【Article】

A Study of Internal Reduplication in Makkan Arabic

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The universal typology of infixation (McCarthy and Prince, 1993; and Prince and Smolensky, 1993) states that an affix can be either a prefix or a suffix. The infixal position of an affix is the result of the interaction of markedness constraints with phonological constraints. This paper extends this view of infixation to the analysis of reduplication in Makkan Arabic. Internal reduplication in biconsonantal and triconsonantal verbs is analyzed as a special case of the alignment of affixes. The infixal reduplicant in these verbs is actually a prefix or a suffix that has been misaligned in order to satisfy highly ranked markedness constraints in the language. Reduplication in nouns and adjectives is analyzed as a straightforward suffixing reduplication. Several significant implications result from the analysis. First, Arabic internal reduplication is subsumed under the universal typology of infixation. Second, the lack of geminates in the reduplicant and the alignment of the reduplicant with the stressed syllable are the main characteristics of reduplication in Makkan Arabic, and can be generalized to reduplication in all varieties of Arabic. This leaves a few constraints to be ranked separately to account for details of reduplication in each dialect.

1. Introduction

Reduplication or the systematic repetition of phonological material within a word is a wide spread phenomenon in the languages of the world. Reduplication may affect verbs, nouns and adjectives, and it usually results in morphological and semantic changes of the original word or base. In the majority of languages that have reduplication, copying occurs at the edges of the word, hence the two predominant and expected types, prefixing and suffixing reduplication. However, fewer languages including the modern dialects of Arabic exhibit infixing reduplication where a copied part of the base appears inside the base. This type is comparatively less common.

Reduplication in biconsonantal verbs is part of the morphology of Arabic and most of the Semitic languages. In this type both root consonants reduplicate giving what looks on the surface as total suffixing reduplication, thus a verb like *kabb* 'spill' reduplicates giving *kabkab* 'spill continuously'. In addition, the modern dialects exhibit a unique type of reduplication where a copy of the first consonant of a triconsonantal verb appears inside the root itself. A verb like *ṣaraʕ* 'annoy' reduplicates as *ṣarṣaʕ* 'to startle'. This type has been referred to in the literature on reduplication as infixing or internal reduplication. Infixing or internal reduplication is the focus of this study.

Studies on reduplication in Arabic are relatively rare and exclusively descriptive in nature (see, for example, El Zarka 2005). Other studies classify reduplication as a way of forming quadriliteral verbs without commenting on the structure of reduplicated forms or on their relation to other forms in the verb paradigm (Abu-Haider 2006; Bakalla 1979; Cowell 1964; El Zarka 2005; Holes 2006; Woidich 2006a, 2006b).

The first formal analysis of reduplication in Arabic is offered in Broselow and McCarthy (1983). They present a theory of internal reduplication using what has come to be known as the Affix and Copy approach, a model mainly developed in work by Marantz (1982), Bell (1983), and Broselow and McCarthy (1983), among others. Broselow and McCarthy analyze reduplication in biliteral and triliteral Arabic verbs as a process of infixation. Their analysis captures the generalization that reduplication in both types of verbs is an instance of internal reduplication although on the surface the reduplicant in biliteral reduplication is in fact a suffix. Treating both types of verbs in the same way will continue in this study.

Reduplication in Makkan Arabic (MA) is used to form quadriliteral verbs where the first or the third consonant of the root is copied giving an intensive, iterative, or pejorative meaning. In addition, reduplication may affect nouns and adjectives in a unique way to create forms with a diminutive meaning.

The main goal of this paper is to provide an account of verbal and nominal or adjectival reduplication in MA within the framework of Correspondence Theory (McCarthy and Prince 1995), which is couched within Optimality Theory (Prince and Smolensky 1993).

I analyze reduplication as a morphological process of affixation with special phonological properties. The reduplicant, which is a single consonant in verb reduplication and a

CVC syllable in nouns, receives its phonological properties from the base in the same way assumed in classical work on reduplication (Marantz 1982; Broselow and McCarthy 1983; and McCarthy and Prince 1995). The identity between base and reduplicant is regulated by the faithfulness constraints of MAX-BR and DEP-BR (McCarthy and Prince 1995).

In analyzing reduplication in verbs, I follow the general theory of infixation proposed in Prince and Smolensky (1993) and McCarthy and Prince (1993b). I assume that the reduplicant is either a prefix or a suffix; the infixal status of the reduplicant emerges as a result of the interaction of phonological constraints with alignment constraints imposed on morphological categories. My aim here is to show that what has been analyzed as internal reduplication in Arabic is in fact a regular case of prefixing or suffixing reduplication. Analyzing reduplication in this way will simplify this aspect of Arabic morphology and will also contribute to the universal typology of infixation by adding Arabic as an example. Reduplication in nouns and adjectives is, however, analyzed as a syllable suffixation and is subject to constraint interaction on the size of word.

A secondary goal of the paper is to argue against studies that treat all types of consonant doubling in Arabic as reduplication. In particular, I argue that there are basic structural and semantic differences between reduplication proper and gemination of the second root consonant typical of Form II of the verb. It will become obvious that while geminate consonants characterize various verb and noun classes of Arabic morphology, gemination is clearly absent from all reduplicative patterns.

The article is organized as follows. Section 2 introduces the different types of reduplication in MA and the steps followed in collecting the data. It also relates the Makkan data to reduplication in Standard Arabic and the modern dialects focusing on the similarities as well as the minor differences that hold among the different varieties. Section 3 discusses some issues that are germane to the analysis, namely, the structural and semantic differences between reduplication proper and gemination of the second consonant of Form II of the Arabic verb. Section 4 offers an account of reduplication in Correspondence Theory. The conclusion briefly summarizes the results and points to directions for future research.

2. Data and explanation

2.1 Data collection

The collection of the data in this paper went through three stages. First, the author, who is a native speaker of MA, prepared four lists of all reduplicating forms in the dialect. The first list is the longest; it includes all biconsonantal verbs that participate in reduplication so that the surface form of such verbs is $C_1VC_2C_1VC_2$. The second list consists of all triliteral verbs that undergo reduplication of C_1 to give a $C_1VC_2C_1VC_3$ structure on the surface. The third list is quite short; it has all triconsonantal verbs that exhibit reduplication of the third consonant to give a $C_1VC_2C_3VC_3$ structure. This list shows that the third consonant in all of these verbs in this category is one of the coronal sonorant sounds [r], [l], or [n]. The fourth list concerns nouns and adjectives that undergo a specific process of

reduplication where a $C_1V.C_2VC_3$ noun or adjective reduplicates to give a $C_1V.C_2VC_3.C_2VC_3$ structure. This list started with a small number of nouns and adjectives that are frequently used in the dialect. However, further investigation of the issue shows that any noun or adjective that exhibits a $C_1V.C_2VC_3$ structure can be reduplicated in this manner.

The second step was a survey of the entire stock of verbs in Wehr's (1980) dictionary of Modern Standard Arabic. The purpose was to check the completeness of the first three lists of reduplicating verbs. Several improvements in the data came out as a result of this survey: a) a small number of biconsonantal verbs that do occur in the dialect but were missed by the author, were added to the list, b) the survey provides further evidence that reduplication of C_1 is a property of the modern dialects; no example of that type was found in the dictionary, and c) in contrast, examples of reduplication of C_3 were several and mostly involve coronal sonorant sounds.

The third step involved checking the lists of reduplicated verbs, nouns and adjectives that have been prepared with other native speakers of the dialect. The purpose was to ascertain the authenticity of the examples. Six informants were consulted three with postgraduate degrees and three with less than high school education. All confirmed the accuracy of the collected forms. When presented with non-occurring verbs where C_3 reduplicates even though it is not a coronal sonorant, all six informants rejected them as being part of the vocabulary of MA. They also confirmed the increase in using reduplication of nouns and adjectives and showed a considerable amount of readiness in deriving a reduplicated $C_1V.C_2VC_3.C_2VC_3$ form from any noun or adjective that has a simple structure of $C_1V.C_2VC_3$.

2.2 Types of reduplication in Makkan Arabic

Makkan Arabic distinguishes two types of reduplication that primarily affect the verbal system and, to some restricted extent, nouns and adjectives. The following is an exposition of how reduplication affects biconsonantal and triconsonantal verbs. Note that the morphological pattern of the reduplicated verbs is always CVC.CVC.

2.2.1 Reduplication in biconsonantal verbs

In biconsonantal verbs, the two root consonants fully reduplicate changing a $C_1VC_2C_2$ into $C_1VC_2C_1VC_2$. The two identical syllables in the output of reduplication give what looks on the surface like total reduplication. There are around 217 verbs of this type in MA. Virtually all consonants that occur in this group of verbs participate in reduplication. Representative examples are given below (Reduplicant is given in bold):

(1)   Simple   Reduplicated
     a.   *barr* (ˤ*barar*) 'to talk'   *bar**b**ar*   'to mutter'
     b.   *ǰarr* (ˤ*ǰarar*) 'to pull'   *ǰar**ǰ**ar*   'to drag'
     c.   *dagg* (ˤ*dagag*) 'to pound'   *dag**d**ag*   'to pound severely'
     d.   *xarr* (ˤ*xarar*) 'to trickle'   *xar**x**ar*   'to leak'
     e.   *sabb* (ˤ*sabab*) 'to insult'   *sab**s**ab*   'to insult repeatedly'

Some reduplicated biliteral roots are onomatopoetic in meaning and denote certain sounds and movements, such as *nawnaw* 'to meow', *ṭašṭaš* 'to splash', and *dabdab* 'to clatter'. The rest indicate intensity or repetition of the action, e.g., *sabsab* 'to insult repeatedly', and *maḍmaḍ* 'to rinse one's mouth'.

2.2.2 Reduplication in triconsonantal verbs

Triconsonantal verbs, however, cannot reduplicate all three consonants because of restrictions on the size of word in Arabic. Verbs stems are maximally two syllables and nouns are maximally three syllables. Therefore, the only option for such verbs is to copy only one out of the three consonants, giving partial reduplication. Copying two or more consonants would require the word to exceed two syllables given that the syllable cannot have complex onsets or codas. Reduplication targets either the first or the third consonant.

Reduplication of C_1 inserts a copy of the first consonant to the right of the second consonant, thus changing a simple verb of the form $C_1VC_2VC_3$ to a reduplicated verb with a $C_1VC_2C_1VC_3$ morphological pattern. Representative examples are given in (2):

(2) Simple   Reduplicated
   a. *faraħ* 'to be happy'   *farfaħ* 'to rejoice'
   d. *maraṭ* 'to tear'   *marmaṭ* 'to humiliate severely'
   c. *naʕas* 'to be sleepy' *naʕnas* 'to be very sleepy'
   d. *lahab* 'to flame'   *lahlab* 'to ignite'

Verbs whose second radical is either [w] or [y] are traditionally known as hollow verbs. Only two of these verbs participate in C_1 reduplication. Examples are given in (3):

(3) Simple   Reduplicated
   a. *ṭaaħ*   'to fall'   *ṭo^wṭaħ* 'to swing'
      Root: *ṭwħ*
   b. *laaħ*   'to appear' *lo^wlaħ* ' to wave repeatedly'
      Root: *lwħ*

There are around 56 reduplicated verbs of this type in MA (Appendix I). All of the reduplicated verbs in this group can be semantically related to an existing simple $C_1VC_2VC_3$ verb or a related noun (the examples in (2) and (3)). Apparent exceptions where the reduplicated verb cannot be related to a verb of Form I are given in (4) and explained below:

(4) Reduplicated
   a. *dardam*   'to make into balls'
   b. *dardaš*   'to chat'
   c. *dardaʕ*   'to swallow rapidly'
   d. *ṭarṭaʕ*   'to explode'

The example in (4a) is related to the triconsonantal verb *radam* 'fill up with earth'. This verb has apparently undergone metathesis to give *daram* which reduplicates as *dardam*. The form in (4b) can be metaphorically related to *daraš*, a verb used to describe the act of grinding seeds and legumes for a long time. The similarity to the act of chatting is obvious. The reduplicated form in (4d) is a back formation from the corresponding nouns *ṭurṭeeʕa* 'firework'. This leaves (4c) as the only reduplicated verb that does not stand in direct relationship to a simple unreduplicated counterpart.

The meaning of these reduplicated verbs is intensive or pejorative. In terms of structure, this is a case of infixing reduplication that distinguishes the modern Arabic dialects from Classical and Standard Arabic.

Makkan Arabic has another type of partial infixing reduplication. Only a small number of the triconsonantal verb roots (around 16 verbs) with copying of the third consonant occurs, changing a simple $C_1VC_2VC_3$ verb (in some cases a noun) into a $C_1VC_2C_3VC_3$ (Appendix II). This type of reduplication is further restricted to verbs or nouns where the third radical is one of the coronal sonorants, [l], [n], or [r]. Among the coronal sonorants [l] occurs as the third radical in two thirds of these verbs. Examples are:

(5)   Simple   Reduplicated
    a.   *ṣahal*   'to neigh'   *ṣahlal*   'to rejoice'
    b.   *šaʕal*   'to light'   *šaʕlal*   'to ignite in flames'
    c.   *baʕar*   'dung'   *baʕrar*   'to act in a snobbish way'

Only three exceptions to this generalization exist in the language. These verbs exhibit reduplication of C_3, though C_3 is not a coronal sonorant:

(6)   Reduplicated
    a.   *baɣdad*   'to behave like one from Baghdad'
    b.   *baxšaš*   'to tip'
    c.   *šaħṭaṭ*   ~   *šaħšaṭ*   'to drag roughly'

The exceptional behavior of the verbs in (6) can be attributed to the fact that the first two of these verbs, (6a) and (6b), are denominal verbs derived from the nouns *baɣdaad* 'Baghdad', and *baxšiiš* 'tip', respectively. The specific example in (6c) is probably a dialectal variation; the Levantine Arabic form is *šaħšaṭ* with reduplication of C_1 (Broselow and McCarthy 1983: 36). The result is that the three examples in (6) cannot be considered as counter-examples to the coronal sonorant restriction imposed by MA on reduplication of C_3. Therefore, the condition holds for C_3 reduplication.

Very few of the verbs in this group cannot be semantically related to simple verbs or nouns:

(7)   <u>Reduplicated</u>
   a.   *ʕak**nan***   'to spoil the mood'
   b.   *šaʕ**nan***   'to have a short temper'
   c.   *zaɣ**lal***   'to dazzle'

While reduplication of C_3, can be traced back to Standard Arabic, reduplication of C_1 is a totally new innovation of MA and most of the Arabic dialects. Reduplication of C_3 is well documented and is formed on the *Faʕlal* pattern. In traditional grammars of Arabic, it is discussed under the name *rubaaʕi maziid biħarf* 'quadriliteral augmented with one letter, i.e., sound'. Colloquial examples in (5), (6), and (7) are parallel to Standard Arabic examples like, *jalbab* 'to wear a robe', *qarfaf* 'to feel disgusted', and *šamlal* 'to be vivid'. However, none of the examples of C_1 reduplication (cf. Appendix I) corresponds to Classical $C_1VC_2C_3VC_3$ verbs.

It is worth noting that reduplicated verbs of all types, biconsonantal and triconsonantal, participate in further morphological derivation, mostly in the formation of the past participle:

(8)   <u>Reduplicated</u>   <u>Past Participle</u>
   a.   *lablab*   *lab**l**uub*   'blabber'
   b.   *dabdab*   *dab**d**uub*   'chubby'
   c.   *lahlab*   *lah**l**uub*   'smart'
   d.   *farfaš*   *far**f**uuš*   'cheerful'
   e.   *bahlal*   *bah**l**uul*   'clown'
   f.   *šaʕnan*   *šaʕ**n**uun*   'short-tempered'

The examples in (8) show further derivation applied to reduplicated forms of biconsonantal verbs (8a & 8b), triconsonantal verbs with reduplication of C_1 (8c & 8d), or C_3 (8e & 8f). Some of the totally reduplicated verbs have corresponding active participles:

(9)   <u>Reduplicated</u>   <u>Active Participle</u>
   a.   *baṣbaṣ*   *baṣ**b**aaṣ*   'a flirt'
   b.   *laʕlaʕ*   *laʕ**l**aaʕ*   'a loud person'

2.2.3 Reduplication in nouns and adjectives

The last type of reduplication in MA involves nouns and adjectives. These nouns and adjectives have the same morphological pattern of a simple unreduplicated verb, i.e., $C_1V.C_2VC_3$. The form of the reduplicated noun or adjective is $C_1V.C_2VC_3.C_2VC_3$, where the reduplicant is a copy of the second CVC syllable of the base. It is clearly a case of suffixing reduplication.

Makkan Arabic is probably the only Arabic dialect, or at least among the very few, that has this type of reduplication. This process is not as active as reduplication in verbs. However, it has started to gain considerable popularity among speakers of this dialect. In

fact, any CV.CVC structure can be mapped into this pattern of reduplication. Few examples of this type are in daily use in the Makkan dialect. The following are some of the most frequently used forms (See Appendix III for more examples):

(10)   Simple   Reduplicated
     a.   *ħuruk*   'moving'   *ħuruk**ruk**   'about to fall'
     b.   *ḍaraħ/ḍariiħ* 'grave'   *ḍaraħ**raħ**   'continuous small annoyance'
     c.   *samak*   'fish'   *samak**mak**   'exclusively for fish'

Unlike reduplicated verbs discussed above the reduplicated forms in this category are not normally subject to further morphological derivation. This pattern expresses the diminutive or partitive meaning, and participates in hypochoristic formation in the language (see Abu-Mansour 2010).

2.3 Reduplication in other varieties of Arabic

The purpose of this section is to highlight the basic characteristics of reduplication that MA shares with the other dialects. First, the survey below shows that reduplication in verbs is not specific to MA. Rather, it plays a crucial role in the verb morphology of Arabic in general; reduplication is one way of forming quadriliteral verbs thus creating new lexical items. Reduplication of both biconsonantal and triconsonantal verbs is well represented in all varieties of Arabic including the Standard variety. Second, with no exception, the examples provided from the different dialects exhibit a basic property of reduplication, and that is the absence of geminates. Geminates are categorically banned from all reduplicative forms (see Rose 2000). In addition, it will emphasize that reduplication of nouns and adjectives of the type discussed in this paper is unique to MA.

2.3.1 Biconsonantal verbs

Reduplication of bi-consonantal verbs is not new in the morphological system of Arabic or Semitic. In fact, as Brockelmann (1908) (cited in El Zarka 2005) states reduplication of biradical roots is a feature of West Semitic. Studies on Classical and Standard Arabic all agree that biconsonantal roots reduplicate to give verbs with two identical syllables that indicate intensive or repeated actions.

In discussing the structure of roots that reduplicate in this manner, Arab grammarians distinguish between simple un-reduplicated verbs and their reduplicated counterparts. They call them by two different names. Simple verbs like *zall* 'to shake' and '*raqq*' 'to become tender' are called *θulaaθi muḍaʕʕaf* 'geminate triliteral' verbs, while the reduplicated forms of these verbs, *za**l**zal* 'to shake violently' and *raqraq* 'to make tender', are called *rubaaʕi muḍaaʕaf* 'geminate quadriliteral' verbs. Wright (1974) treats the reduplicated forms of biconsonantal verbs as just quadriliterals along with other quadriliteral verbs with geminated consonants.

Section 4 presents reduplication of biconsonantal and triconsonantal verbs as one and the same process. This unified analysis crucially relies on the assumption that geminate

roots are triconsonantal roots with identical C$_2$ and C$_3$.

Classical Arabic lexicographers drew attention to such verbs in their studies. In his analysis of Althaalibi, Shivtiel (2000: 41) (reported by Versteegh 2009) gives numerous examples of such verbs, both derived, e.g., *kaḥḥa* 'to cough' → *kaḥkaḥa* 'to cough repeatedly', and underived, e.g. *tamtama* 'to mutter'.

Procházka in his (1993) analysis of reduplicated biconsonantal verbs in Arabic considers the reduplicated verb as the original verb form and the simple form as derived thus *takka* is derived from *taktaka*, both of which mean 'to tick'. He groups these verbs into two categories, those that express the intensive meaning and those that indicate rhythmic motion, e.g., *faʔfaʔ* 'to stutter' and *xarxara* 'to snore', respectively.

McCarthy (1979) calls this group of verbs 'geminate roots' of which 200 exist in Classical Arabic. According to this theory biconsonantal roots are realized on the surface with gemination of the second consonant as a result of the universal left-to-right association convention. Therefore, geminate roots are like triconsonantal roots except that the second and third consonants are identical, e.g., /samam/ → [samm] 'to poison'. These biconsonantal roots are subject to a root reduplication process that doubles them and associates them with the prosodic template [CVCCVC] (McCarthy 1981), thus, the root [zl] appears as *zalzal* 'shook'. These roots are also doubly reduplicated in the second and fifth measures of the Arabic verb paradigm, thus, *samm* → *sammam* 'to poison someone', and *ḥall* → *ḥallal* 'to analyze'. Biconsonantal root reduplicated verbs express the intensive meaning in general (Broselow and McCarthy 1983).

Reduplication of biconsonantal roots is well represented in most of the modern varieties of Arabic as well, and is treated as one of the ways to form quadriliteral verbs. These verbs usually give the meaning of intensiveness or repetition of an action. Some of these verbs are onomatopoetic in nature. A handful of the dialects that exhibit reduplication of biconsonantal verbs will be mentioned below.

In Syrian Arabic these verbs are quite common. Examples include *laflaf / bilaflef* 'to wrap up', *ḥalḥal / biḥalḥel* 'to untie, undo', *ʔaṣʔaṣ / biʔaṣʔeṣ* 'to cut', and *šamšam / bišamšem* 'to sniff' (Cowell 1964: 111).

Woidich (2006a) considers reduplication as a means to form quadriradical verbs, both in Cairo Arabic and in Bʕeri Arabic (Woidich 2006b: 299). Reduplicated verbs indicate a diminutive or repetitive sense, e.g., Cairo Arabic *daʔdaʔ* 'to crush' and *taftif* 'to splutter', and Bʕeri *ʕasʕas* 'to grope about' and *balbal* 'to wet'. Other verbs are onomatopoetic in nature, e.g., *dabdab* 'to knock', *karkar* 'to gurgle' and *raṭraṭ* 'to chatter' from Bʕeri Arabic.

In Khartoum Arabic reduplication affects what Dickins (2007: 566) calls twin-radical morphemes, e.g., *kat* → *katkat* 'to tremble' and *maḍ* → *maḍmaḍ* 'to rinse out the mouth'. It also affects doubled roots, e.g., *laff* → *laflaf* 'to wrap round and round'.

Among the many other dialects that show total reduplication of verbs are Meccan Arabic (Bakalla 1979), Bahraini Arabic (Holes 2006), Baghdad Arabic (Abu-Haidar 2006), Kuwaiti Arabic (Holes 2007), Moroccan Arabic (Caubet 2008), and Hadhramawti Arabic (Al-Saqqaf 1999).

2.3.2 Triconsonantal verbs

While reduplication of biconsonantal verbs is found in both Standard Arabic and all of the modern dialects, the same cannot be said about reduplication of C_1 or C_3 in triconsonantal verbs. In particular, reduplication of the first consonant seems to be an innovation on the part of the modern dialects. Thus, examples like, *farah* → *farfah* 'to rejoice', and *garaṭ* → *gargaṭ* 'to crunch' are unique to some dialects of Arabic. In this type of reduplication a simple $C_1V.C_2VC_3$ verb changes to $C_1VC_2C_1VC_3$ form with intensive or pejorative meaning.

Cowell (1964: 109) states clearly that reduplication of C_1 in what he refers to as pattern *FaʕFaL*, e.g., *ṭarṭaš* 'to splatter' "is among the verb patterns that are used little or not at all in Classical Arabic". However, the grammar books of the majority of the modern dialects report the occurrence of examples of C_1 reduplication in the triliteral verbs. They all treat this type of reduplication as well as reduplication in biconsonantal verbs as a means of forming quadriliteral verbs. In addition, they agree that verbs reduplicated in this way are intensive and pejorative in meaning. However, it is in Broselow and McCarthy (1983) that we find the first formal analysis of this type of internal reduplication in Levantine Arabic.

Among the dialects that have reduplication of this type is Khartoum Arabic. Dickens (2007: 567) considers single radical reduplication as a feature of Khartoum Arabic morphology. It occurs with sound and medial weak verbs. Examples include verbs like *gargaš* 'to eat bread without broth', *karkaʕ* 'to drink with a gulping sound', *lōlah* 'to wag' < /lwħ/, and *ṭōṭah* 'to swing' < /ṭwṭ/.

Woidich (2006a) considers C_1 reduplication as insertion of consonants. In some cases this leads to what he calls 'semi-reduplication' in verbs. Examples from Cairo Arabic are *radam* → *daram* → *dardim* 'to fill up with earth', *dalaʔ* → *daldaʔ* → 'to spill', and *maraš* → *marmaš* 'to bite' and *naʕaš* → *naʕniš* 'to refresh' from Bʕeri Arabic.

Reduplication of the first consonant is also reported to occur in Meccan Arabic by Bakalla (1979: 580). He cites as examples *ṭarṭaš* 'to splash' and *farfaš* 'to enjoy oneself'.

The other type of partial reduplication that affects triliteral verbs involves copying of the third consonant of the root and placing it after the second consonant, thus changing $C_1V.C_2VC_3$ to $C_1VC_2C_3VC_3$. This pattern can be traced back to Classical as well as Standard Arabic. The Arab grammarians refer to it as *rubaaʕi maziid biħarf waahid* 'quadriliteral augmented by one letter, i.e., sound'. The reduplication pattern is *FaʕLaL* where the third root consonant is reduplicated. Some of C_3 reduplicated forms come from nouns with reduplicated consonants such as *ǰalbab* 'to wear a Jilbab' from the noun *ǰalbaab* 'a kind of dress'. However, the majority of C_3 reduplicated forms have corresponding simple unreduplicated verbs.

The following are examples from Standard Arabic frequently cited in traditional books of grammar:

(11) a. *šaʕlal*
     'He ignited fire'

   b. *ta-šamlal*
     3SG.M-became vivid
     'He became vivid'

   c. *ta-qarfaf*
     3SG.M-felt disgusted
     'He felt disgusted'

Note that in the examples in (11) the third consonant is reduplicated regardless of whether or not it is a coronal sonorant. Therefore, Standard Arabic is different from MA in this respect.

Examples of C_3 reduplication are also found in most varieties of Arabic. Some examples seem to be part of a pan Arab vocabulary, such as, *šaʕlal* 'to ignite', *šamlal* 'to become vivid', and *ʕaknan* 'to spoil the mood'.

2.3.3 Nouns and adjectives

Reduplication in nouns and adjectives of the type discussed here is, however, not as common in the modern Arabic dialects as reduplication of verbs. As mentioned before, MA is among the very few dialects that exhibit reduplication of nouns and adjectives where the second CVC syllable is reduplicated in full, for example, *ħurukruk* 'about to fall' (see Section 2.2.3).

As reported by Zewi (2006: 639), Brockelmann (1908), Moscati (1964), and Lipinski (2001), all agree that reduplication of the second and third consonants indicates a diminutive meaning of the reduplicated forms only in Hebrew for names of color. However, Brockelmann (1928) lists this type of reduplication as one of four patterns that have a diminutive meaning in Semitic languages including Arabic. Zewi cites from Brockelmann (1928: 117) the Arabic example of *ħubaara* 'bustard' which might reduplicate in one of the following ways:

(12) a. *ħubruur / ħibriir* (Reduplication of C_3)

   b. *ħabarbar / ħuburbur* (Reduplication of second CVC syllable)

The example in (12b) is identical to the Makkan example *ħurukruk* 'about to fall' and to the examples in (10). In fact, this pattern of reduplication, which distinguishes MA from the other dialects, bears striking similarity to diminutive reduplication in Modern Hebrew. The following examples from Hebrew (Kreitman 2003) exhibit similarity to the MA data:

(13)   <u>Simple</u>   <u>Reduplicated</u>
   a.   *gezer*   'carrot'   *gzarzar*   'baby carrot'
   b.   *šamen*   'fat'   *šmanman*   'chubby'
   c.   *lavan*   'white'   *levanvan*   'whitish'
   d.   *varod*   'pink'   *vradrad*   'pinkish'

The only difference between the MA examples in (10) and the Hebrew examples in (13) is that some of the Hebrew examples include complex onsets that result from a rule specific to Hebrew.

This section has shown that reduplication is well documented in the verbal system of the Standard language, and is widely used in the grammar of the majority of the modern dialects to form quadriradical verbs. Reduplication of C_1 is, however, a characteristic of the modern dialects. Makkan Arabic is unique in having reduplication of nouns and adjectives as a process that applies freely to any noun or adjective that has a $C_1V.C_2VC_3$ structure turning it to a $C_1V.C_2VC_3.C_2VC_3$.

3. Preliminaries

This section elaborates on issues that are germane to the scope of the data and to the analysis. I first discuss the reasons that underlie the exclusion of gemination of C_2 that marks Form II of the Arabic verb as a form of reduplication.

3.1 Gemination of C_2 versus reduplication

Semitic languages in general and Arabic in particular, both the Standard language and the different modern dialects, exhibit various types of consonant doubling. The question that arises here is 'should all types of consonant repetition be counted as instances of reduplication?' The literature is divided on this issue. El-Zarka (2005: 371) considers all types of consonant doubling including the gemination of C_2 in Arabic as cases of reduplication. She also reports other studies that share this view (Moravcsik 1978; Rubino 2005). However, none of these studies provide convincing arguments to treat all types of consonant doubling as reduplication. The opposite view has been maintained in recent work in phonological theory; for instance, Wiltshire and Marantz (2000) exclude gemination in Semitic from discussion of reduplication.

While the question of local versus long distance geminates has been given serious consideration in recent work on Semitic and non-Semitic languages (Gafos, 1995, 1998; Rose 2000), the details of the differences between the two types of geminates are not relevant to the analysis presented here. However, the lack of geminates in reduplicative forms has been reported for many languages. For instance, Rose (2000) considers avoidance of geminates as a characteristic of reduplication. She reports a wide variety of processes in different languages that eliminate geminates from the reduplicant. The discussion provided below is in line with Rose's (2000) observation.

In what follows I provide arguments that support the exclusion of gemination of C_2 as an instance of reduplication. It will become clear that both structural and semantic differences distinguish the two. These differences rest on valid analytical grounds that cannot be ignored in any serious attempt to characterize and document the phenomena of reduplication and that of gemination. I first consider the representation of geminates in recent phonological theory, and then provide evidence internal to the data under consideration to justify the exclusion of gemination of C_2 from the discussion of reduplication.

The following examples represent Form II of triconsonantal (14a) as well as biconsonantal verbs (14b):

(14)   Form I   Form II
    a.   *katab*   'to write'   *kattab*   'to make write'
   b.   *daqq*   'to knock'   *daqqaq*   'to scrutinize'

Form II is derived by gemination of the middle consonant (14a) or gemination followed by spreading (14b). Form II of the Arabic verb designates the causative meaning in addition to the intensive.

The formal representation that has been given to geminates in autosegmental phonology (McCarthy 1979, 1981) is one of multiple associations of root consonants with the CV-tier. However, this original approach requires delinking and linking again (see McCarthy 1979). Thus, in prosodic morphology (McCarthy 1992), this representation has been modified. Gemination of Form II has been described as augmentation of the Form I stem through the addition of a mora. This mora is realized as an infix via prosodic circumscription. Medial gemination of Form II is thus analyzed as a disyllabic template consisting of a bimoraic syllable and a monomoraic syllable whereby the final consonant is extrasyllabic. The geminate consonant is represented as autosegmentally linked to a mora in the coda of the first syllable and at the same time to the onset of the second syllable. This representation is shown in the following diagram using *kattab* as an example:

(15)   Medial Gemination Rule (McCarthy and Prince 1990b: 46)
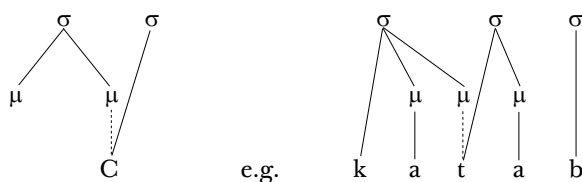
This double linking of geminates diagramed in (15) is clearly different from the mode of one-to-one association that figures in the reduplicative template illustrated in (16) by reduplication of C_1. This is exemplified with the reduplicated verb *farfaħ* 'to rejoice':

(16) f a r f a $\hbar$

        | | | | | |

        C_1 V C_2 C_1 V C_3
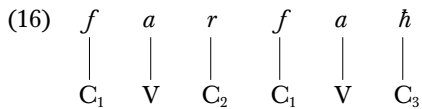
In (16) each melodic element is exclusively associated with one and only one slot on the CV-tier. Multiple linking of /f/ is blocked by line-crossing. The upshot of this discussion is that gemination is structurally different from reduplication. This difference in structure is captured by the distinct representation it has been given in phonological theory and therefore must be kept apart in any consideration of reduplication proper.

Further support for the previous argument is internal to the data under consideration; it comes from reduplication of C_3. The point here is that while only coronal sonorants, *n*, *l*, and *r* participate in C_3 reduplication in MA, all types of consonants, coronal sonorants and others, can be geminated and then spread to C_3 position in Form II of biconsonantal verbs. The following examples show that any consonant can be doubly geminated. This is what McCarthy (1981) calls double reduplication in the second and fifth *binyanim* 'forms' with roots like *sm: sammam*. The examples in (17) are from MA:

(17)   <u>Form I</u>   <u>Form II</u>

    a. *habb*   'to get up'   *habbab*   'to make some one stand up, to spoil'

    b. *šamm*   'to smell'   *šammam*   'to make smell'

    c. naṭṭ   'to jump'   *naṭṭaṭ*   'to make jump'

    d. *ṣaħħ*   'correct (ADJ)'   *ṣaħħaħ*   'to correct (verb)'

All consonant types in the examples in (17) participate in gemination. These include an obstruent in (17a), a non-coronal sonorant in (17b), an emphatic in (17c), and a guttural in (17d). All involve spreading of the phonetic material of C_2 to position three under the principle of left-to-right spreading (McCarthy 1979; McCarthy and Prince 1990a, 1990b). This spreading takes place whenever constraints on the prosodic shape require it regardless of the type of consonant.

Now consider the same consonant types in the examples in (18) and how they behave with respect to reduplication:

(18)   <u>Simple</u>   <u>Reduplicated</u>

    a. *lahab*   *lahlab*   'to inflame'   not   **lahbab*

    b. *maraṭ*   *marmaṭ*   'to spoil'   not   **marṭaṭ*

    c. *šaraħ*   *šaršaħ*   'to criticize severely' not   **šarħaħ*

Reduplication of C_3 is not possible with any of the consonants in (18) since none of them satisfies the condition of being coronal and sonorant. Rather it is C_1 that reduplicates.

As pointed out by one of the reviewers, further support for drawing a distinction between reduplication and gemination of consonant C_2 in Form II of the Arabic verb comes

from the failure of the underlying geminate to be realized in the reduplicated form. In form II of the verbs in (17), gemination consistently marks the causative. However, in the reduplicated forms of the verbs in (17), none of the reduplicative forms exhibits gemination: *habhab* 'to live a slipshod life', *šamšam* 'to sniff', *naṭnaṭ* 'hop up and down continuously', and *ṣaḥṣaḥ* 'to become very alert'.

The conclusion here is that gemination of C_2 in triconsonantal verbs and gemination followed by spreading in biconsonantal verbs to derive Form II are both structurally different from reduplication and therefore cannot be given the same analysis as reduplication.

The other argument in support of excluding Form II of the verb from the discussion of reduplication is semantic in nature. Two issues are relevant to the discussion. The first point revolves around the change in the meaning expressed by Form II. This change happened gradually as we move from Classical and Standard Arabic to the modern dialects, and had the effect of dissociating Form II from meanings closely related to the meanings expressed by reduplicated verbs. I explain below.

The original meaning of Form II in Classical Arabic is that of expressing the meaning of 'intensive' (19a), and covers different ways of carrying out an action, such as 'continuous' (19b), 'iterative' (19c), or 'distributive' (19d) (Wright 1974):

(19)   <u>Form I</u>   <u>Form II</u>
   a.   kasara   'to break'   kassara   'to break in pieces'
   b.   daraba   'to beat'   darraba   'to beat continuously'
   c.   ṭaafa   'to circle'   ṭawwafa   'to go round often'
   d.   baraka   'to kneel (SG)'   barraka   'to kneel down (PL)'

The semantic field that is covered by Form II has undergone a considerable change. On the one hand some of the meanings that used to be expressed by Form II of the verb (19b, c, & d) have been weakened or lost. On the other, Form II started to take over the function of expressing the causative meaning, which originally belongs to Form IV. In fact, in most of the Arabic dialects Form IV verbs are either rare or exist only in few fixed expressions or recent borrowings from Standard Arabic. See Holes (2006) for Bahraini Arabic, Lentin (2006) for Damascus Arabic, Cowell (1964: 240–241) for Syrian Arabic, Abu-Mansour (2007) for Meccan Arabic, and Dickins (2007) for Khartoum Arabic. The result is that the main function of Form II of the verb in all of these dialects is to express the causative meaning. A few examples of this change are given below:

(20)   <u>Standard</u>   <u>Colloquial</u>
   a.   *ʔabka*   (IV)   *bakka*   (II)   'to make cry'
   b.   *ʔawqafa* (IV)   *waggaf*   (II)   'to arrest'
   c.   *ʔasma*   (IV)   *samma*   (II)   'to name'
   d.   *ʔamla*   (IV)   *malla*   (II)   'to dictate'
   e.   *ʔašbaʕa* (IV)   *šabbaʕ*   (II)   'to make full'

The result of these changes is that Form II of the verb, which is morphologically char-acterized by gemination of C_2, is almost exclusively used to express the causative meaning in the modern dialects and not so strongly associated with meanings related to reduplica-tion; thus it should not be counted as a pattern of reduplication.

3.2 Theoretical background

The analysis of MA reduplication offered in this paper is couched in the framework of Optimality Theory (Prince and Smolensky 1993) and its offspring, Correspondence Theory (McCarthy and Prince 1995). Correspondence Theory maintains the three fundamental tenets of OT, parallelism of constraint interaction, constraint ranking, and faithfulness between derivationally-related representations. It also "extends the reduplicative copying relation of McCarthy and Prince (1993a) to the domain of input output faithfulness, and indeed to any domain where identity relations are imposed on pairs of related representa-tions. The full theory of reduplication involves correspondence between stem and base, between base and reduplicant, and between stem and reduplicant" (McCarthy and Prince 1995: 252). The diagram in (21) shows the basic system of relations:

(21)   Basic Model (McCarthy and Prince 1995: 252)

        Input: $/\text{Af}_{\text{RED}}$ + Stem$/$

                                  $\updownarrow$ I-O *faithfulness*

        Output: R $\rightleftarrows$ B

                   B-R Identity

Under Correspondence Theory, the reduplicative morpheme is represented in the input as an abstract phonologically empty morpheme which receives its segmental content from the base via a correspondence relation. Correspondence is a relation between two structures such as base and reduplicant or input and output (McCarthy and Prince 1995: 262):

(22)   Correspondence (McCarthy and Prince 1995: 262)
        Given two strings S_1 and S_2, CORRESPONDENCE is a relation R from the elements
        of S_1 to those of S_2. Segments $\alpha \in S_1$ and $\beta \in S_2$ are referred to as CORRESPONDENTS
        of one another when α R β.

The identity between base and reduplicant or input and output is assessed by three families of constraints that decide the degree of correspondence. Two of the faithfulness constraints will be relevant to the analysis in this paper, MAX and DEP. The general schema of the two constraints are given in (23) (McCarthy and Prince 1995: 264):

(23) MAX

        Every segment of S_1 has a correspondent in S_2 .

   DEP

        Every segment of S_2 has a correspondent in S_1.

               Where S_1 (base, input, etc.)

                    S_2 (reduplicant, output, etc.)

MAX inhibits deletion, while DEP prevents insertion. In reduplication it is the correspondence between the base and the reduplicant that is assessed by these two constraints, hence, MAX-BR and DEP-BR are the relevant constraints responsible for assessing the correspondence between base and reduplicant. If MAX-BR is un-dominated, there is perfect correspondence between base and reduplicant, which means total reduplication. If, for some higher-ranking prosodic constraints, correspondence between base and reduplicant is not perfect, then we have a case of partial reduplication. The other instantiation of the faithfulness constraints are MAX-IO and DEP-IO. High ranked input/ output faithfulness constraints protect the base from truncating.

With this brief theoretical introduction of Correspondence Theory, I proceed to mention some general characteristics of the data that will underlie the formal analysis.

3.3 General characteristics of the data

Reduplication in MA involves the affixation of the RED-morpheme. The presence of this affix in the input causes copying from the base. Reduplication is internal in verbs, but suffixal in nouns and adjectives. The following observations can be stated on the basis of the data:

(24) The size of the reduplicant varies: it is a single consonant C in verbs, and a bimoraic CVC syllable in reduplication in nouns and adjectives.

This generalization is in line with the constraint proposed in McCarthy and Prince (1994) that restricts the size of the reduplicant to a syllable. This constraint is given in (25):

(25) Afx≤ σ (McCarthy and Prince 1994)
     The phonological exponent of an affix is no longer than a syllable.

The second property exhibited by the data concerns the output of reduplication. The output of reduplication in all types has the structure (CV).CVC.CVC. This generalization is given in (26):

(26) The final templatic shape of all reduplicated forms is CVC.CVC.
     In prosodic terms this is a HL uneven trochaic foot.

The third and crucial generalization concerns the position of the reduplicant. It is always aligned to the right edge of the stressed syllable or the head of the prosodic word. The alignment of morphological categories to prosodic constituents has been established in McCarthy and Prince (1993b). Gafos (1995) analyzes Temiar reduplication as prefixation to the stressed syllable.

There is no need to stipulate (25) and (26); rather the size of the reduplicant for each type of reduplication as well as the final templatic shape of reduplicated forms will emerge as a result of the interaction of high-ranked constraints, such as maximum size on the prosodic word and the alignment of the reduplicant to the right edge of the stressed syllable.

4. The analysis

Reduplication in MA targets the root consonants of the verbs, nouns, or adjectives and maps them into a CVC.CVC, the template of quadriliteral verbs. In what follows, I analyze reduplication in both biconsonantal as well as triconsonantal verbs as instances of affixation. The affix can either be a prefix or a suffix. The infixal status of an affix emerges as a result of the dominance of some phonological constraints in the language. This assumption is in accordance with McCarthy and Prince's (1993b) theory of infixation and its relation to the alignment of morphological categories with each other and with prosodic categories. Their analysis focuses on the phenomenon of infixation in Tagalog and other related languages where an affix surfaces as a prefix or a suffix only if its status in the hosting word does not violate highly ranked phonological constraints; otherwise, it migrates into an infixal position in order to avoid the violation.

I extend this idea to the analysis of reduplication in Arabic. I claim that reduplication of C_1 and C_3 of the verb are instances of prefixal and suffixal reduplication, respectively. The reduplicant in each case will surface as an infix due to satisfaction of highly ranked markedness constraints in the language. Following Broselow and McCarthy (1983), reduplication of C_1 in biconsonantal and triconsonantal verbs is treated in the same way assuming that the simple form of biconsonantal verbs is $C_1VC_2VC_2$.

Reduplication in nouns and adjectives will be analyzed as a straightforward case of suffixing reduplication thus subject to few more constraints.

4.1 Biconsonantal verbs

At the beginning of the analysis we need to establish the infixal position of the reduplicant. The assumption here is that a reduplicant can either be a prefix or a suffix (McCarthy and Prince 1993b). A well-aligned prefix is one that coincides with the left edge of the stem in the absence of phonological constraints; otherwise, misalignment occurs. In the case of biconsonantal verbs (and triconsonantal verbs as we will see below), C_1 of the root is the reduplicant and it is prefixed to the stem. The stem, I assume, is the simple underived form of the verb.

A defining characteristic of reduplication is the absence of geminate consonants from

the CVC.CVC template that characterizes all reduplicated forms; therefore, it needs to be accounted for at the onset of the analysis. This prohibition is formally expressed by the markedness constraint *COMPLEX given in (27). Two other constraints are also needed here, namely, the OCP constraint and the alignment constraint stated in (28) and (29), respectively. The OCP constraint militates against adjacent identical segments while the alignment constraint requires the reduplicant to be aligned with the left edge of the stem.

(27) *COMPLEX (Prince and Smolensky 1993)
      Complex margins are prohibited.

(28) The Obligatory Contour Principle (OCP) (Leben 1973; Goldsmith 1976; McCarthy 1986)
      Adjacent identical segments are prohibited.

(29) ALIGN($[C_1]_{RED}$, L, Stem, L)
      Align the left edge of the reduplicant with left edge of the stem.

(30) *COMPLEX, OCP » ALIGN($[C_1]_{RED}$, L, Stem, L)

RED-*sabab*	*COMPLEX	OCP	ALIGN($[C_1]_{RED}$,L, Stem, L)
a. *ssabab*	*!		
b. ☞*sabsab*			***
c. *sasbab*		*!	**

In constraint interaction in tableau (30), candidates (30a) and (30c) show better alignment of the reduplicant as a prefix than the actual output in (30b); candidate (30c) incurs only two violations of the alignment constraint, while (30a) is perfectly aligned. However, each of these candidates violates one of the markedness constraints; (30a) contains a complex onset and is thus ruled out by *COMPLEX, while (30c) violates the OCP constraint which prohibits adjacent identical segments from occurring. This is the formal expression of the well-established constraint on Arabic roots (McCarthy 1979) and holds over the root tier. As mentioned earlier, the ban against local geminates in reduplicated structures noted by Rose (2000) will rule out the *sabbab* candidate. It also excludes (30a). This leaves (30b) as the winner despite violating the alignment constraint three times. The outcome of the ranking in (30) is that the infixal status of the reduplicant is a direct result of the domination of the markedness constraints; it is better to be an infix and not include a complex onset or adjacent identical segments. Thus, the locus of the affix does not have to be encoded in the input as an infix; it results from the interaction of the markedness constraints with the alignment constraint on the affix.

Reduplication in biconsonantal verbs is partial where only the first consonant of the root is reduplicated. In correspondence theory (McCarthy and Prince 1995) reduplication is expressed by two faithfulness constraints that evaluate mapping between the base and the reduplicant, MAX-BR and DEP-BR. MAX-BR stated in (31) requires total reduplica-

tion by demanding that every segment of the base have a correspondent in the reduplicant.
DEP-BR, on the other hand, militates against insertion of fixed segmentism in the re-
duplicant and therefore does not play any role in Makkan reduplication since one of the root
consonants is always copied.

(31) MAX-BR (McCarthy and Prince 1995: 264)
      Every segment of the base has a correspondent in the reduplicant.
      (Reduplication is total)

      In evaluating input/output mapping two faithfulness constraints are used, namely,
MAX-IO and DEP-IO. In MA reduplication only DEP-IO is utilized, and is given in (32).

(32) DEP-IO (McCarthy and Prince 1995: 264)
      Every segment of the output has a correspondent in the input.
      (Prohibits phonological epenthesis)

The interaction of the faithfulness constraints MAX-BR and DEP-IO with the markedness
constraints discussed thus far is illustrated in tableau (33).

(33) *COMPLEX, OCP » ALIGN([C_1]$_{RED}$, L, Stem, L), MAX-BR » DEP-IO

RED-*sabab*	*COMPLEX	OCP	MAX-BR	ALIGN([C1]$_{RED}$, L, Stem, L	DEP-IO
a. *sasbab*		*!		**	*
b. ☞*sabsab*				***	*
c. *ssabab*	*!	*	*		
d. *sabab*			*!		

      In tableau (33), two new rankings are established, namely between MAX-BR and
ALIGN-L and DEP-IO, where the former dominates the latter. This is on the grounds that
candidate (33d) is the only output that does not parse its consonantal reduplicant at the
expense of not incurring any violation of ALIGN-L and DEP-IO.

      At this point the partial ranking in (34) can be established for the data considered so
far, i.e., reduplication in biconsonantal verbs.

(34) Partial ranking

                 *COMPLEX   OCP

                    Max-BR

                   ALIGN-L

                    DEP-IO
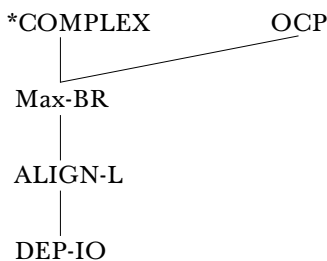
The infixal nature of the reduplicant is decided by the un-dominated markedness constraints, while the fact that reduplication is partial is illustrated by the lower ranking of MAX-BR.

4.2 Triconsonantal verbs

Triconsonantal verbs exhibit a slightly different behavior from biconsonantal ones. The first consonant is always copied unless the third consonant is one of the coronal sonorants sounds, [n], [l], or [r], then the third consonant is reduplicated. The same constraint ranking we obtained in our discussion of biconsonantal verbs holds here explaining the infixal status of the reduplicant. This constraint ranking is repeated in (35) using the triconsonantal verb *farfaħ* 'to rejoice'.

(35)   *COMPLEX, OCP » ALIGN($[C_1]_{RED}$, L, Stem, L)

RED-*faraħ*	*COMPLEX	OCP	ALIGN($[C_1]_{RED}$, L, Stem, L)
a. *ffarraħ*	*!		
b. *fafraħ*		*!	**
c. ☞ *farfaħ*			***

Candidate (35a) fatally violates the markedness constraint *COMPLEX so it is excluded. Output (35b) loses by virtue of placing the reduplicant before C_2 thus earning one mark of violation for the OCP. This renders (35c) optimal despite having three violations of the alignment constraint. The conclusion at this point is that triconsonantal verbs where C_1 reduplicates and biconsonantal verbs behave in the same manner although the surface reduplicated forms of these verbs look different. Compare *farfaħ* 'to rejoice' and *sabsab* 'to insult severely'. The internal position of the reduplicant is determined by the markedness constraints of *COMPLEX and the OCP.

We now move to the second type of triconsonantal verbs where the third consonant that is a coronal sonorant is copied. The same argument used to establish the infixal status of the reduplicant in biconsonantal verbs holds here with a minimal difference. The designated edge in this case is the right periphery of the stem. This is a general form of Alignment for suffixes (Prince and Smolensky 1993). The reduplicant is assumed to be a suffix in this group of verbs and the size of the reduplicant is one consonant, C_3. The following new constraints will come into play in accounting for reduplication in these verbs.

(36)   ALIGN($[C_3]_{RED}$, R, Stem, R)
      Align the right edge of the reduplicant with the right edge of the stem.

(37)   RED-C_1
      The reduplicant affix copies the first consonant of the root.

(38)   RED-C_3 [+SON, + COR]

The reduplicant affix copies the 3rd consonant of the root only if it a coronal sonorant.

(39)   *COMPLEX, RED-C_3 [+SON, +COR] » RED-C_1 »OCP, ALIGN([C_3]$_{RED}$, R, Stem, R

ṣahal-RED	*COMPLEX	RED-C_3 [+SON, +COR]	RED-C_1	OCP	ALIGN([C_3]$_{RED}$, R, Stem, R)
a. ṣah**ṣ**al		*!			
b. ṣaha**ll**	*!		*	*	
c. ☞ ṣah**l**al			*	*	*

In candidate (39b) the reduplicated consonant, a copy of C_3, is perfectly aligned with the right edge of the stem; however, it violates *COMPLEX and is thus excluded. Candidate (39a) is also ruled out since it copies C_1 of the root in the presence of a coronal sonorant as a third root consonant. The actual output ṣahlal violates the alignment constraint minimally, but satisfies the highly ranked markedness constraint *COMPLEX.

While the ranking in (39) is enough to establish the infixal position of the reduplicant in reduplication of C_3, the violation of the OCP constraint by the optimal form in (39c) remains to be explained. Recall that in reduplication of C_1, OCP is highly ranked and plays a crucial role in establishing the locus of the reduplicant as an infix. In other words, avoidance of an OCP violation in reduplication of C_1 results in pushing the reduplicant further inside the stem (see tableaux (33) & (35)). However, this is not the case in (39c) where an OCP violation is tolerated in the actual output.

This asymmetry in the ranking of OCP with respect to the different edges of the stem can be attributed to a general property of the Arabic lexicon. It is a well-known fact that there are no verbal or nominal roots with identical first and second radicals (Greenberg 1951; McCarthy 1979, among others). However, verb roots with identical second and third radicals are quite common in Arabic. In autosegmental phonology their existence is explained as an expected result of the operation of the convention of left-to-right association, which also explains the absence of roots with identical first and second radicals. So, one can expect the low ranking of OCP in the right periphery of the stem.

However, in an OT analysis an explanation that involves constraint interaction is to be preferred. The constraint in question is an alignment constraint. It is motivated by the observation that in all types of reduplication in Sections 2.2 and 2.3, the reduplicant always comes after the stressed syllable. The alignment of reduplicative structures to the prosodic word or the stressed syllable has been proposed by Gafos (1998) to account for reduplication in Temiar. The new constraint appropriate for the Arabic data is given in (40). It demands that the left edge of the reduplicant be aligned with and adjacent to the right edge of the stressed syllable. Its interaction with OCP is illustrated in (41).

(40)   ALIGN, RED, L, STRESSED-SYLLABLE, R

Align the left edge of the reduplicant with the right edge of the stressed syllable.

(41) ALIGN-RED, L, STRESSED-SYLLABLE, R » OCP

ṣáhal-RED	ALIGN-RED, L, Ś, σ, R	OCP
a. ṣálhal	*!	
b. ☞ ṣáhlal		*

The ranking in tableau (41) shows that OCP has to be violated by the optimal candidate in (41b) in order to avoid misalignment of the reduplicant with the stressed syllable. In (41a), further migration of the reduplicant inside the stem spares the candidate an OCP violation but at the expense of violating the alignment constraint. Then, the ranking in (41) must hold making OCP a dominated constraint on the right edge of the stem. Note that with respect to reduplication of C_1 the OCP and the alignment constraint in (40) do not come into interaction and are not ranked with respect to each other. In C_1 reduplication, the optimal form satisfies both constraints independently at the same time.

Furthermore, the fact that the optimal output satisfies the constraint RED-C_3 at the expense of incurring one mark of violation for the OCP shows that RED-C_3 must outrank the OCP constraint, as evident by the winning output in tableau (42).
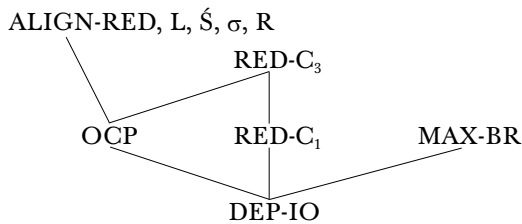
(42) RED-C3 [+SON, +COR] » OCP

ṣahal-RED	RED-C_3[+SON, +COR]	OCP
a. sahṣal	*!	
b. ☞ ṣahlal		*

And finally, in tableau (43), obeying MAX-BR is prioritized over input/output faith DEP-IO thus ruling out candidate (43a) in favor of (43b), then the ranking in (43) must hold.

(43) MAX-BR » DEP-IO

ṣahal-RED	MAX-BR	DEP-IO
a. ṣahal	**!***	
b. ☞ ṣahlal	****	*

(44) Partial ranking

ALIGN-RED, L, Ś, σ, R

RED-C_3

OCP   RED-C_1 MAX-BR

DEP-IO

A note on the behavior of 'hollow verbs' is in order here. As mentioned in Section 2.2.2 very few verbs of this type participate in reduplication of C_1. In fact, [ṭowṭaħ] 'to swing'

and [lowlaħ] 'to wave repeatedly' are probably the only two examples of this type that are used in the Makkan dialect. The simple verb forms of these verbs are [ṭaaħ] and [laaħ], respectively. However, the underlying glide that has been given to these verbs in the books of traditional grammar and in Wehr's (1980) dictionary is *w* in each case. The theoretical significance of these two forms is the fact that reduplication in these examples references the underlying glide in each case, hence [ṭowṭaħ] and [lowlaħ]. In addition to reduplication, the underlying glide surfaces in Form II of these verbs, [ṭawwaħ] 'to cause to swing' and [lawwaħ] 'to wave repeatedly', respectively. These examples provide evidence for recognizing the underlying root.

In this section I have worked out reduplication of both biconsonantal and triconsonantal verbs. In the following section I look at reduplication in nouns and adjectives. Although this type exhibits some differences from reduplication in verbs, it can be accounted for by basically the same set of constraints introduced so far. Only two new constraints are added to characterize the suffixal nature of this type of reduplication.

4.3 Nouns and adjectives

Nouns and adjectives of the pattern CVCVC reduplicate the last CVC syllable by suffixation. This is a productive process used in MA to create new diminutive forms. In accounting for reduplication in nouns I utilize the same constraints that have been employed in the analysis of verbs. New constraints will be introduced when needed.

By reduplicating the second syllable in CVCVC patterns, the second and the third root consonants are copied. Therefore, a new constraint is needed to rule out candidates where the first and the third consonants are reduplicated or even the first and the second consonants. The constraint I-CONTIGUITY in (45) is needed here. I-CONTIQUITY ensures that segments that are adjacent in the base are also adjacent in the reduplicant. My use of this constraint is specific to the sequence assumed by the root consonants regardless of the presence of vowels. In other words, in order for candidates to satisfy this constraint they must keep the order in which the root consonants occur. Unlike reduplication in verbs, the reduplicant in this case is a bimoraic syllable. This constraint is given in (46). The constraint that aligns the left edge of the reduplicant with the right edge of the stressed syllable has been shown to be crucial in C_3 reduplication, and is repeated in (47).

The ranking of I-CONTIQUITY with other constraints that have come into play so far is illustrated in tableau (48).

(45)   I-CONTIG ("No Skipping") (McCarthy & Prince 1995: 371)
       The portion of S_1 standing in correspondence forms a contiguous string.
       Domain (R) is a single contiguous string in S_1.

(46)   RED=σμμ (McCarthy and Prince 1995)
       The reduplicant is a bimoraic syllable.

(47) ALIGN, RED, L, STRESSED-SYLLABLE, R

Align the left edge of the reduplicant with the right edge of the stressed syllable.

(48) ALIGN-RED, L, STRESSED-SYLLABLE, R, I-CONTIG » DEP-IO

samak-RED	ALIGN-R, L, ś-σ, R	I-CONTIG	DEP-IO
a. *samáksak*		*!	***
b. *sámakak*	*!		**
c. ☞ *samákmak*			***

In tableau (48), form (48a) is ruled out by the I-CONTIGUITY constraint because the reduplicant copies C_1 and C_3 of the base. Candidate (48b) loses due to fatal violation of the alignment constraint where the reduplicant is not aligned with the stressed syllable thus allowing (48c) to emerge as the winner.

Another potential output that can compete for the optimal candidacy is the one that copies C_1 and C_2 of the root, and thus obeying I-CONTIG. The constraint that will decide either in favor of or against this candidate is RIGHT-ANCHOR-BR stated in (49).

(49) RIGHT-ANCHOR-BR(McCarthy and Prince 1995: 371)

Any element at the designated periphery of S_1 has a correspondent at the designated periphery of S_2.

(50) RIGHT-ANCHOR-BR » I-CONTIG, DEP-IO

samak-RED	RIGHT-ANCHOR-BR	I-CONTIG	DEP-IO
a. *samáksam*	*!		***
b. ☞ *samákmak*			***
c. *samáksak*		*!	***

In tableau (50) RIGHT-ANCHOR-BR dominates both I-CONTIG and DEP-IO. This is on the grounds that while both outputs in (50a) and (50b) fare equally with respect to the faithfulness constraint and both copy consecutive elements of the root, only candidate (50b) satisfies the anchor constraint rendering it optimal. Note that candidate (50c) is ruled out by the contiguity constraint.

A salient characteristic of reduplication in nouns and adjectives is the maximization of the size of the reduplicant; it is a bimoraic CVC as opposed to a single C in the case of verb reduplication. This property remains to be expressed in terms of constraints.

Input/output evaluation with base/reduplicant faithfulness and the markedness constraint on the size of the reduplicant are illustrated in the following tableaux. Both MAX-BR and RED=σμμ support the realization of the maximum size of the infix.

(51) MAX-BR » DEP-IO

| *samak*-RED	MAX-BR	DEP-IO
a. *samak**ma***	***!	**
b. ☞ *samak**mak***	**	***

Form (51b) bests its rival (51a) because it maps more of the base into the reduplicant. A similar scenario is shown in (52).

(52) RED=σμμ » DEP-IO

samak-RED	RED=σμμ	DEP-IO
a. *samak**ma***	*!	**
b. ☞ *samak**mak***		***

The partial ranking of the three constraints that were needed to account for reduplication in nouns and adjectives is given in (53).

(53) Partial ranking

$$\text{RIGHT-ANCHOR}$$

$$\text{MAX-BR} \qquad \text{I-CONTIG} \qquad \text{RED=σμμ}$$

$$\text{DEP-IO}$$
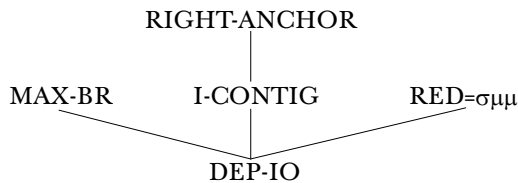
The question that poses itself now is should reduplication in nouns and adjectives be treated as an instance of infixing reduplication under the same assumption that was crucial in verbs? In what follows I consider this possibility. It will become clear that while assuming an infix in this case will add to the unity of the analysis by treating reduplication in verbs and nouns as infixes, an infixal analysis will violate basic principles of the language.

(54) ALIGN-RED, L, ś-σ, R, » RED=σμμ » DEP-IO

samak, RED	ALIGN-R, L, ś-σ, R	RED=σμμ	DEP-IO
a. ☞ *samák**mak***			***
b. ☞ *sámak**mak***			***

Tableau (54) shows satisfaction of the alignment constraints yield two winning outputs with equal marks of violation of all constraints. The wining candidate is the one where the reduplicant is both bimoraic and well aligned. However, once we consider the overall metrical constraints of the language one output emerges as winner, namely, the one where the reduplicant is analyzed as a suffix rather than as an infix. This is illustrated in tableau (55).

(55) ALIGN-RED, L, ś-σ, R, WSP, WBYP » DEP-IO

Samak	ALIGN-R, L, ś-σ, R	WSP	WBYP	DEP-IO
a. ☞ sa(mák)**mak**				***
b. (sá.**ma**)**k**.mak		*!	*!	***

In form (55b) [sá**mak**mak] the reduplicant is an infix and is aligned to the stressed syllable. This candidate, however, violates two of the basic metrical constraints of the language. The two constraints are WEIGHT-TO-STRESS (WSP) and WEIGHT-BY-POSITION (WBYP). These constraints have been established as high ranked in the prosodic structure of MA (Kabrah 2004, 2014). First, candidate (55b) violates the WSP constraint that requires heavy syllables to be prominent and thus receive stress. This is not true of the heavy syllable of the infix; **k** cannot be assigned a mora since its syllable is parsed as a light syllable forming a trochaic foot, since degenerate feet are categorically banned. The second constraint that is violated by [sá**mak**mak] is WBYP that requires codas to be moraic and **k** is not. Since **mak** is parsed as a light syllable by not assigning a mora to the coda **k**, candidate (55b) fatally violates the two metrical constraints so it loses. The optimal form in (55a) obeys both metrical constraints.

The conclusion here is that giving a suffixing analysis to reduplication in nouns and adjectives is to be chosen because of the overall prosodic structure of the language.

5. Conclusion and future research

This paper offered the first unified analysis of reduplication in MA in terms of Optimality Theory and Correspondence Theory. The main idea of the paper was the analysis of internal reduplication in the verb system of Arabic as a case of prefixal or suffixal reduplication. The infixed consonant in reduplication of C_1 is analyzed as a prefix and that in the reduplication of C_3 as a suffix. Satisfaction of highly ranked markedness constraints compels these reduplicative affixes to migrate into an infixal locus inside the stem giving what has been known as internal or infixal reduplication in Arabic. Reduplication in nouns and adjectives was analyzed as a straightforward case of suffixing reduplication.

The analysis has several significant implications for linguistic theory in general and Arabic linguistics in particular. First, the internal or infixal reduplication typical of Arabic is subsumed under the less exotic patterns of affixation, prefixing or suffixing. Therefore, Arabic provides further instantiation of the typology of infixation established in McCarthy and Prince (1993b). Second, the analysis lends support to the crucial role of the alignment of edges of constituents in linguistic analysis. It is therefore in line with the basic tenets of Optimality Theory and Generalized Alignment. Two types of alignment constraints figure prominently in the analysis: the alignment of one morphological category with another and the alignment of morphological constituents with prosodic structures. Constraint ranking possible in Optimality Theory establishes the former case of alignment as being outranked by markedness constraints, while the latter is undominated in all types of reduplication in

the language. Third, the analysis establishes basic structural and semantic properties that distinguish reduplication proper from gemination of the second consonant of the root in Form II of the Arabic verb.

Finally, both the data and analysis offered in this work point to several striking similarities in reduplication in the verbal system of different varieties of Arabic. Specifically, the absence of geminates from reduplicative forms, the infixal nature of the reduplicant in all types of verb reduplication, and the alignment of the reduplicant to the stressed syllable emerge as the main characteristics of reduplication in general. The possibility of generalizing this part of the analysis to account for verb reduplication in other dialects or in Arabic in general is feasible. Therefore, *COMPLEX, OCP, and the alignment constraints become the undominated constraints in the phonology of reduplication in all varieties of Arabic. Variation will then involve aspects like the presence of C_1 reduplication in a dialect and the restrictions or lack of restrictions imposed on C_3 reduplication, which will require a few other constraints ranked differently for each dialect. In addition, more dialects might turn out to be like MA in having reduplication of nouns and adjectives of the type described in the paper.

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Appendix I

Reduplication of C$_1$

Simple verb	Meaning	Reduplicated verb	Meaning
baħaš/ baħas	'search'	baħbaš	'prope'
—		barbax	'a big hose'
baraǰ	'to display'	barbaǰ	'to swell'
barraħ	'make room'	barbaħ	'make extra room'
barad	'shave'	barbad	'shave uneavenly'
—		barbaš	'to flutter one's eyes'
baraʕ	'to be skillful'	barbaʕ	'to be startled'
—		barbaɣ	'to talk a lot'
baʕaǰ	'to slit open'	baʕbaǰ	'to slit open in several places'
baʕaṣ	'to shove'	baʕbaṣ	'to make the obscene gesture repeatedly'
balaṣ	'to bribe'	balbaṣ	'to peep repeatedly'
balaṭ	'to pave with tiles'	balbaṭ	'to float'
balaʕ	'to swallow'	balbaʕ	'to swallow repeatedly'
daħar	'to dislodge'	daħdar	'to roll down a hill'
darab	'a steep alley'	dardab	'roll'
radaħ > daraħ	'to fight relentlessly'	dardaħ	'to train someone to be strong'
daraš	'to grind'	dardaš	'chat'
—		dardaʕ	'to swallow rapidly'
darak	'to last'	dardak	'without interruption'
daram < radam	'fill with earth'	dardam	'make into balls'
dalaʕ	'to pamper'	daldaʕ	'to pamper extensively'
dalag	'pour'	daldag	'pour repeatedly'
—		dandaš	'to use excessive accessories'
danaf	'to lower'	dandaf	'to be weak'
zammar	'to blow a wind instrument'	zamzar	'to scream loudly'
raħaṭ	'soft leather'	raħraṭ	'make saggy'
sarab	'to flow'	sarsab	'to drip sweat'
—		samsar	'act as a broker'
nasaf > sanaf	'to blow up/ scatter'	sansaf	'to destroy with words'
šaħaṭ	'to strand'	šaħšaṭ	'to make all over the place, to scatter'
šurraab	'socks'	šaršab	'to wear socks needlessly'
šaraħ	'to slice, to cut up'	šaršaħ	'to criticize severely'
šaraf	'a straight line'	šaršaf	'bed sheet'
šafag	'to pity'	šafšag	'to feel sorry for'
ṣaraʕ	'to annoy'	ṣarṣaʕ	'startle'
ṭaraš	'to vomit'	ṭarṭaš	'splash'
ṭurṭeeʕa	'fire work'	ṭarṭaʕ	'explode'
faraħ	'be happy'	farfaħ	'rejoice'
faraṣ	'squeeze'	farfaṣ	'to squeeze severely'
faraṭ	'to break up'	farfaṭ	'to break up into pieces'
faraš	'to spread out'	farfaš	'to feel happy'
garaš	'to crunch'	gargaš	'eat crisp cookies'
garaṭ	'to mince'	gargaṭ	'gnash one's teeth'
garaʕ	'to knock'	gargaʕ	'crack'
gahar	'to overpower'	gahgar	'to move backward'
karab	'to overburden'	karkab	'to throw into disorder'
karad	'to wrinkle'	karkad	'to make hair kinky'
—		kalkas	'to blow the horn'
lahab	'to set on fire'	lahlab	'to ignite, to inflame'
maraš	'to pull'	marmaš	'to eat meat from bones'
maraṣ	'to squeeze'	marmaṣ	'to wrinkle'
maraṭ	'to tear out'	marmaṭ	'to treat in a humiliating manner'
maraɣ	'to roll in the dust'	marmaɣ	'to humiliate'
naʕas	'to be sleepy'	naʕnas	'to be very sleepy'
naʕaš	'to refresh'	naʕnaš	'revive'

Appendix II

Reduplication of C$_3$

Simple Form	Meaning	Reduplicated Verb	Meaning
baʕar	'dung'	baʕrar	'to act snobbishly'
baʕal	'husband'	baʕlal	'to take a husband'
bahal	'to curse'	bahlal	'to act like a clown'
dibil	'to wither'	dablal	'to waste away'
digin	'beard'	dagnan	'to grow a shaggy beard'
—		zaɣlal	'dazzle'
sabal	'to shut'	sablal	'to half close the eys'
šaʕal	'to light'	šaʕlal	'to ignite into flames'
—		šaʕnan	'to get mad easily'
šamal	'to gather'	šamlal	'to act vividly'
—		šannan	'grow old ungracefully'
ṣahal	'neigh'	ṣahlal	'rejoice'
—		ṣannan	'to stink'
—		ʕaknan	'to spoil the mood'
hamal	'to neglect'	hamlal	'to disregard'
baxšiiš	'a tip'	baxšaš	'to tip'
baɣdaad	'Baghdad'	baɣdad	'behave like one from Baghdad'
ǰilbaab	'a kind of dress'	ta-ǰalbab	'to wear a Jilbab'

Appendix III

Representative examples of reduplicating nouns and adjectives

Base Form	Meaning	Reduplicated Form
ʔanas	'sociable'	ʔanasnas
ʔamal	'hope'	ʔamalmal
badar	'full moon'	badardar
basma	'smile'	basamsam
tamara	'a name'	tamarmar
ħasan	'beautiful'	ħasansan
ħuruk	'moving'	ħurukruk
ħurum	'depriving'	ħurumrum
ħiliw	'pretty'	ħalawlaw
salaam	'peace'	salamlam
samar	'night stay'	samarmar
samak	'fish'	samakmak
šurum	'clif'	šurumrum
ḍaraħ	'grave, tomb'	ḍaraħraħ
ʕaram	'big'	ʕaramram
ʕazul	'Obnoxions'	ʕazulzul
fatar	'stop pestering'	fatartar
gamar	'moon'	gamarmar
laban	'yogurt'	labanban
laħam	'meat'	laħamħam
malak	'angel'	malaklak
karam	'generosity'	karamram
wisaam	'badge'	wasamsam