Word-Formation and Reduplication in Standard Arabic: A New Distributed Morphology Approach

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Abstract

The current paper aims to capture the properties of reduplication within the distributed morphology model (Halle and Marantz, 1993, 1994; Embick and Noyer, 2007; Siddiqi, 2009; Embick, 2010). Taking Standard Arabic (SA) as a representative, the article shows that SA, like many other languages, has both full and partial reduplication. Full reduplication repeats entire stems while partial reduplication doubles part of it. Rather than the available two analyses, i.e. the readjustment approach (Raimy, 2000; Frampton, 2009) and the affixation approach (Haugen, 2008, 2010, 2011; Haugen and Harley, 2010), the current paper provides a novel approach to the phenomenon of reduplication in the world languages. It argues that root consonants and vowels should be decomposed into non-phonetic distinctive features that undergo late insertion at PF. These non-phonetic distinctive features are supplied with sound items at PF in the same fashion that the terminal nodes with morphosyntactic features are fed with vocabulary items. This approach serves three purposes. It accounts for speech errors, captures the non-concatenative morphology in Semitic languages, and allows the reduplicant form to copy all the distinctive features of the roots, yielding instances of full reduplication. Instances of partial reduplication can be generated by root-sensitive impoverishment rules which target and delete some of the features of the stem or the reduplicant form.

Keywords: reduplication, Standard Arabic, distributed morphology, sound items, impoverishment rule.

1. Introduction

Reduplication is a morphological process in which a stem, segment, or syllable are repeated (Raimy, 2000; Inkelas & Zoll, 2005; Haugen, 2008 among others)[1]. It can be full or partial. Full reduplication repeats full stems as in (1) from Halkomelem (cf. Shaw, 2004), whereas partial reduplication doubles only a part (a sound, two sounds, or a syllable, etc) of the stem as in (2) from Agta (cf. Healey, 1960).

1.	a.	[qʷél]	‘to speak’	→	[qʷél-qʷél]	‘talkative’
	b.	[k’ʷə́ɬ]	‘to capsize’	→	[k’ʷə́ɬ-k’ʷə́ɬ]	‘likely to capsize’
2.	a.	[ɸuɾab]	‘afternoon’	→	[ɸu-ɸuɾab]	‘late afternoon’
	b.	[ŋaŋaj]	‘a long time’	→	[ŋa-ŋaŋaj]	‘a long time (in years)’

There are many grammatical or rhetorical purposes for reduplication (Haspelmath, 2013). The primary use of reduplication is pluralization as in Agta in (3) (cf. Raimy, 2000) and Dakota in (4) (cf. Shaw, 1980).

3.	a.	pusa	‘cat’	→	pu-pusa	‘cats’
	b.	kaldin	‘goat’	→	kal-kaldin	‘goats’
	c.	takki	‘leg’	→	taktakki	‘legs’
	d.	uffu	‘thigh’	→	uf-uffu	‘thighs'
4.	a.	hãska	‘tall’	→	hãska-ska	‘tall (plural)’
	b.	waʃte	‘good’	→	waʃte-ʃte	‘good (plural)’

Reduplication can also be used for intensifying events, as in Gunu in (5a) (cf. Rekanga, 1989), Mbukushu in (5b) (cf. Fisch, 1998) or Yao in (5c) (cf. Ngunga, 2000).

5.	a.	bela	‘lie’	→	bela-bela	‘lie continually’
	b.	kwata	‘touch’	→	kwata-kwata	‘touch everything’
	c.	lima	‘cultivate’	→	lima-lima	‘cultivate frequently’

[1] Abbreviations used in this article are as follows: DM=Distributed Morphology; LF=Logical Form; MS=Morphological Structure; PF=Phonetic Form; SA=Standard Arabic; SI(s)=Sound Item(s); VI(s)=Vocabulary Item(s).

In contrast to the above uses of reduplication (i.e. multiplication and intensity), reduplication can also express the opposite function, namely diminution or attenuation, as in Mainland Comox in (6) (cf. Watanabe, 1994), or as in Ndyuka and Sranan in (7) (cf. Kouwenberg & LaCharité, 2005).

6.	a.	supaju	‘ax’	→	suspaju	‘little ax’
	b.	ʔaltxʷ	‘room’	→	ʔaʔltxʷ	‘little room’
	c.	tala	‘money’	→	tatla	‘little money’

7.	a.	lon	‘to run’	→ lon-lon ‘to be kind of running’	[Ndyuka]
	b.	ferfi	‘to paint’	→ ferfi-ferfi ‘to paint a bit’	[Sranan]

As far as Standard Arabic (SA) is concerned, reduplication is employed for intensity and emphasis (Procházka, 1993; Elzarka, 2005; Maas, 2005; Abu-Mansour, 2015). Full stems can be reduplicated in SA as in (8). These examples are instances of full reduplication.

8. Full Stem Reduplication

a.	xarxar	(cf. xar+xar)	‘bubble’
b.	tamtam	(cf. tam+tam)	‘mumble’
c.	ɣamɣam	(cf. ɣam+ɣam)	‘babble’
d.	zaqzaq	(cf. zaq+zaq)	‘chirp’
e.	tˤaʔtˤaʔ	(cf. tˤaʔ+tˤaʔ)	‘lower one’s head’
f.	kamkam	(cf. kam+kam)	‘cover’
g.	sˤarsˤar	(cf. sˤar+sˤar)	‘scream’
h.	ħasˤħasˤ	(cf. ħasˤ+ħasˤ)	‘manifest’
i.	fadˤfadˤ	(cf. fadˤ+fadˤ)	‘disclose’
j.	waswas	(cf. was+was)	‘suspect’

Partial reduplication also exists in SA where part of the stem is doubled while the rest thereof is deleted. In (9), the first CV of the stem is deleted, whereas, in (10), the final VVC of the reduplicant form is the one being erased[2].

[2] In this paper, we follow Clements & Keyser’s (1983) linear model of CV phonology in treating long vowels as VV. We also follow previous approaches such as Raimy (2000), Frampton (2009), Haugen

9. Partial Stem Reduplication (the 1st CV of the stem → Ø)

a.	ʕaram+ram	(cf. ʕaram+[ʕa]ram)	'very numerous'
b.	ɣaʃam+ʃam	(cf. ɣaʃam+[ɣa]ʃam)	'very unjust'
c.	ʕarak+rak	(cf. ʕarak+[ʕa]rak])	'very experienced'
d.	kaðab+ðab	(cf. kaðab+[ka]ðab)	'big liar'
e.	ʕasˤab+sˤab	(cf. ʕasˤab+[ʕa]sˤab)	'very hard'
f.	damak+mak	(cf. damak+[da]mak)	'very sweeping'
g.	ʃalaʕ+laʕ	(cf. ʃalaʕ+[ʃa]laʕ)	'very tall'
h.	ħarak+rak	(cf. ħarak+[ħa]rak)	'very quick'
i.	hawal+wal	(cf. hawal+[ha]wal)	'very scared'
j.	ɣatˤam+tˤam	(cf. ɣatˤam+[ɣa]tˤam)	'very deep'

10. Partial Stem Reduplication (2nd VVC of the reduplicant form → Ø)

a.	mar+mari:s	(cf. mar[i:s]+mari:s)	'a very hard land'
b.	mar+mari:r	(cf. mar[i:r]+mari:r)	'a very empty land'
c.	mar+mari:t	(cf. mar[i:t]+mari:t)	'a very empty land'
d.	qar+qari:r	(cf. qar[i:r]+qari:r)	'a stomach sound'

Given that "all syllables in Arabic require an onset" (Watson, 2002:65), we assume that the obliterated parts in (9) are syllables but those in (10) are not. The first rhotic sound [r] in the words in parenthesis in (10) should function as the onset of the following deleted parts, not as the coda of the preceding /ma/ or /qa/. Because this [r] is preserved in (10), the deletion process must have applied only to part of the syllable, namely VVC.

In this paper, we will develop a distributed morphology approach to account for full and partial reduplication in the world languages, using SA as a representative. We assume that reduplication behave uniformly in all the world languages. Because the reduplicant form borrows all (or a number of) sounds from roots and stems as original sources, we will begin our analysis with a discussion of the formation of roots, stems, and words in SA. Understanding the root/stem/word formation in SA helps in capturing reduplication facts in Arabic as well as other languages.

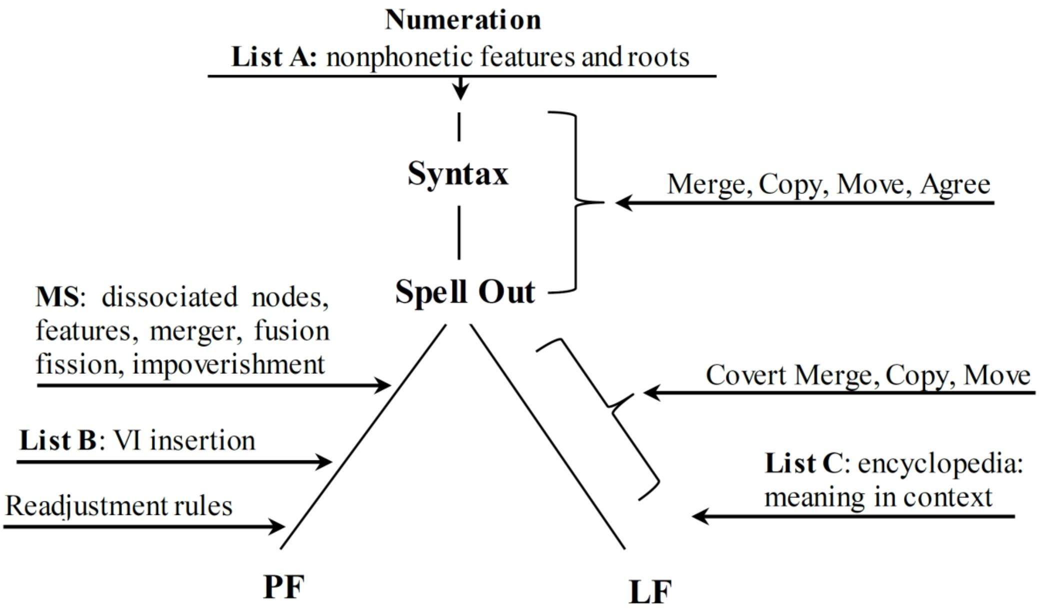
(2008, 2010, 2011) and Haugen and Harley (2010) which assume that the reduplicant form is syntactically left adjoined to the stem (see section 3.2). Thus, in light of syntactic linearization, we claim that the deletion in (9) affects the stem, but it affects the reduplicant form in (10).

The organization of the paper will be as follows. We will lay out the framework of DM in section (2) focusing on the tools that can be of use in developing our approach. We will move from there to present our approach in section (3) showing that it can account for word formation as well as reduplication in SA. Concluding remarks will be given in section (4).

2. DM Framework

Based on earlier realizational theories of morphology (Kiparsky, 1973; Anderson, 1992), Distributed Morphology (DM) is developed as a unified piece-based framework that modulates both morphosyntactic and moprhophonological phenomena via the Chomskyan generative Y-model as shown in (11). Rather than listing sound/meaning correspondences of words in the lexicon, DM, as its name suggests, distributes the lexical properties among three grammatical components (Halle and Marantz, 1993, 1994; Embick and Noyer, 2007; Embick and Marantz, 2008; Siddiqi, 2009; Embick, 2010). The first component, known as List A, provides the syntax with the basic formatives which include roots and morphosyntactic features, which in turn undergo the common syntactic operations such as Merge, Move and Copy, in the sense of the Minimalist Program (Chomsky, 1995, 2000, 2001, 2004 et seq). Given that DM is a late insertion approach, the second component, namely List B, contains phonological material that realizes terminal nodes at PF. The third component, List C, interprets the terminal nodes at LF. These interpretations proceed convergently and yield the intended meaning of the final structure.

11. Grammar Architecture of Distributed Morphology

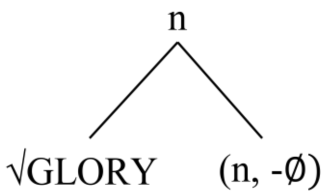


As represented in (11), every derivation sets out with a selection of language-particular roots as well as feature bundles. Feature bundles are drawn from Universal Grammar (Embick and Marantz, 2008:5); every language selects the required features from a group called Universal Feature Inventory (Embick, 2015: 32). This selection is known as the numeration or the lexical array in the Chomskyan terms. In DM, however, roots are not categorially labelled; they are only notated with the symbol √ (cf. Pesetsky, 1995). They are later categorized according to the Categorization Assumption in (12) (cf. Marantz, 1997, 2007).

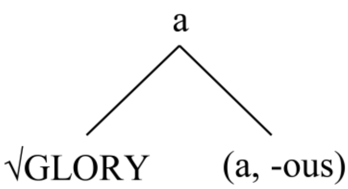
12. **Categorization Assumption**: Roots cannot appear without being categorized; roots are categorized by combining with category-defining functional heads. (Embick and Noyer, 2007: 296).

The Categorization Assumption in (12) ensures that a root never appears in a bare form but as a member of the well-known lexical categories such as nouns, verbs, adjectives etc. Thus, the derivation of the noun *glory* and the adjective *glorious* will be formed from the same category-neutral root √GLORY. The only difference follows from the merging of the former with the nominal functional head *n* as in (13a) and the merging of the latter with the adjectival functional head *a* as in (13b) (cf. Embick and Marantz, 2008:22).

13. a. The noun *glory*



b. The adjective *glorious*



In (13), the root √GLORY is a noun or an adjective based on its relationship with the category-defining head with which it is combined, either *n* or *a*. The nominal head *n* in (13a) is spelled out as [–Ø] (i.e. null) whereas the adjectival head *a* in (13b) is realized as [-ous].

After the syntax builds a well-formed structure out of List A, the structure is handed off from Spell-Out to both PF and LF. At PF, language-specific operations may apply in a stage called Morphological Structure (MS). These operations include lowering, merging, raising, impoverishment (i.e. feature deletion), fusion (i.e. grouping the features of two nodes into one node), and fission (i.e. splitting the feature bundle on one node into two nodes). These operations eventually alter the structure and the feature content in deference to the language's morphophonological constraints.

After MS, Vocabulary Items (VIs) from List B (aka the vocabulary) are accessed and given to the terminal nodes (aka positions of exponence) in the structure.

These VI are phonological strings and they fill the terminal nodes in a competition-based manner. They vary cross-linguistically. The competition between the VIs is regulated via the Subset Principle (Halle, 1997), which is a reformulation of Kiparsky 1973's Elsewhere Condition. According to the Subset Principle, the most highly specified VI is more eligible to insert into a terminal node than less specified candidates. To illustrate, the most specified VI /-t/ is inserted in the context of [+past] feature for the verb *learn* yielding *learnt* before the less specified or the elsewhere case /-ɪd/ is chosen. At LF, the same correspondence between the VI and the features is held in a model-theoretic fashion yielding a compositional interpretation for the whole derivation.

To sum up, DM is a competition-based approach where List A feeds the syntax with formatives such as roots and affixes. The syntax operates on these formatives via the common processes: Merge, Move and Copy. At Spell-Out, the syntactic structure is sent to PF and LF. The roots and affixes are supplied with phonological candidates at PF, and they are associated with their semantic interpretive candidates at LF.

3. Word Formation and Reduplication in SA

In this section, we will provide a unified account to both word formation and reduplication in SA. The issue of word formation will be explored in section (3.1.) whereas that of reduplication will be addressed in section (3.2).

3.1. Word Formation in SA

Prior to the discussion of reduplication, it is important to explore how roots, stems and words are formed in SA. The understanding of Arabic word formation will make the phenomenon of reduplication easy to capture. For word formation, SA, like many other Semitic languages, has a non-concatenative morphology, sometimes known as discontinuous morphology, introflection (Watson, 2000:126; Haspelmath, 2002:22) or root-pattern morphology (Ryding, 2005:45). In other words, SA draws on three or four consonants in each root, and incorporates them within fixed vocalic templates. This morphological mechanism is productive in SA and it does not only derive new lexical categories but it also conveys grammatical functions. As shown in (14), the consonants of the triconsonantal root *k-t-b* are always maintained, but they interlock with different vocalic templates to derive lexical categories such as nouns, verbs, adjectives and adverbs.

14.	Word	Template	Translation	Lexical Category
a.	**k**i**t**a:**b**	CiCa:C	‘book’	Noun
b.	**k**a**t**a**b**a	CaCaCa	‘wrote’	Verb
c.	ma**kt**u:**b**	maCCu:C	‘written’	Adjective
d.	**k**i**t**a:**b**at-an	CiCa:Cat-an	‘in a written form’	Adverb

The same root *k-t-b* can also be integrated within other templates as in (15) for word inflection, i.e. to express number (plural vs. singular) as in (15a,b), aspect (perfective vs. imperfective) as in (15c,d) or voice (active vs. passive) as in (15e,f).

15.	Word	Template	Translation	Function
a.	**k**i**t**a:**b**	CiCa:C	‘book’	singular
b.	**k**u**t**u**b**	CuCuC	‘books’	plural
c.	**k**a**t**a**b**a	CaCaCa	‘wrote’	perfective
d.	ya**kt**u**b**u	yaCCuCu	‘write’	imperfective
e.	**k**a**t**a**b**a	CaCaCa	‘wrote’	active
f.	**k**u**t**i**b**a	CuCiCa	‘be written’	passive

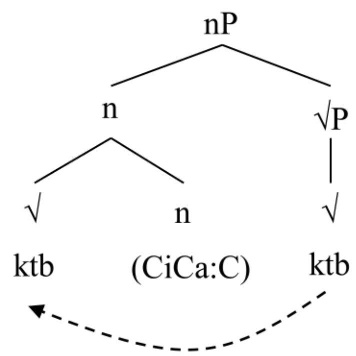
Until now, DM practitioners remain silent regarding the integration of consonants and vowels within words in Semitic languages (see e.g. Arad, 2003, 2005; Kramer, 2006; Tucker, 2011; Wallace 2013; Kastner, 2019 among others). In contrast, in languages that have concatenative morphology such as English, the categorization of words is simply conducted via prefixes or suffixes as in (16) and (17) respectively.

16.	a.	blaze (noun)	→	**a**blaze (adjective)
	b.	witch (noun)	→	**be**witch (verb)
	c.	slave (noun)	→	**en**slave (verb)

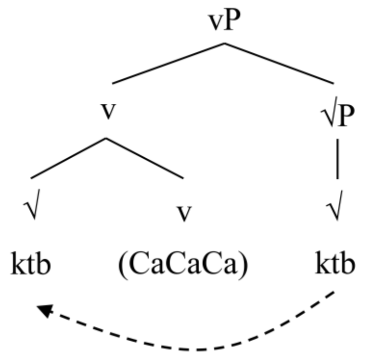
17.	a.	vapor (noun)	→	vapor**ous** (adjective)
	b.	vaporous (adjective)	→	vaporous**ness** (noun)

However, this is not the case in SA non-concatenative morphology, where prefixation or suffixation do not suffice for word derivation. Rather, vowels must interlock with the consonants of the root in an intricate way, i.e. the root *ktb* becomes *kataba* 'wrote', *kita:b* 'book', *maktu:b* 'written' or *kita:batan* 'in a written form' as in (14). The Arabic literature presents some attempts to deal with this issue. For instance, Alqarni (2015: 96) proposes that the category-defining head, proposed by Marantz's (1997, 2007) categorization assumption in (12), bears the vocalic template in which the root consonants can incorporate. Thus, the root *ktb* can be *kita:b* 'book' (a noun) by merging with the template CiCa:C found on the head *n* in (18a), or it can be *kataba* 'wrote' (a verb) by being combined with the template CaCaCa on the verbal head *v* in (18b).

18. a. The noun *kita:b* 'book'



b. The verb *kataba* ‘wrote’



By merging the root with the template under the category-defining head, either (CiCa:C) or (CaCaCa), words in SA are formed. Alqarni (2015), however, did not go further to explain exactly how the root consonants replace these Cs in each template, and what mechanism in the DM approach can do so. The picture becomes more complicated if we know that the templates (CiCa:C) and (CaCaCa) in (18a,b) are not the only Arabic templates that make nouns or verbs out of roots. There are many different templates for nouns as in (19) and many others for verbs as in (20). Some of these templates have different vowels as well as fixed consonants such as *mu-* for nouns in (19d) and such as *ʔa-* or *ʔin-* for verbs in (20c,d).

19.	roots	template	examples (nouns)
a.	ktb	CiCa:C	kitab ‘a book’,
	ʕql		ʕiqa:l ‘a headband’
b.	qtl	Ca:CiC	qa:til ‘a killer’
	xtm		xa:tim ‘a ring’
c.	rsl	CaCu:C	rasu:l ‘a messenger’
	ðll		ðalu:l ‘a camel’
d.	ħrb	muCa:CiC	muħa:rib ‘a fighter’,
	fʕl		mufa:ʕil ‘a reactor’
	etc.		

20.	roots	template	examples (verbs)
a.	ktb	CaCaCa	kataba ‘wrote’,
	qrʔ		qaraʔa ‘read’
b.	qnʕ	CaCuCa	qanuʕa ‘got satisfied’,
	xlsˤ		xalusˤa ‘concluded’
c.	xrdʒ	ʔaCCaCa	ʔaxradʒa ‘drove out’,
	ʕln		ʔaʕlana ‘announced’
d.	ɣlq	ʔinCaCaCa	ʔinɣalaqa ‘become closed’
	dmdʒ		ʔindamadʒa ‘got combined’
	etc.		

Although more than one template can be applied to one root, see (14) and (15) above, the data in (19) and (20) shows that, generally speaking, every root is associated with a specific template. Consider the following examples where the root *ʕln* can only appear in the verbal template *ʔaCCaCa* but not in the other verbal templates in (21).

21.	roots	template	examples (verbs)
	ʕln	ʔaCCaCa	ʔaʕlana ‘announced’,
		*CaCaCa	*ʕalana
		*CaCuCa	*ʕaluna
		*ʔinCaCaCa	*ʔinʕalana

For these reasons, Alqarni (2015) proposes that every root merges with a category-defining head bearing its appropriate template. In other words, these templates are VIs that appear under the category-defining head when their relevant roots appear in their domain. Thus, all the templates above will be vocabulary items for nouns as in (22) or for verbs as in (23) below.

22. Template Vocabulary Items for Nouns

CiCa:C	←→	n __	{√ktb, √ʕql etc}
Ca:CiC	←→	n __	{√qtl, √xtm etc}
CaCu:C	←→	n __	{√rsl, √ðll etc}
muCa:CiC	←→	n __	{√ħrb, √fʕl etc}

The list goes on.

23. Template Vocabulary Items for Verbs

CaCaCa	←→	v __	{√ktb, √qrʔ etc}
CaCuCa	←→	v __	{√qnʕ, √xlsˤ etc}
ʔaCCaCa	←→	v __	{√xrdʒ, √ʕln etc}
ʔinCaCaCa	←→	v __	{√ɣlq, √dmdʒ etc}

The list goes on.

Although every root is now associated with its template, the question remain unanswered regarding how these radical consonants appear in a discontinuous format and how the vowels can be interspersed between them. Our objective in this paper is to develop a theory-driven approach to lead such derivations within the DM framework.

To do so, we will make use of the phonological feature theory and incorporate it into the DM framework. Phonological feature theory is an approach in cognitive science that represents mental sounds with formal features (Hayes, 2009: 70). According to this theory, a sound can be mentally represented using a bundle of features. For example, the sound /f/ can be represented with distinctive features that can collectively define it, such as [+consonantal +continuant +labiodental –voice]. For the vowel /u/, it can be represented with other relevant features that contribute to its realization, such as [-consonantal +voice +high –low +back –front +round].

We will take advantage of this phonological feature theory and propose that the root consonants and the templatic vowels in SA, and other languages, enter the syntactic component as distinctive features such as [±consonantal], [±continuant], [±sonorant], [±voice], [±labial] etc. Thus, for the noun *kita:b* ‘book’ to be formed in SA, the root sounds *ktb* appear as bundles of features under the root node as demonstrated in (24a) whereas the vowels appear under the nominal head *n* as in (24b).

24. a. the root [k t b]

√

$$\begin{pmatrix} \text{+consonantal} \\ \text{-continuant} \\ \text{-sonorant} \\ \text{+dorsal} \\ \text{-voice} \\ \text{etc} \end{pmatrix} \begin{pmatrix} \text{+consonantal} \\ \text{-continuant} \\ \text{-sonorant} \\ \text{+coronal} \\ \text{-voice} \\ \text{etc} \end{pmatrix} \begin{pmatrix} \text{+consonantal} \\ \text{-continuant} \\ \text{-sonorant} \\ \text{+labial} \\ \text{-voice} \\ \text{etc} \end{pmatrix}$$

b. the templatic vowels [i a:]

n

$$\begin{pmatrix} \text{-consonantal} \\ \text{+high} \\ \text{-low} \\ \text{+front} \\ \text{-back} \\ \text{-round} \\ \text{-long} \end{pmatrix} \qquad \begin{pmatrix} \text{-consonantal} \\ \text{-high} \\ \text{+low} \\ \text{+front} \\ \text{-back} \\ \text{-round} \\ \text{+long} \end{pmatrix}$$

The representations in (24) are sets of features that can collectively define each sound in the word *kita:b*. For our purposes, it is not a matter of concern that some of the features in each set in (24) are redundant and non-essential for the pronunciation of the given sound. We assume that each sound must enter the syntax with as many features as required to be pronounced at PF.

Note that this is not contra the basic principles of the syntactic theory that the syntax cannot deal with phonological information. The featural representations in (24) are not phonological in the first place, neither are they pronounced. They are simply formal representations of information, similar to the representations of the morphosyntactic features [±pl], [±def], etc. Given that the latter representations can enter the syntactic computations and can be manipulated, we assume that the formal representations in (24) can also be operated on by the syntax. These distinctive features in (24) will be pronounced only after they are shipped off to PF.

Before discussing how these features are pronounced at PF, it is important to address the controversy of the DM community over the realization of roots in comparison to morphosyntactic features. This will help us find a foothold for our approach. Recall from section (2) that List A consists of morphosyntactic features and roots. Morphosyntactic features are part of universal grammar, and they include [+pl], [+f], [+past], [+def] etc. That is, Arabic and English have the same set of morphosytantic featurs such as [+pl], [+f], [+past], [+def]. As far as roots are concerned, they are language-particular; every language has its own set of roots, i.e. the root *klb* ‘dog’, for example, is particular to the Arabic language, whereas the root *move* is part of the English root inventory.

There is a consensus between the DM theorists that the morphosyntactic features are realized via VI completion as discussed in section (2). However, there are three proposals on how and when the roots are phonologically realized. The first proposal argues that roots enter the syntax phonologically realized (Embick, 2000; Embick and Halle, 2005; Embick and Noyer, 2007; Borer, 2014). That is, an English word such as *map* is already phonologically realized as [mæp] in List A. Thus, the syntax takes [+pl] (with no phonological information) and [mæp] (with its phonological information) and applies to them its operations such as Move, Merge, and Copy. In other words, there is no late insertion for roots. Late insertion applies only to morphosyntactic features[3].

The second proposal argues that all the elements of List A that enter the syntax, be they morphosyntactic features or roots, must be subject to late insertion, i.e. they must receive their phonological content at PF. As argued by Marantz (1995: 16).

> There are two basic reasons to treat "cat" and all so-called lexical roots as we treat inflectional affixes, and insert them late. . . . First, it's extremely difficult to argue that roots behave any differently from affixes with respect to the computational system. No phonological properties of roots interact with the principles or computations of syntax, nor do idiosyncratic Encyclopedic facts about roots show any such interactions (Marantz, 1995: 16).

Put differently, all the elements of List A must enter the syntax devoid of any information, be it phonological or semantics. The phonological and semantic information that can distinguish *cat* from *dog* is irrelevant to syntax and should not be present on the terminal nodes of the roots. Thus, roots should appear as the abstract symbol √ in the syntactic structure. However, according to Marantz (1995), the only available features that can enter the syntax and can be placed on root nodes are semantic, e.g. [±count], [±animate]. These features can help resolve the competition of which root is more suitable to enter into a given node at PF. As shown in (25), if there is a configuration where the head D has the article 'a', which requires a single count noun, and the root has [+count] and [+animate], the root at PF can be realized by *cat* as in (25b), but not *rice* as in (25c) because the latter is [-count] and [-animate].

[3] An early version of this proposal comes from Halle (1990, 1997). Halle argues that there should be two types of morphemes in DM: concrete and abstract. Concrete morphemes are those that have a fixed underlying phonological representation such as *dog, red, car* etc and any bound morphemes such as -*ness* and *un-* etc. Abstract morphemes are those that have surface representations different from the underlying ones, such as the verb *be* (*is, am, are, was, were, be,* and *been*) and all the variants of suffixes for plural (such as -*s*, -*z*, and -*ɪz*) or for past (such as -*d*, -*t*, and -*ɪd*). According to Halle, concrete morphemes should enter the syntax fully realized and cannot be subject to late insertion. Abstract morphemes should be subject to competition in the light of the Subset Principle (Halle, 1997).

25. a. $[_{DP}\,[_{D}$ a $[_{nP}\,[_{n}\,[_{\surd}$ [+count] [+animate]]]]]]]

b. $[_{DP}\,[_{D}$ a $[_{nP}\,[_{n}\,[_{\surd}$ cat]]]]]]

c. *$[_{DP}\,[_{D}$ a $[_{nP}\,[_{n}\,[_{\surd}$ rice]]]]]]

Given that there are many English roots that can have the features [+count], [+animate] such as *dog, lion, man,* etc, and they can compete with the word *cat* to enter in the same root node in (25a), Marantz (1995) submits that, at PF, any root with enough information is eligible for insertion into the root node based on the speaker's intention. Thus, at PF, *cat, dog, lion, man* etc are all candidates for insertion. Many scholars regard this as the weakest point in Marantz's proposal (e.g. Pfau, 2000, 2009; Acquaviva, 2008; Harley, 2014). If all the roots that have the features [+count] and [+animate] can insert in the node in (25a), one might inquire about their semantic interpretation at LF. In the syntactic theory, PF cannot access LF because they are impenetrable to each other (Chomsky, 1995). In light of Marantz's proposal, the word *cat* may be inserted into the root node at PF, and the semantic interpretation of *dog* could be given to the root at LF, given the inaccessibility between the two branches (Harley, 2014). To avoid this problem, Marantz (1995) requires that LF must know what is going on at PF. He said:

> Late insertion involves making a specific claim about the connection between LF and semantic interpretation. LF can't by itself be the input to semantic interpretation. If "cat" is inserted in the phonology at a node at which "dog" could just as well have been inserted – and if, as we assume, the difference between "cat" and "dog" makes a difference in semantic interpretation – then the phonological representation, specifically the choice of Vocabulary items, must also be input to semantic interpretation (Marantz, 1995: 17).

A group of scholars, i.e. who represents the third position, defies Marantz's proposal on this theoretical problem. They argue that the root node must not be an abstract symbol √ which makes a long list of roots eligible for insertion. Rather, roots must be more specified in the syntax so that only one root can win the competition (see e.g. Pfau, 2000, 2009; Acquaviva, 2008; Siddiqi, 2009; De Belder, 2011; Harley, 2014).

These scholars deprive roots from both semantic and phonological information, but they make them specific by adding index notations to them when they enter the syntax. Thus, roots can enter the syntax with a hypothetical numerical address such as $\surd_{250}$, $\surd_{147}$ or $\surd_{19}$. At PF, only roots with the same address can insert into their relevant nodes. For instance, if the root *cat* is associated with the number 147, it would be the only competitive root that can insert into $\surd_{147}$ at PF. These numerical indexes help in resolving the issues arising from Marantz's proposal because both PF and LF can now relate $\surd_{n}$ to its relevant phonology and semantics.

Our approach seeks a compromise between these three approaches: the first approach which argues that roots must enter the syntax phonologically realized, and the second two approaches which argue that roots should be stripped of any phonological and semantics information until PF and LF. Our approach states that every root enters the syntax with the formal representations of the sounds it contains, as shown in (24a) for the root [ktb] and (27b) for the vocalic template [ia:]. As stressed earlier, these features are not phonological, but they are like abstract morphosyntactic features, in that the syntax can manipulate both of them as non-phonological atoms.

This proposal is appealing as it serves many purposes. First, it renders all the information in List A into features: morphosyntactic (e.g. [+pl], [+f], [+past]) and non-phonetic distinctive features (e.g. [+nasal], [+consonantal], [+labial] etc). Recall that Embick and Marantz (2008:5) claim that morphosytnactic feature bundles in DM are derived from Universal Grammar. Similarly, non-phonetic distinctive features come from Universal Grammar. The feature [+nasal] is universal in that it appears in all nasal sounds in the world languages. The same applies to vowels which are [-consonantal] cross-linguistically. As put by Mielke (2008: 31), the universality of distinctive features follows from the fact that

> features in two languages which refer to the same acoustic feature are fundamentally the same. Thus, the feature [high] in Turkish is fundamentally the same as the feature [high] in Russian … the universality of the distinctive features (in spoken languages) is a direct consequence of the universality of the human vocal tract (Mielke, 2008: 31).

In other words, our approach gains importance from the fact that all the features in List A are now drawn from Universal Grammar.

The second advantage of our approach follows from the fact that all these features in List A will be supplied with their phonological content in a unified fashion. That is, given that morphosyntactic features (such as [+sg], [+pl] etc) are supplied with phonological VIs at PF, we propose that, at PF, the distinctive features of the root consonants and vowels in (24) are also fed with Sound Items (SIs). To illustrate, if /ɪd/ and /s/ are VIs that are associated with [+past] and [+present] respectively as in (26), we propose that the phonemes /k/, /t/, /b/ are SIs linked to their respective features as in (27).

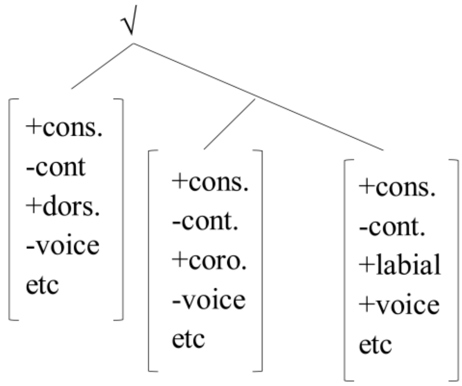
26. VI list
    /ɪd/ ←→ [+past]
    /-s/ ←→ [+present]

27. SI List
    /k/ ←→ [-continuant +dorsal, -voice]
    /t/ ←→ [-continuant +coronal -voice]
    /b/ ←→ [-continuant +labial +voice]

Under this account, we will have a unified and governed theory of insertion in DM. Sound insertion (akin to vocabulary insertion) undergoes the same competition principles such as the Subset Principle (Halle, 1997). Like VIs, SIs compete with each other for insertion, and the strongest candidate is the one that matches the maximum number of the available distinctive features on the node.

The third advantage of our approach follows from the fact that it can derive all words in the world languages: the word formation in non-concatenative root-pattern languages such as SA, and that in concatenative languages such as English. To derive the noun *kita:b* ‘book’, we propose that the root √*ktb* enters the syntax as demonstrated in (28). Note that these features in (28) are only representative, i.e. we do not bring all the required features for these sounds for space limitations.

28. Root /ktb/



Given that grammatical features such as [+past], [+pl] etc are borne by terminal nodes, we assume that these distinctive features appear as bundles under sub-terminal nodes within the root node. These sub-terminal nodes can be a result of Copy, where the node of the root copies itself two or three times to accommodate the feature bundle of each consonant and vowel, or as an alternative, the root node undergoes a fission operation twice (if the root consonants are three) or thrice (if they are four). Both proposals yield similar results. At PF, different phonemes (or SIs) as in (29) will compete for insertion into the root sub-terminal nodes in (28) above, yielding the root √*ktb* ‘write’ in (30).

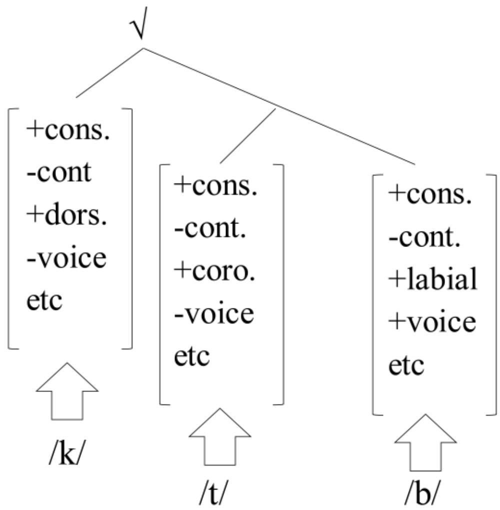
29. List of SIs

/k/ ←→ [+dorsal –voice]

/t/ ←→ [+coronal –continuant –voice]

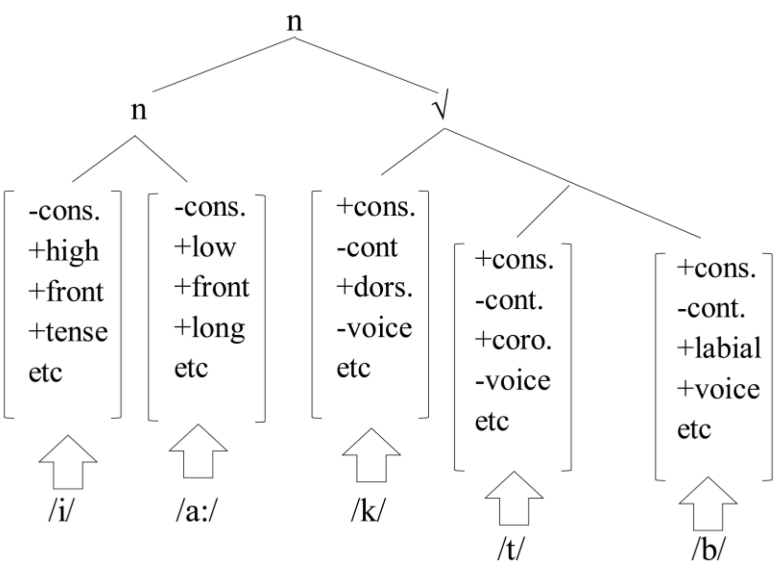
/b/ ←→ [+labial +voice]
/n/ ←→ [+nasal +coronal, +voice]
/m/ ←→ [+laibal +nasal +voice]
/i/ ←→ [-consonantal +high +front]
/a:/ ←→ [-consonantal +front +low +long]
etc

30.



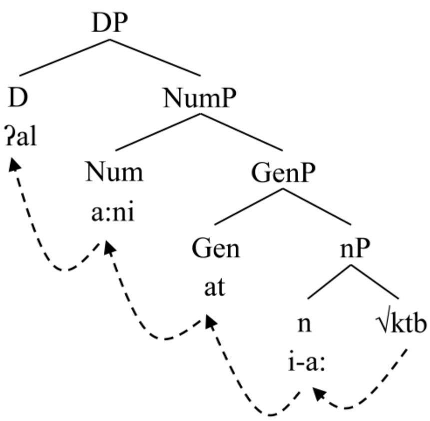
As the structure is built from bottom up, the root √ktb will be categorized as a noun by merging with a nominal head *n*. Given that the main assumption in the literature that the head *n* bears templatic vowels (Alqarni, 2015), we assume that the head *n* (bearing [_i_a:_]) will also be endowed with distinctive features for these vowels as shown in (31). These vocalic features represent the nominal template within which the consonants /ktb/ will be incorporated. All these distinctive features will undergo sound insertion at PF, yielding [i-a:-k-t-b].

31.



The main concern at this point is how to conglomerate the roots within the vocalic template on the head *n*. Otherwise, the resulting structure in (31) will yield *[ia:ktb], as opposed to the desirable output [kita:b] 'book'. We take it for granted that the root moves from its original position to the head *n* and adjoins to it. In SA, words are derived by head-to-head affixal movements. For example, the dual noun phrase [ʔal-kita:b-at-a:ni] 'the two styles of writing' is derived via successive head-to-head movements as shown in (32) below.

32.



In (32), the root √ktb first moves to the head *n* and forms [kita:b] in a way that will be discussed momentarily. The noun [kita:b] will continue rising to Gen to combine with the feminine marker [-at] generating [kita:b-at] ‘a style of writing’. From Gen, the complex heads proceed towards Num and attach to the dual suffix [-a:ni] yielding [kita:b-at-a:ni] ‘two styles of writing’. Finally, the adjoined heads land on D for the definite article [ʔal] ‘the’. Note that if every head moves from bottom up and adjoins to the left of the higher heads, the final output will be *[kita:b-at-ani-ʔal] where the definite article [ʔal] ‘the’ is unfavorably suffixed to the whole word. The wanted form is [ʔal-kita:b-at-a:ni] where the definite article has a prefixal nature.

To subvert this problem, we resort to DM-based tools proposed by Embick and Noyer (2007:319), namely Local Dislocation Rules. These rules manipulate the linear order of affixes. We propose local dislocation rule (33) to switch the order between the complex heads [kita:bata:ni] ‘two styles of writing’ and the definite article [ʔal] ‘the’.

33. Local Dislocation Rule
√+n+Gen+Num^D → D^√+n+Gen+Num

Thus, the ill-formed word *[kita:b-at-ani-ʔal] in (34a) will undergo an affixal reordering via rule (33), resulting in the correct form in (34b).

34.	a. *[kita:b^at^a:ni^**ʔal**]	before local dislocation rule
	b. [**ʔal**^kita:b^at^a:ni]	after applying rule (36).

However, it should be known that Embick and Noyer (2001) take issue with rules such as (33). Local Dislocation Rules should switch only the positions of string-adjacent elements, i.e. [ʔal] ‘the’ and the closest affix to it in (34a), namely the dual suffix [a:ni]. To achieve the objective of rule (33), Embick and Noyer (2001, ft 9) draws on Sproat’s (1985) proposal that rebracketing may apply to these affixes before the dislocation rule takes place. In other words, affixes undergo a rebracketing operation and appear in different units. Thus, (34) should be revised as in (35).

35.	a. [kita:b^at^a:ni^**ʔal**]	rebracketing
	b. [[kita:b^at^a:ni]^[**ʔal**]]	applying rule (36).
	c. [[**ʔal**]^[kita:b^at^a:ni]]	final result

The single unit [kita:b^at^a:ni^**ʔal**] in (35a) should first undergo rebracketing and become two units [[kita:b^at^a:ni]^[**ʔal**]] as in (35b). These two units can therefore be reordered, yielding the wanted form [[**ʔal**]^[kita:b^at^a:ni]] in (35c) where the definite article appears word-initially.

Taking these operations into account, we propose that the root-pattern derivation in SA (or any Semitic languages) proceeds similarly. After the root adjoins to the left of the nominal head *n*, the result will be as shown in (36) where the vowels follow the root consonants.

36. k^t^b^i^a:

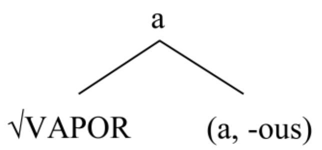
At this stage, we induce rebracketing and local dislocation rules to order the consonants and vowels at hand. These rules will re-apply multiple times so as to produce the well-formed word *kita:b* 'book'. This can be accomplished in the step-by-step illustration in (37), where the rules re-apply until the final result is derived.

37. a. [k^t^b^i^a:]	rebracketing	(ill-formed word)
↓↓		
b. [k^t^[**b^i**]^a:]	dislocation rule	
↓↓		
c. [k^t^[**i^b**]^a:]	rebracketing	
↓↓		
d. [k^[**t^i**]^b^a:]	dislocation rule	
↓↓		
e. [k^[**i^t**]^b^a:]	rebracketing	
↓↓		
f. [k^i^t^[**b^a:**]]	dislocation rule	
↓↓		
g. [k^i^t^a:^b]	final output	(well-formed word)

In summary, all the root-pattern formation can be accomplished via the steps above. Unlike earlier works that do not discuss the derivation of root-pattern morphology at great length, our proposal is now theoretically formalized via three operations from DM: root sound features, rebracketing and dislocation rules. The latter two operations are independently motivated in DM and can be carried over to our approach.

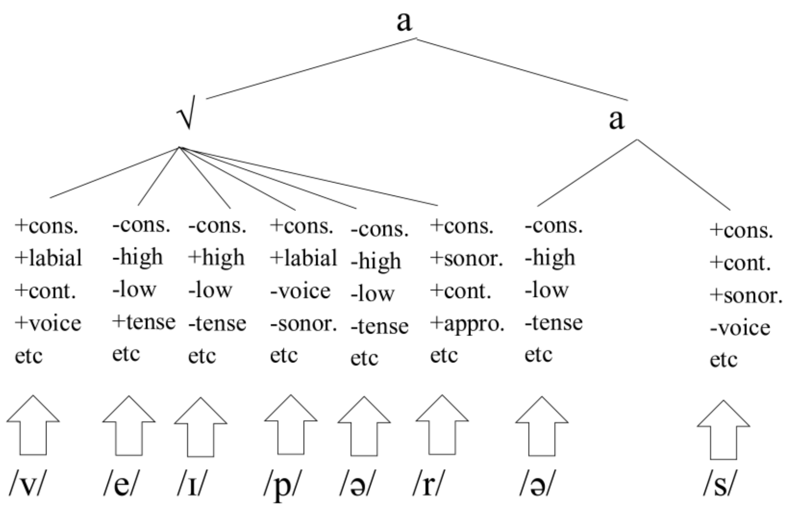
Extending our proposal to other languages as a unified theory for root realization, it can also derive concatenative morphology more straightforwardly. For the English word *vaporous* in (38), the root and the category defining heads will be endowed with distinctive features as in (39) and will eventually receive appropriate SIs at PF.

38. The adjective *vaporous*



(cf. Embick and Marantz, 2008:11).

39.



In other words, we can simply replace these consonants and vowels in (38) with representative features that are spelled out by SIs at PF. In sum, this is the fourth advantage of our approach, i.e. it can account for both concatenative and non-concatenative morphologies.

The fifth advantage of our approach follows from its ability to account for metathesis cases that occur at the sentence level as in (40) (cf. Rudy, 1988: 7).

40. a.	May I **s**ew you to another **sh**eet?	(cf. May I **sh**ow you to another **s**eat).
b.	B**r**aid of g**l**ass	(cf. B**l**ade of g**r**ass).
c.	**B**y **M**erest **D**ozen	(cf. **M**y **D**earest **C**ousin).

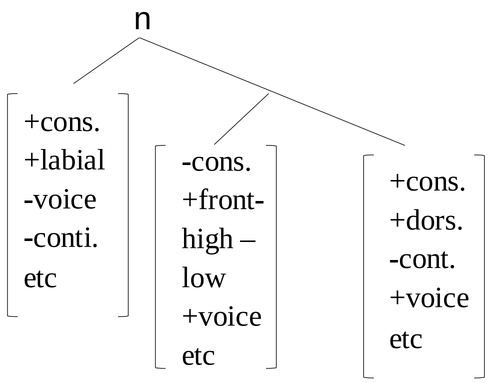
Note that these sounds are distributed beyond the boundaries of words, unlike the metathesis cases within word boundaries such as *ask-aks* or *prescribe-perscribe.* Unless there are distinctive features in the syntax, other approaches would not be able to expect examples such as (40a) where the first sounds of the words *show-seat* are wrongly switched as in *sew-sheet* across the clause. For (40a), we can simply argue that the numeration collects all the distinctive features required to pronounce all the relevant roots in the clause, e.g. *show*, *seat*, etc: the features of /ʃ/ (i.e. [+consonantal +continuant -anterior, +distributed]) for the word *show* and those of /s/ (i.e. [+consonantal +continuant +anterior, +distributed]) for the word *seat*. However, for a reason or another, the syntax distributes the feature bundles of /ʃ/ and /s/ mistakenly beyond their word boundaries. That is, the sound /ʃ/ which should be part of the root *show* is wrongly put along the feature bundles of the root *seat*, whereas the sound /s/, which should be part of the word *seat*, is put among the features of the root *show*, hence the metathesis cases in (40a), namely *sew* and *sheet*. Thus, and unlike other approaches, our approach therefore makes perfect predictions regarding metathesis cases at the sentential levels.

Our approach can also account for other speech errors within word boundaries. Consider the speech error in (41) made by English-speaking children and that in (42) made by African American speakers.

41. I fount a pek for the pram. (cf. I found a peg for the pram).
42. You can aks him. (cf. You can ask him).

The available DM-based approaches account for the occurrences of the natural mistakes in (41) and (42) by resorting to readjustment rules in the phonology part after Vocabulary Insertion (see Haugen, 2016, for a severe criticism of readjustment rules). In contrast, our current approach can account for these mistakes by adopting the tenets in DM such as impoverishment rules and dislocation rules. Consider the word *peg* that is wrongly pronounced as *pek* in (41). The feature bundles of the word *peg* will enter the syntax as follows.

43.



At PF, English SIs will compete to insert into the above nodes. Consider a subset of the English SIs in (44).

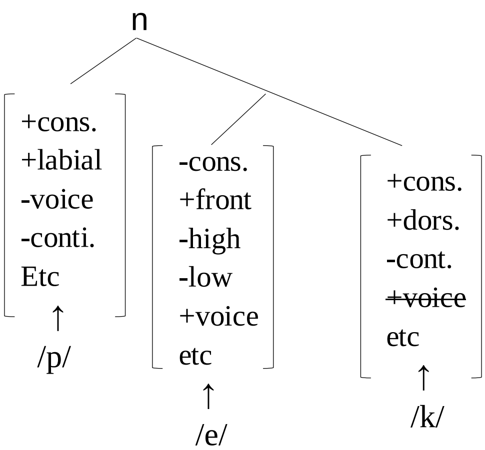
44. A List of English SIs
/p/ ←→ [+labial –voice]
/e/ ←→ [+front –low –high]
/g/ ←→ [+dorsal +voice –continuant]
/k/ ←→ [+dorsal –continuant]
etc

Prior to the sound insertion stage, the right-hand terminal node that bears the features [+consonantal, +dorsal, -continuant, -voice] in (43) will undergo an impoverishment rule such as the one in (45).

45. Impoverishment Rule
[+voice] → Ø / __ [+coronal, +consonantal –continuant etc] #

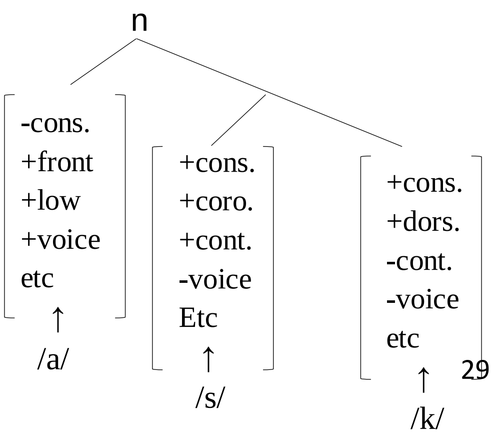
After [+voice] feature is erased by rule (45), the VI /g/ in (44) will not be eligible for discharging the features on the right-hand node in (43). That node does not have the feature, i.e. [+voice] any longer as shown in (46) below. Thus, the VI /t/ in (44) will rather win the competition yielding the word *pek*.

46.



Concerning the pronunciation of the word *ask* as *aks,* the word *ask* undergoes the SI insertion as shown in (47).

47.



Afterwards, the last two SIs [s*k] undergo a local dislocation rule as in (48) below, resulting in *aks*.

48. Dislocation Rule
    [s*k] → [k*s] / a___#

In the section to follow, our approach can also explain reduplication facts in SA and many other languages. This is the sixth and final advantage.

3.2. Reduplication in SA

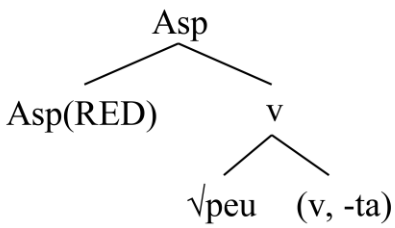
Reduplication has been cast in various models such as Optimality Theory (McCarthy & Prince, 1995; Kim, 2008; Zukoff, 2012; Downing & Inkelas, 2015 among others), Paradigm Uniformity Theory (Gouskova, 2004; Kirchner, 2013), Functional Discourse Grammar (Schwaiger, 2018), and DM (Raimy, 2000; Frampton, 2009; Haugen, 2008, 2010, 2011; Haugen and Harley, 2010). Unlike the current work which couches Arabic reduplication within DM, previous works present Arabic reduplication from descriptive or optimality theoretic point of views (see e.g. Procházka, 1993; Elzarka, 2005; Maas, 2005; Abu-Mansour, 2015). In this paper, and for space limitations, we will not review the whole literature on Arabic reduplication, which we find irrelevant to our approach. Rather, we will address the available DM-based approaches showing their drawbacks and flaws, and showing how our approach is superior to them.

In the DM literature, two approaches are put forward to tackle the issue of reduplication (Haugen, 2011): (i) readjustment approach and (ii) affixation approach. The readjustment approach claims that there is a null affix that represents the reduplicant form (henceforth, shortened to reduplicant). This null affix triggers a readjustment operation to the stem after the vocabulary insertion takes place (Raimy, 2000; Frampton, 2009). As for the affixation approach, it proposes that a special VI (called reduplicative affix, reduplicant or RED) is added to the syntactic structure so as to discharge certain features which are fed with phonological content from the stem (Haugen, 2008, 2010, 2011; Haugen and Harley, 2010).

Consider example (49) from Hiaki (also known as Yaqui, Uto-Aztecan). The reduplicant *peu*, in bold, functions as a habitual aspect, and appears on the left side of the root *peu* 'butcher'. Under the affixation approach, Haugen and Harley (2010) propose that this reduplicant appears under the node Asp(RED) as in the simplified tree in (50). During the vocabulary insertion, this suffix will realize features with phonological content from the stem *peu*, yielding *peu-peu*.

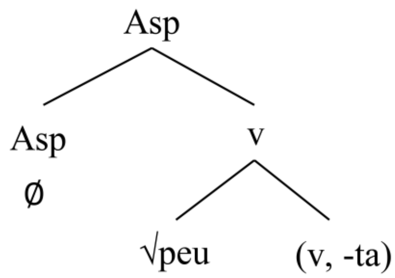
49. aapo maso-m **peu**-peu-ta
3.SG deer-PL RED-√butcher-TR
'S/he is always butchering deer'

50. Affixation Approach (Haugen and Harley, 2010)



The readjustment approach takes a different path. It proposes that the reduplicant *peu* in (49) is realized as a null affix as shown in (51). After vocabulary insertion, this null affix triggers readjustment rules to effect changes to the root *peu* making two copies of it.

51. Readjustment Approach (Raimy, 2000; Frampton, 2009)



As is clear from the above structures, both approaches are not clear as to how this reduplicant affix obtains the required part of the stem or the whole thereof. Under the adjustment approach, however, Raimy (2000) proposes a looping mechanism to derive such reduplicant forms. For the example in (49), the looping mechanism will proceed as in (52). In Raimy's terms, the notation # and % mark the beginning and the end of the string respectively.

52. #→p→e→u→%

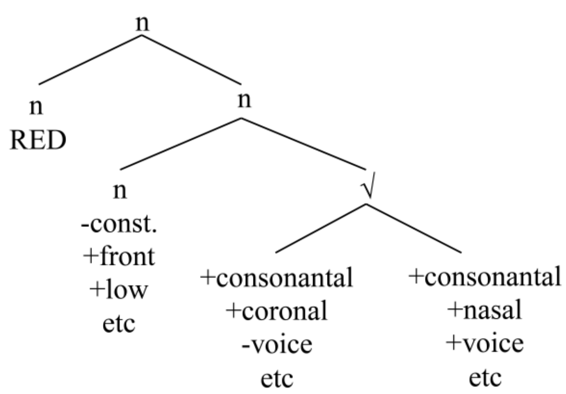
Linearizes to #→p→e→u→p→e→u→%

Yet, this kind of derivation suffers from theoretical drawbacks. Although the readjustment rules are still active within the DM theory, some scholars consider them as conceptually problematic because they are process-based mechanisms within a piece-based model (see Haugen, 2016). Second, the looping mechanism in (52) needs to be independently motivated to avoid prosodic issues (Frampton, 2009), not to mention that it may lead to an infinite number of loops. It is not clear where this loop stops and where it starts in the phonological word. Haugen (2011), for instance, notes that this looping mechanism makes wrong predictions in deriving other forms of reduplication in Hiaki. As for the affixation approach, it proposes that reduplicants are VIs which compete to insert into the RED node. However, this approach does not either address how the RED affix becomes a copy of the stem. In other words, both approaches do not provide a clear-cut derivation that ensures that the reduplicant must be phonetically similar to the root in a relative way.

In this paper, we adhere to the earlier two approaches in that the reduplicant is adjoined as an affix in a separate head close to the root. However, we differ in the way the reduplicant is realized. Under our approach, the derivation of full stem reduplication in SA in (8) above, some of which are reproduced in (53) below, will be as sketched in (53d) for example (53a).

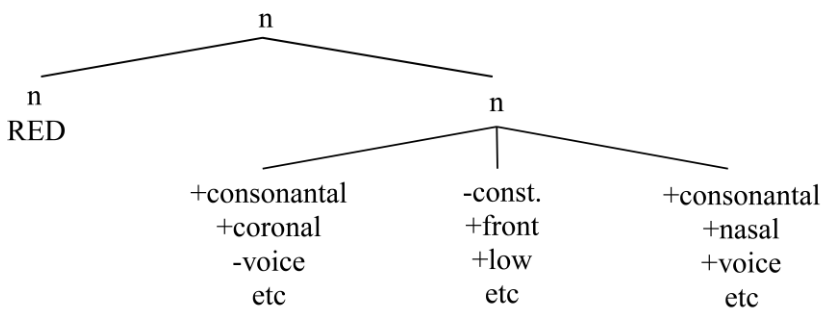
53.
a.	tamtam	(cf. tam+tam)	‘mumble’
b.	xarxar	(cf. xar+xar)	‘bubble’
c.	ɣamɣam	(cf. ɣam+ɣam)	‘babble’

d. Representation of (53a)



In (53d), the sound features of the root are still unmerged with the templatic vowel [a], which is the only vowel in this template. After the root-to-n movement takes place, the features on the root consonants are combined with the vowel of the nominal template, yielding the simplified structure in (54).

54.



In (54), the organization of the root sound features of *tam* is accomplished. For the reduplicant to appear, we propose that the reduplicant node copies the exact sound features on the newly derived word. Thus, at PF, the head n (i.e. RED) in (54) will copy the sound features of *tam*. This can be accomplished via Feature Copying proposed by Embick and Noyer (2007:309) in (55).

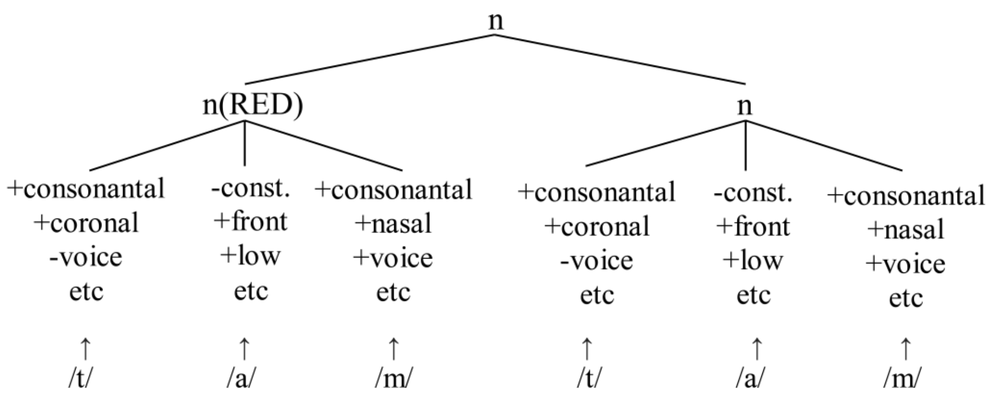
55. **Feature copying**. A feature on node X in the narrow syntax is copied onto node Y at PF.

Given that features are borne by nodes, Feature copying is a DM-based tool that enables a node to copy the features found on another adjacent one. Thus, for reduplication to be held, we assume that the sound features of the root will therefore be moved from their subterminals to dissociated nodes under n(RED). These dissociated nodes are also introduced to the DM theory by Embick (1997, 1998).

56. **Dissociated Node**: A node is dissociated if and only if it is added to a structure under certain conditions at PF.

After the reduplicant copies the features of the root as shown in (57), all the features will be supplied with their sound items (namely [t], [a], [m]) during sound insertion, yielding the reduplicated form /tamtam/.

57.



Let us now examine the derivation of the partial reduplication in (9) and (10) recited in (58) and (59) below. In SA, the final VVC of the reduplicant is sometimes deleted as in (58). In other times, the first CV of the stem is removed instead as in (59).

58. *The Removal of the Final VVC from the Reduplicant*

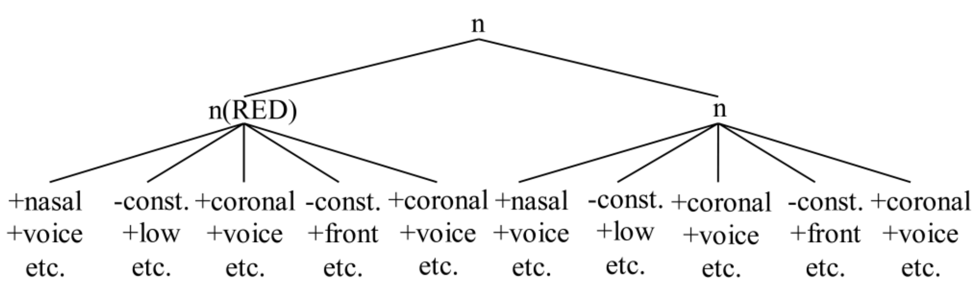
a.	mar+mari:s	(cf. mar[i:s]+mari:s)	‘a very hard land’
b.	mar+mari:r	(cf. mar[i:r]+mari:r)	‘a very empty land’

59. *The Removal of the First CV from the Stem*

a.	ʕaram+ram	(cf. ʕaram+[ʕa]ram)	‘very numerous’
b.	ɣaʃam+ʃam	(cf. ɣaʃam+[ɣa]ʃam)	‘very unjust’

Let us tackle the first phenomenon where the final VVC of the reduplicant is removed. The analysis will follow straightforwardly where the reduplicant copies the features from the root as shown in (60) for example (59a).

60.

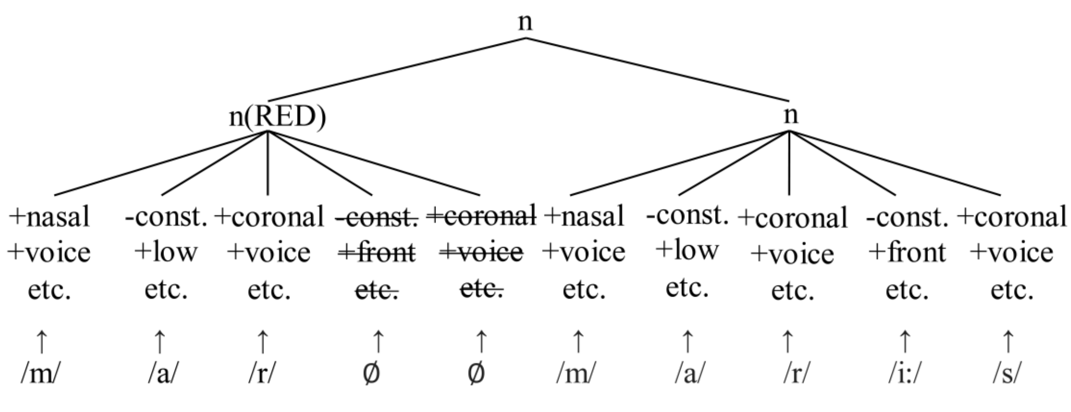


Before the Vocabulary Insertion, we propose that the final VVC of the reduplicant undergoes an impoverishment rule which deletes all the features of [i:] and [s]. As we have discussed in section (2), impoverishment rules can intervene to delete parts of the node content such as features. These rules are well-established in the DM literature (Bonet, 1991; Harley, 1994, Harris, 1997; Noyer, 1997, 1998). Therefore, we can implement an impoverishment rule as given in (61), where the roots are listed for this rule to be evoked.

61. Features of Final VVC → Ø [RED___ √mrs √mrr √mrt √qrr etc]

Given that this behavior is only attested in the roots listed in rule (61), and the root √mrs is available in (61), the last two sound features under the n(RED) head will be deleted, hence unpronounced, as shown in (62).

62.

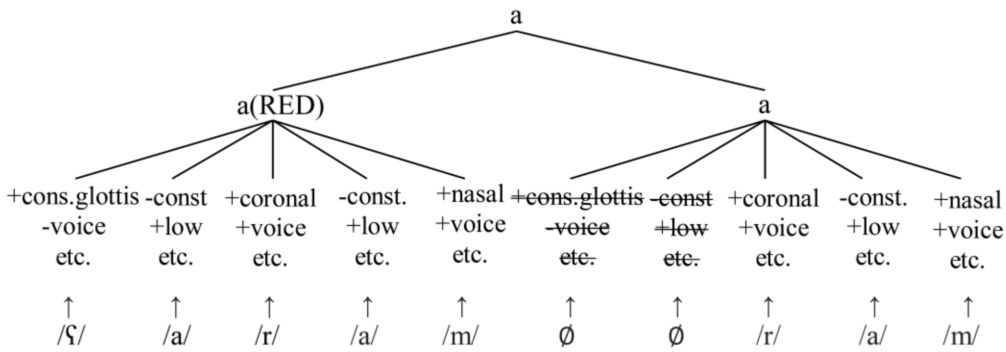


Structure (62) produces /mar-mari:s/ ‘a very hard land’ as given in (58a). We carry the same analysis over to the other phenomenon where the first CV of the stem is deleted. However, we need a different impoverishment rule as in (63) where certain roots are listed for the rule to apply.

63. Features of First CV → Ø [RED___ √ʕrm √ɣʃm √ʕrk √kðb etc]

Thus, the representation of the adjective *ʕaramram* ‘very numerous’ in (59a) will be as follows. Notice that the features of the first CV are now erased, thus unrealized.

64.

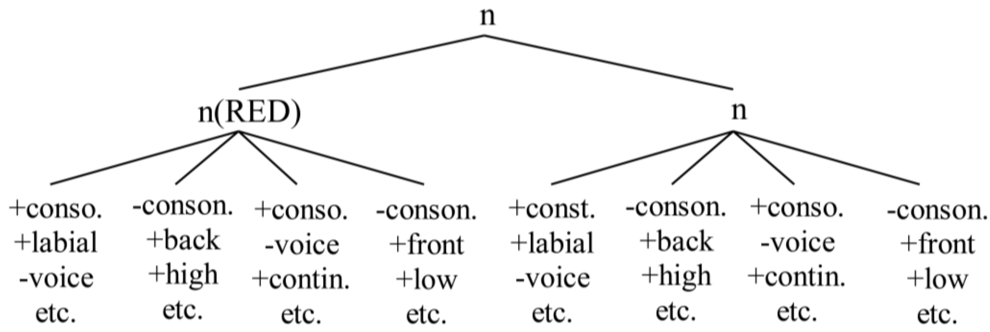


As shown from the above derivation, all the reduplication facts in SA can be captured via our approach that decomposes root consonants and vowels into sound features that are fed with phonological content (i.e. SIs) at PF. We assume that this approach can simply account for other full or partial reduplication facts in other languages discussed in the introduction. As an illustration, consider the reduplication facts in (65) from Agta (cf. Raimy, 2000).

65.	a.	pusa	‘cat’	pu-pusa	‘cats’
	e.	kaldin	‘goat’	kal-kaldin	‘goats’
	f.	takki	‘leg’	taktakki	‘legs’
	g.	uffu	‘thigh’	uf-uffu	‘thighs'

In Agta, the stem is reduplicated, with the deletion of the final CV. To capture this data, we can simply propose that the RED node copies all the distinctive features from the stem /pusa/ in (65a) as shown in (66).

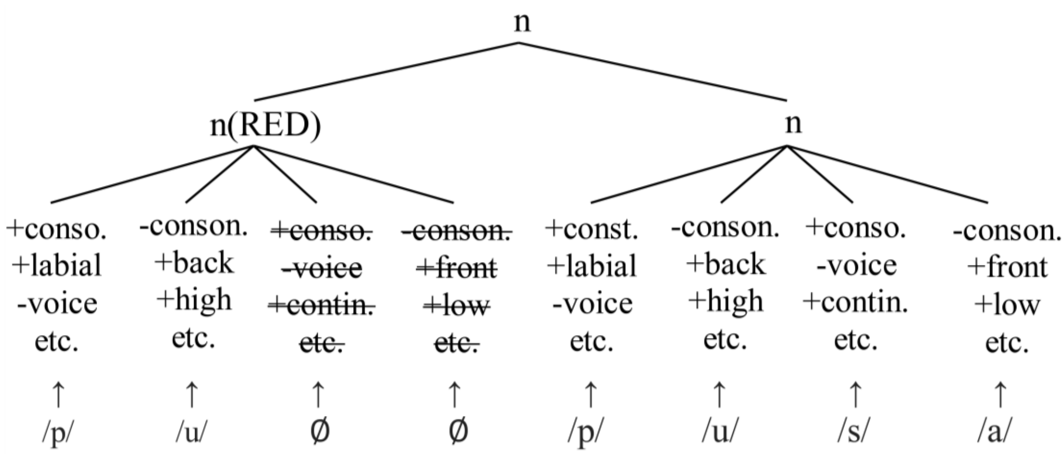
66.



Later, the impoverishment rule in (67) intervenes and deletes the final CV from the RED head before these features are supplied with SIs as illustrated in (68).

67. Features of Final CV → Ø [RED___ √pusa √kaldin √takki √uffu etc]

68.



In other words, there is nothing special about reduplication facts in all those languages; they will be no different from the forms in SA. Language-particular impoverishment rules are, however, needed to intervene and delete only the targeted sounds or part of the feature bundle in every language.

4. Conclusion

The paper contributes to the theory of DM, by proposing an approach that accounts for reduplication and both concatenative and nonconcatenative morphology. The approach is not only in harmony with the basic tenets of the DM model, but it also provides new insights to realizational theories of morphology. It argues that root consonants and templatic vowels should be decomposed into abstract distinctive features. These features enter the narrow syntax and they are organized via local dislocation rules to derive both concatenative morphology in English and non-concatenative root-pattern morphology in SA and other Semitic languages. We provided evidence that this approach can resolve the issues between the DM theorists regarding the realization of roots. This approach provides a unified theory of root realization by rendering the information in List A into features from Universal grammar, and subjecting them to the same principles of competition at PF. It also accounts for speech errors and metathesis cases at the clause levels. For reduplication, this approach proposes that the distinctive features of the root are copied from one node to another via Feature Copying. At PF, and after these features are realized by SIs, akin to the Vocabulary Insertion, two copies of the same root are pronounced, hence full reduplicant forms. For partial reduplication, the sound features will undergo impoverishment rules; thus, only part of the stem or the reduplicant is pronounced. We assume that this approach can be carried over to all languages that include full or partial reduplication, and it can make better predictions than the two available approaches such as readjustment and affixation approaches.

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