceptable universally. The latter violates Align-R. [VERB] (stem, R; Syll, R) (see 30), another specific version of the general constraint in (11). This constraint aligns sound verb stems with final syllables at the right periphery.

(30) Align-R. [verb] (stem, R; Syll, R):

The right edge of the stem is aligned with the right edge of the syllable.

This alignment constraint is crucial to the regulation of the MA lexicon as it differentiates between sound trilateral verb stems, which incorporate a schwa invariably between the last two root consonants (CCəC), and trilateral nouns where schwa insertion is governed by the sonority condition (Son-Cond) (see 31).

(31) Son-Cond:

Schwas are inserted before the most sonorant consonant or between the last two consonants with the same sonority index.

This constraint accounts for the formal difference between verbs like *drəb* ‘to hit’, *krəh* ‘to hate’ and nouns like *dərb* ‘hitting’, *kərh* ‘hatred’. The hierarchy where the sonority constraint is ranked below Align-R, when verbs are evaluated, results in verbal forms that incorporate phonetic schwas invariably between the last two consonants and display simple onsets and codas (.C.CəC.) (Bernouss 2009: 160).

The paradigm in (27) is interesting as it shows why the 1 sg. respects ANCHOR and why the 3 sg. fem. violates it to satisfy PC. This paradigm is not attested for the simple reason that domain uniformity is violated twice.

In (32), uniformity in D1 is violated in the case of **kətbət* because it is not identical in form with the members of its domain *ktəbti*, *ktəbna* and *ktəbtu*:

(32) PC DU >> O-O ANCHOR >> Align-R. *Min-syll

| /ktb-t/ 1 sg. Base: [ktəb] | PC | DU | O-O ANCHOR (σ, σ, Initial) | Align-R. | *Min-syll |
|-------------------------------|----|-------|-------------------------------|----------|-----------|
| 1 - kətbət | | *! D1 | ** | | |
| 2 - k.təb.t | | | | * | ** |

In (33), **ktəbt* (3 sg. fem.) is not uniform with *kətbu* (D2) as the distribution of the schwa is not the same in the two elements:

(33) PC DU >> O-O ANCHOR >> Align-R. *Min-syll

| /ktb-t/ 3 sg. fem. Base: [ktəb] | PC | DU | O-O ANCHOR (σ, σ, Initial) | Align-R. | *Min-syll |
|------------------------------------|----|-------|-------------------------------|----------|-----------|
| 1 - kətbət | | | ** | | |
| 2 - k.təb.t | | *! D2 | | * | ** |

This state of affairs makes the paradigm in (24) a winner as it satisfies PC and DU: *kətbət* is distinct in form from *ktəbt* and similar in form with *kətbu*; at the same time, *ktəbt* is distinct in form from *kətbət* and identical with *ktəbti*, *ktəbna* and *ktəbtu*.

The remaining problem concerns the 3 sg. masc. *ktəb*, which violates DU as it is similar in form with forms in D1. It should be noted here that this is the only unaffixed member in the paradigm. One solution is to redefine DU and state that domain suffixed members are similar in form; however, this constraint will be perceived as adhoc or as one that is stated

to solve one particular problem. In fact, the problem is deeper as it has to do with the general problem of schwa epenthesis in CCC structures in MA. Trilateral sound stems (verbs) invariably satisfy Align-R. [VERB] (stem, R; Syll, R) in order to maintain lexical distinctions between trilateral sound verbs and nouns (e.g., *dhək* ‘laugh’ and *dəhk* ‘laughter’). As we mentioned before, this is accomplished by ranking the alignment constraint under the general sonority constraint. Under the present analysis, the 3 sg. masc. form violates DU in order to satisfy the crucial alignment constraint. Table (34) is eloquent as it displays a ranking where DU is fatally violated to give the optimal output the chance to emerge as a form which aligns the right edge of the stem with the right edge of a full syllable. As we said before, this alignment is crucial to the MA lexicon as it distinguishes between CCC verbs and nouns solely through schwa distribution.

(34) Align [VERB] >> DU >> O-O ANCHOR *Min-syll

| /ktb/ 3 sg. masc. Base: [ktəb] | Align [VERB] | DU | O-O ANCHOR (σ, σ, Initial) | *Min-syll |
|-----------------------------------|-----------------|-----|-------------------------------|-----------|
| 1 - kət.b | *! | | ** | * |
| 2 - k.təb | | *D2 | | * |

Although *ktəb* violates DU, it wins the competition because of the high rank accorded to the alignment constraint that regulates the difference between verbal and nominal CCC structures in MA.

To make the analysis complete, let us see the derivation of *ktəbtu* ‘I wrote it’ and *kətbəttu* ‘she wrote it’, forms concatenated with an object suffix, in (35) and (36):

(35) ONS *Compl. >> O-O ANCHOR >> DEP-C

| /ktb+t#u/ 1 sg.#object suffix Base: [k.təb] | ONS | *Compl. | O-O ANCHOR (σ, σ, Initial) | DEP-C |
|---|-----|---------|-------------------------------|-------|
| 1 - ⵏk.təb.tu | | | | |
| 2 - kət.bət.u | *! | | ** | |
| 3 - kətb.tu | | *! | ** | |
| 4 - kət.bət.tu | | | *!* | * |

Table (35) declares *ktəbtu* ‘I wrote it’ as a winner since it is the only form to satisfy all the constraints in the hierarchy, whereas the form *kətbəttu* ‘she wrote it’ in table (36) below wins because of the powerful position of PC in the hierarchy, a position that prevents *ktebtu* from being optimal although it satisfies all constraints.

(36) PC >> ONS *Compl. >> O-O ANCHOR >> DEP-C

| /ktb+t#u/ 3 sg. fem. #object suffix Base: [k.təb] | PC | ONS | *Compl. | O-O ANCHOR (σ, σ, Initial) | DEP-C |
|--|-------------|-----|---------|-------------------------------|-------|
| 1 - k.təb.tu | *! 1 sg. | | | | |
| 2 - kət.bət.u | | * | | *!* | |
| 3 - kətb.tu | | | * | *!* | |
| 4 - ⵏkət.bət.tu | | | | *!* | * |

The two tables above show that the amplification of the bases by adding an object suffix does not affect their previous structures.

Although the scope of PC is the paradigm, there is no need to submit entire paradigms for evaluation since the problematic cases are the ones that exhibit phonological similarity at the level of the underlying representation. As we have demonstrated, contrary to what is proposed by Crosswhite (1999) and Kenstowicz (2005), candidates under evaluation can be phonologically identical, what matters is that they are morphologically different and that they must remain phonetically distinct. In this case, the satisfaction of PC necessarily implies a violation of a crucial identity constraint (in our case O-O ANCHOR). Some scholars have attempted to account for the different behavior of an affix by positing different underlying forms (cf. Dell & Elmedlaoui 2002) or by assuming an affix specific constraint (Pater 2007) or a cophonology (Inkelas & Zoll 2005). All these alternatives do require some degree of stipulation to account for the behavior of one single affix, and so does the analysis in this paper; however, the fact that our analysis takes into account the paradigmatic dimension of language to explain morphophonological phenomena makes it more natural as paradigms are at the heart of linguistic organization.

This article cannot determine whether PC is a cover constraint made of other constraints that each prevent a different type of similarity or not; all we can say is that PC should be ranked above the powerful constraint ANCHOR to prohibit total identity between two paradigm members. Future research with more comprehensive data will have to explore this area more deeply. The analysis we have sketched is different from all previous analyses in two ways: our proposal where paradigm members have single bases (Base-Identity) and at the same time exert influence on each other (Uniform exponence) is a new and legitimate proposal that deserves to be seriously considered, and the fact that language attempts to resolve the problem of similar underlying representations through paradigmatic organization is another interesting feature that needs further investigation.

5. Conclusion

It is clear that the role of PC needs more attention from scholars working in the area of the phonology-morphology interface. The way it interacts with the faithfulness constraint and eventually blocks total identity shows that inflectional paradigms exhibit a special type of behavior that should be investigated in order to express more linguistically significant generalizations. Generally, the analysis has tackled the notion of contrast

from an inflectional angle; thus, we have opened new channels to link between inflection and areas at the interface between phonology and morphology. The analysis also points to the existence of specific domains within a single paradigm; future research will have to explore other domains where notions of contrast and uniformity play a pivotal role.

Abbreviations

| | |
|-------|-----------|
| fem. | feminine |
| masc. | masculine |
| pl. | plural |
| pro. | pronoun |
| sg. | singular |
| σ | syllable |

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