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Majd S. Abushunar & Radwan S. Mahadin, *Arab Society of English Language Studies*

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Majd S. Abushunar
Language Centre, Hashemite University, Zarqa, Jordan

Radwan S. Mahadin
Department of English Language and Literature
Faculty of Foreign Languages, the University of Jordan
Amman, Jordan

Abstract
This study aims to analyze the passive participle in Standard Arabic within the framework of autosegmental phonology. It focuses on the pattern of non-derived, triliteral verbs /maCCu:C/. The sample of the study is collected from three sources Wehr (1994), Wright (1996), and Al-waSi:T Dictionary (2004). The study discusses strong, weak, geminated, and glottalized verbs using the X-skeleton of autosegmental phonology. It considers the imperfective stem as the basic form from which other forms are derived. The findings indicate that strong, geminated, and glottalized stems show regularity to the pattern /maCCu:C/. Nevertheless, irregularities from the general pattern are observed with weak verbs due to the unstable nature of glides in Standard Arabic. Also, the study shows that autosegmental phonology provides an adequate analysis for the passive participle.
Key words: Arabic passive participle, autosegmental, phonological analysis, X-skeleton

Introduction:
Participles are verbal adjectives which are derived from verbs and have many syntactic functions. For instance, the passive participle /masju:n/ "imprisoned" can be a noun, adjective, adverb, or verb substitute (Massey, 2008). In Standard Arabic, participles are classified based on the distinction of voice (active or passive): active participles denote the verb's agent, whereas passive participles indicate the verb's patient (Ryding, 2005). For example, the active participle /?aakil/ "eating" refers to who performs the action "eat", whereas the passive participle /ma?ku:l/ "eaten" refers to what is acted upon. Present and passive participles are distinguishable in Standard Arabic, in which they have two forms: one for derived verbs and another for non-derived verbs (Schulz, 2008). For example, the passive participle /ma'mu:l/ corresponds to the basic verb /'amila/ while the passive participle /musta'mal/ corresponds to the derived verb /ista'mal/.

The aim of this study is to investigate passive participles of basic non-derived verbs (Form I) which usually have the form /maCCu:C/ and can only be derived from transitive verbs (Ryding, 2005). To achieve this goal, we provide phonological analysis of passive participle in the framework of linear generative phonology reflecting the work of Brame (1970), and Mahadin (1982, 1996). Then, we use X-skeleton, an autosegmental approach, and highlight its superiority and simplicity over linear approach.

Both Brame (1970) and Mahadin (1982, 1996) have provided phonological analysis for passive participle. They offer numerous phonological rules and suggest possible orderings for these rules to account for the different phonetic forms of passive participle within the framework of early generative phonology. Nevertheless, such analysis represents complicated derivational steps. Moreover, the same phonological patterns of passive participle can be examined using autosegmental phonology without such complicated derivations.

X-skeleton suggests that hierarchal syllabic representations are best represented when referring to the overall timing or quantity of a sound independently of its quality (Watson, 2002; Durand & Katamba, 2014). These different levels in such hierarchal representations are known as tiers. The timing units are referred as the timing (quantity) tiers (the x-tiers), whereas the quality units are known as the melody tiers (the segment tiers) (Spencer, 1996). The association between the skeletal and the segmental tiers is governed by two main principles:

(1) Adjacent identical segments are not permitted at the melodic level (Obligatory Contour Principle, OCP) (Mustafawi, 2011). As (1) shows, (a) is not acceptable in autosegmantal phonology and should be replaced by (b).

1) Obligatory Contour Principle (OCP):
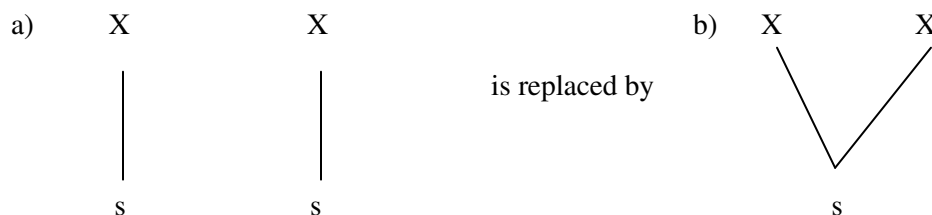
(2) Crossing association lines between the different tiers during the mapping process are unacceptable (Johnson & Roca, 1999). Thus, the representation in (2) is not permitted in phonological analysis.

2) Crossing association lines

X   X

t   v
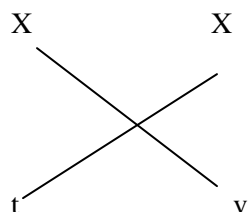
These principles of non-linear phonology solve the problem in the representation of long vowels and weak stems in Standard Arabic. Long vowels are represented as one segment associated with two X-tiers, whereas the difference between glides and vowels is determined by the position they occupy in the syllable structure: Glides are linked to the onset or the coda, whereas the vowels are linked to the nucleus of the syllable (Mahadin, 1998, 1994; Watson, 2002; van Oostendorp et al., 2011; Durand & Katamba, 2014). Therefore, the study attempts to apply these principles and generalizations in order to account for passive participles in Standard Arabic.

Method
The study collects a sample from three well-established resources of Standard Arabic: Wehr (1976), Wright (1996), and Al-waSi:T Dictionary (1998). Then, it classifies the collected passive participles into different categories based on their stem (i.e. strong, weak, glottalized, and geminated stems). Each category is analyzed individually using two frameworks (linear and autosegmental phonology) and an attempt is made to reveal the phonological processes associated with passive participle.

Data analysis and interpretation
This section provides the phonological processes required to derive passive participle from strong, weak, glottalized, and geminated verbs.

The formation of passive participle
The usual practice of linguists as well as traditional Arab grammarians when forming the passive participle of triliteral verbs is to place the root (e.g., /ktb/) on the pattern /maCCu:C/ to produce the word /maktu:b/. However, we agree with Mahadin (1982) who argues against taking the root as one morpheme and the vocalic pattern as another morpheme. This is because the root alone without its stem vowel does not provide the necessary information to derive the passive participle in Standard Arabic. For instance, it is possible to find two different verbs that have the same root but differ in their stem vowel which is responsible for making it possible to derive the passive participle. To take the verbs /jazara/ "to slaughter" and /jazira/ "to sink" as an example, the two verbs share the same root /jzr/, but it is /jazara/ not /jazira/ which has an equivalent in passive participle /majzu:r/. The reason for this is that /jazara/ is a transitive verb, and thus it may have a correspondence in passive participle. The verb /jazira/, on the other hand, is intransitive, and thus it doesn't have an equivalent in passive participle. Moreover, a passive participle like /maHsu:b/ from the root /Hsb/ may correspond to the verb /Hasiba/ "to deem or consider" meaning "considered" or to the verb /Hasaba/ "to count" meaning "counted". Therefore, as suggested by Mahadin (1982), the stem and not the root should be considered in phonological analysis because this analysis is more adequate and efficient for investigating the phonological and the semantic relationship between base and derived forms.

In the analysis of Standard Arabic, many linguists as Brame (1970) use the stem of the perfect /CaCVC-/ as the basic form from which other forms are derived, yet in this study we consider the stem of the imperfect /-CCVC-/ the starting point of derivation. Following Mahadin (1998, 1996, 1982), the stem of the imperfect is more economical and natural as it provides the minimum amount of information

required to derive the passive participle and other linguistic forms. For instance, both the passive participle /maCCu:C/ and the imperfect /-CCVC-/ have no vowel between the first and the second radicals, while the stem of the perfect /CaCVC-/ has a vowel requiring a rule to delete it when deriving the passive participle. Moreover, both the passive participle and the imperfect are attached to prefixes unlike the stem of the perfect which cannot be prefixed. The passive participle starts with a participle prefix /ma/, while the imperfective form usually starts with a personal prefix having the underlying form /Ca/. Thus, a word like /mafhu:m/ is derived from the imperfect form /ya-fham/ "to understand" by replacing the personal prefix /ya/ with /ma/ and changing the stem vowel of the imperfect /a/ with the long vowel /u:/.

Nevertheless, Brame (1970) and Mahadin (1996) argue that the underlying representation of passive participle is /maCCuwC/ not /maCCu:C/. They provide strong evidence to show that long vowels in the surface form of passive participle as well as other grammatical forms do not exist in underlying representation. According to them, Arabic long vowels are a combination of a short vowel plus a glide which surface as a long vowel through the application of phonological processes. Thus, the long vowel /u:/ in the surface form of the passive participle is derived from /uw/ as a result of two phonological rules:
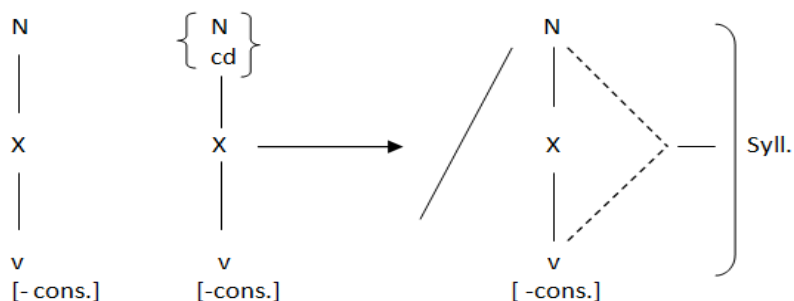
3) Syllabicity assimilation.

$$\left\{ \begin{matrix} y \\ w \end{matrix} \right\} \longrightarrow \left\{ \begin{matrix} i & i \\ u & u \end{matrix} \right\} / \underline{\hspace{2cm}} C \qquad \text{(Brame, 1970:97)}$$

4) Vowel lengthening:

$$V_i V_i \longrightarrow V_i: \qquad \text{(Brame, 1970:42)}$$

By using the notations of autosegmental phonology, on the other hand, we can represent these two processes in one phonological rule reflecting the simplicity and the naturalness of non-linear phonology. The following rule shows that a nucleus or a coda which has the feature [-consonantal] assimilates the preceding nucleus in the same syllable. This is known as syllabicity assimilation (Mahadin, 1994:85):

5) Syllabicity assimilation.

In this rule, assimilation is not a feature changing rule as suggested by Brame, above, but it is a spreading process by associating and delinking lines between segments or features. Syllabicity assimilation operates to satisfy the OPC at both tiers: the segmental and the feature tiers. The result of this phonological rule reveals identical segments or features as one segment or one feature associated with

two X-slots. Also, it is observed that there is no need to determine the feature of syllabicity in this rule. This is because in X-skeleton glides (e.g., /y/ and /w/) differ from vowels in their position in the syllable structure: the glides [-syllabic] are linked to the onset or the coda, whereas the vowels [+syllabic] are linked to the nucleus.

Strong verbs

Strong verbs (or sound verbs) are ones which do not have the glides /y/ or /w/, the glottal stop /ʔ/, and geminated consonants (Wright,1996). Strong verbs are usually stable and do not deviate from the pattern /maCCu:C/. In linear phonology, the rules needed to derive passive participle from strong stems are syllabicity assimilation and vowel lengthening as shown in Table (1):

Table1. *The Passive Participle of Triliteral Strong Verbs*

The stem	/ya-ktub+u/ to write	/ya-fham+u/ to understand	/ya-l'ab+u/ to play
Underlying representation	/maktuwb+un/	/mafhuwm+un/	/mal'uwb+un/
Syllabicity assimilation	/maktuub+un/	/mafhuum+un/	/mal'uub+un/
Vowel lengthening	/maktu:b+un/	/mafhu:m+un/	/mal'u:b+un/
Surface form	/maktu:b+un/ written	/mafhu:m+un/ understood	/mal'u:b+un/ played

In autosegmental approach, on the other hand, the derivation of passive participle of strong verbs is represented more economically and explicitly by one rule (Syllabicity Assimilation):

6) [maktu:b] "written" from the verb [ya-ktub] "to write
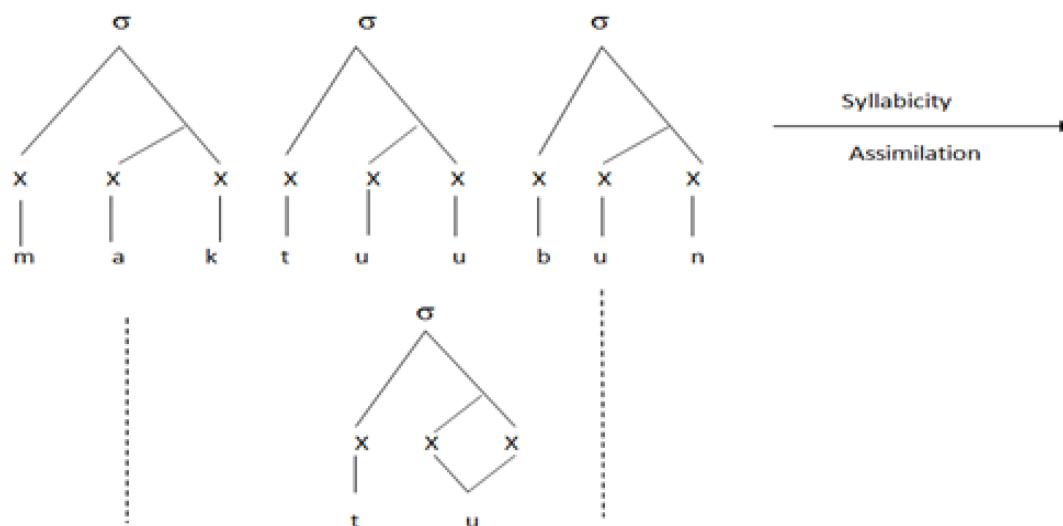
As the rule shows, syllabicity assimilation applies on the sequence /uw/ to derive the long vowel /u:/ since adjacent identical segments are prohibited at the melodic level as indicated by OCP.

Weak verbs

Weak verbs are those which have at least one glide (e.g.,'y' or 'w') in their stem. They are usually divided into three types depending on the position of the glide in the stem: initially (assimilated verbs), medially (hollow verbs), and finally weak verbs (defective verbs). Also, if the verb contains more than one glide in more than one position, it is then called doubly weak verb (Wright, 1996).

Initially weak verbs

The passive participle of initially weak verbs is derived in much the same way as the passive participle of strong verbs:

Table 2. *The Passive Participle of Triliteral Initially Weak Verbs*

| The stem	/ya+wajad+ u/ to find	/ya+yʔas+u/ to despair	/ya+wqif+u/ to stop
Underlying representation	/mawjuwd+un/	/mayʔuws+un/	/mawquwf+un/
Syllabicity assimilation	/mawjuud+un/	/mayʔuus+un/	/mawquuf+un/
Lengthening	/mawju:d+un/	/mayʔu:s+un/	/mawqu:f+un/
Surface form	/mawju:d+un/ found	/mayʔu:s+un/ hopeless	/mawqu:f+un/ stopped

Despite the fact that glides in initially weak stems are deleted in some phonological environments as that of the imperfect verb /yajid/ "to find", and /yaqif/ "to stop", they are not deleted in passive participles. This is because the phonological environment in (7) which causes glide deletion in imperfect weak verbs does not exist in passive participles:

7) Deletion of the glide /w/:

$$w \longrightarrow \emptyset / \ yV\# \_\_\_ C_2iC_3 \ \bigg| \ yV = \text{personal prefix}$$

$$\# = \text{morpheme boundary} \quad \text{(Mahadin, 1982: 269)}$$

According to (7), /w/ is deleted but not /y/. Also, /w/ is deleted only when it is prefixed by /yV/ and there is /i/ between the second and the third radical. These conditions, however, are not met in the passive participle. Thus, the glide is not deleted in the passive participle and it has the same derivation of strong verbs:

8) [mawju:d] "found" from the verb [yajid] "to find"
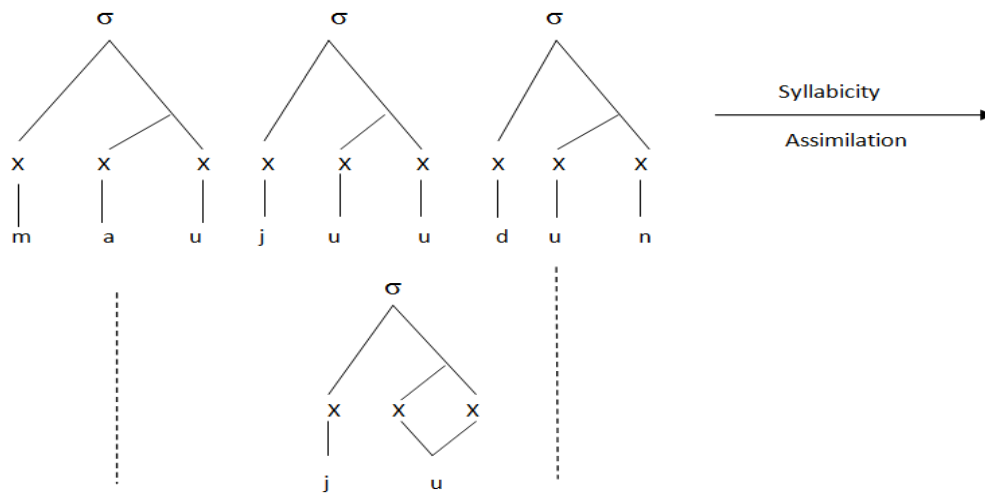
Another reason why the initial glide is not deleted is that there is no violation of OCP. The nucleus /a/ is not identical to the glide in the coda in the first syllable. Generally, the diphthongs /aw/ and /ay/ are stable in Standard Arabic and appear in surface representations (Mahadin, 1996).

Medially weak verbs

According to the general phonological rules of the passive participles, the surface forms of the stems /ya-byi'/ "to sell" and /ya-qawal / "to say" are predicted to be */mabyu:'/ "sold" and /maqu:l/"said" in passive participle. Nevertheless, the passive participles of these stems surface as /mabi:'/ and /maqu:l/, respectively. Brame (1970) has suggested that these forms are a result of successive phonological processes that apply before syllabicity assimilation. They are:

9) Metathesis:

$$\begin{bmatrix} V_i \\ C \end{bmatrix} G\ V_J \longrightarrow \begin{bmatrix} V_i \\ C \end{bmatrix} \acute{\mathcal{O}}\ V_J\ G \quad,\ \text{If}\ j=[+lo],\ \text{then}\ i=[\ +lo] \quad \text{(Brame, 1970: 302)}$$

10) Consonant Deletion:

$$C \longrightarrow \acute{\mathcal{O}}/\ C\ \underline{\quad\quad}\ C \quad \text{(Brame, 1970: 410)}$$

11) Vocalic Assimilation:

$$\begin{Bmatrix} u \\ i \end{Bmatrix} \longrightarrow \begin{bmatrix} i \\ u \end{bmatrix} \underline{\quad} \begin{Bmatrix} y \\ w \end{Bmatrix}\ C]\ \text{(Brame, 1970: 409)}$$

12) Syllabic Assimilation:

$$[-cons] \longrightarrow [+voc]\ /\ \underset{[+high]}{V}\ \underline{\quad\quad}\ \begin{Bmatrix} \# \\ C \end{Bmatrix} \quad \text{(Brame, 1970: 454)}$$

According to Brame (1970), we first apply glide metathesis which alters the position of the glide (the second radical) and the vowel /u/. Therefore, /mabyuw'/and /maqwuwl/ becomes /mabuyw'/ and /maquwwl/ respectively. Then, the metathesis rule produces a sequence of three consonants which motivates consonant deletion rule. After deleting the second consonant of the three-consonant cluster, we are left with /mabuy'/ and /maquwl/ to which we apply vocalic assimilation, syllabic assimilation, and vowel lengthening respectively.

Table 3. *The Passive Participle of Triliteral Medially Weak Verbs*

The stem	/ya-byi'/ to sell	/ya-qwul/ to say
Underlying form	/mabyuw'+un	/maqwuwl+un/
G metathesis	/mabuyw'+un/	/maquwwl+un /
Consonant deletion	/mabuy'+un /	/maquwl+un /
Vocalic Assimilation	/mabiy'+un/	----------
Syllabic assimilation	/mabii'+un/	/maquul+un /
Vowel lengthening	/mabi:'+un/	/maqu:l+un /
Surface form	/mabi:'+un/ sold	/maqu:l+un / said

Glide metathesis is a very natural rule and deeply-rooted in the phonology of Standard Arabic. It is used to explain many phonological phenomena not just the passive participle of medially-weak verbs (Brame, 1970; Mahadin, 1982). However, the metathesis rule can be explicitly and naturally explained using the notations of X-skeleton as the derivation below shows:

13) [mabi:'] "bought" from the verb [yabi:'] "to buy"
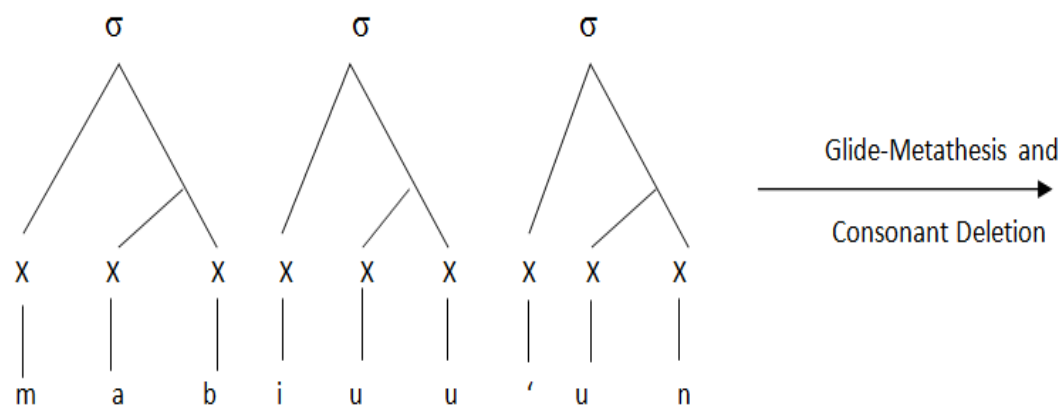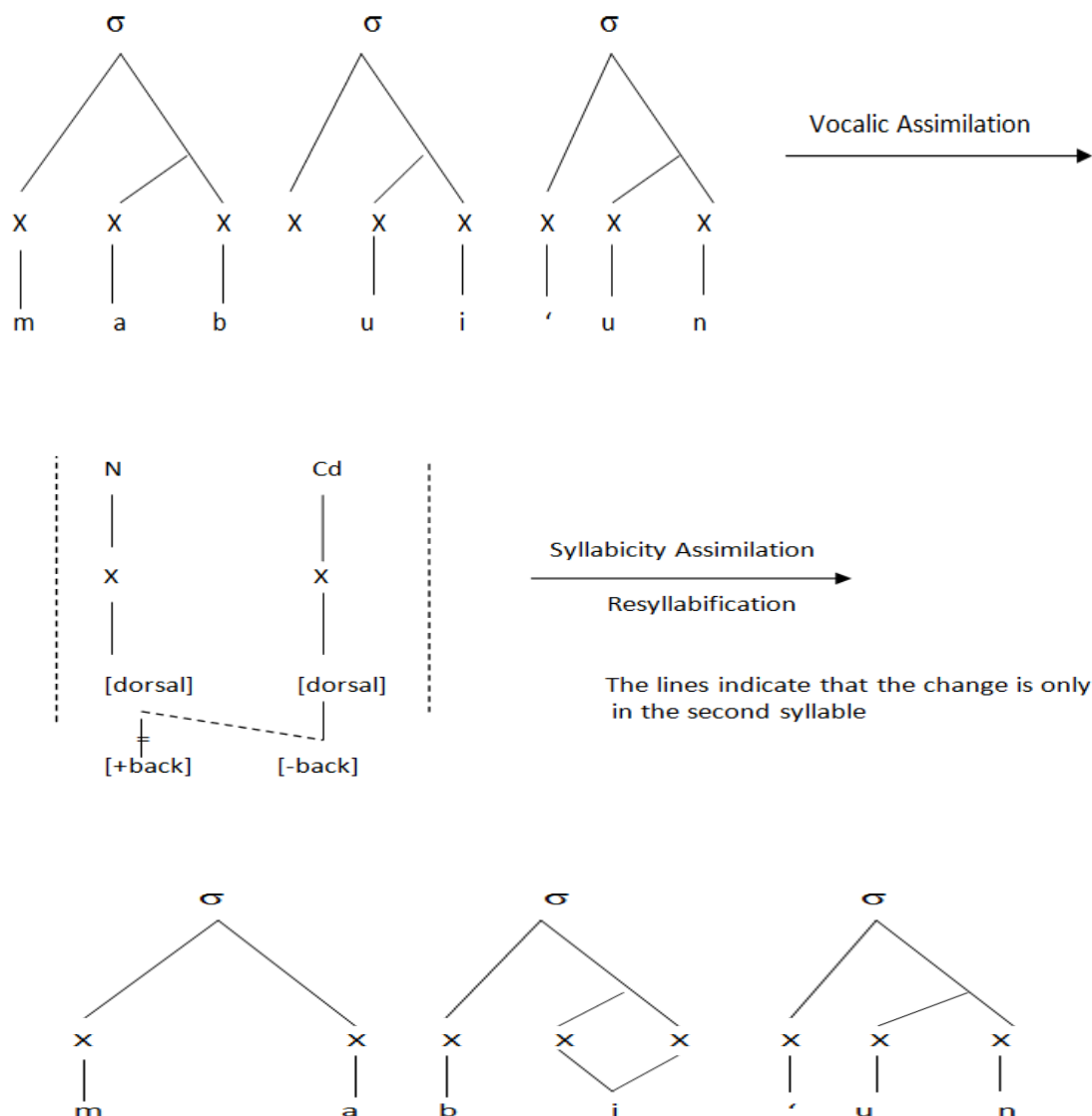
As we can see from the above analysis, the sequence resulted from the metathesis rule triggers consonant deletion and vocalic assimilation. Interestingly, vocalic assimilation occurs at the feature tier, whereas glide-metathesis and syllabicity assimilation occur at the segmental tier. Moreover, vocalic assimilation stimulates syllabicity assimilation since the outcome of vocalic assimilation gives a sequence of two identical segments in the melodic tier. Consequently, syllabicity assimilation operates to link one segment in two X-slots to satisfy OPC. Finally, the shift of the glide from the onset to the coda triggers resyllabification because Arabic syllables must have an onset (Mahadin, 1996)

Finally weak verbs

The passive participle of finally weak verbs differs from that of strong verbs. It is /maCCuww+un/ when stems end with /w/, and /maCCiyy+un/ when stems end with /y/. Accordingly, the phonetic representations of /ya-nsiy/ "to forget" and /ya-d'uw/ "to invite" are /mansiyy+un/ 'forgotten' and /mad'uww+un/ 'invited', respectively. Such differences between the passive participle of strong

stems and that of finally weak stems can be explained by adopting two assimilation processes proposed by Brame (1970):

14) W- fronting: w $\longrightarrow$ y/ —— y (Brame, 1970: 405)

15) Vocalic assimilation: $\left\{ \begin{array}{c} u \\ i \end{array} \right\} \longmapsto \left\{ \begin{array}{c} i \\ u \end{array} \right\} / ——\left\{ \begin{array}{c} y \\ w \end{array} \right\} C]$ (Brame, 1970: 409)

Table 4. *The Passive Participle of Triliteral Finally Weak Verbs*

The stem	/ya-nsay+u/ to forget	/ya-d'uw+u/ to invite
Underlying form	/mansuwy+un/	/mad'uww+un/
W-fronting	/mansuyy+un/	……………
Vocalic assimilation	/mansiyy+un/	…………
Surface form	/mansiyy+un/ forgotten	/mad'uww+un/ invited

The glide /y/ of finally weak stem is deleted in the imperfect verb /yansa:/, whereas it is present in the passive participle /mansiyy+un/. This is because the phonological environments of the two forms are different: The sequence /aGV/ in the imperfect verb triggers glide elision and then vowel lengthening (Mahadin, 1982:235), whereas the sequence /wy/ in the passive participle triggers w-fronting and vocalic assimilation.

The above linear rules are best explained using the notations of autosegmental approach. For example, the derivation of [mansiyyun] "forgotten" can be represented as:

16) [mansiyyun] "forgotten" from the verb [yansa:] "to forget"
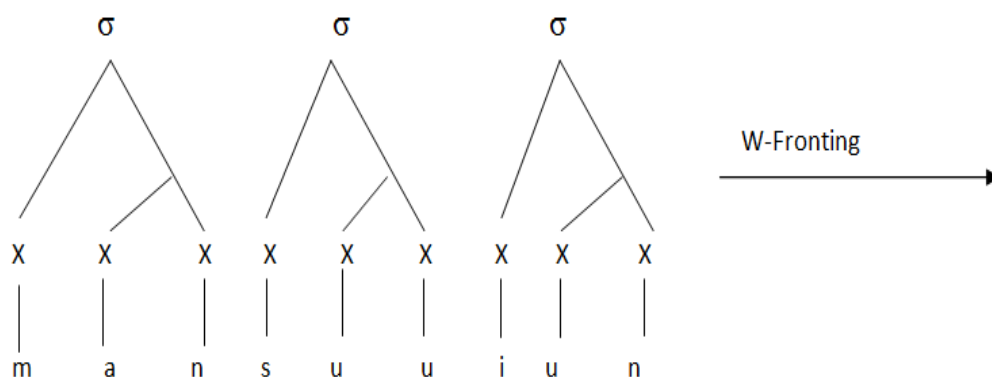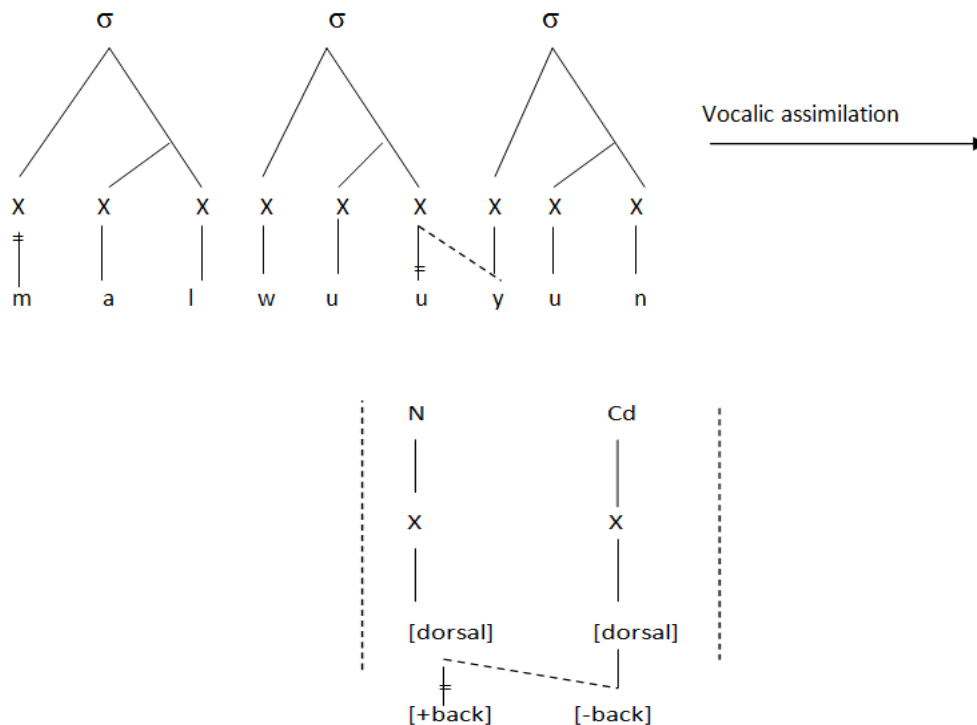
As we can see here, syllabicity assimilation is not implemented in the second syllable and hence the diphthong /iy/ surfaces in the phonetic representation. This can be related to the outcome of w-fronting which is true geminate. According to Spencer (1996), true geminates are two segments having one melody tier linked to two timing slots in accordance of OCP. Therefore, /y/ cannot assimilate with /u/ in the nucleus of the second syllable. Mahadin (1998:11) supports this by stating that the diphthongs / iy/ and /uw/ are retained when the glide is doubled and cannot be split by some phonological rule such as epenthesis.
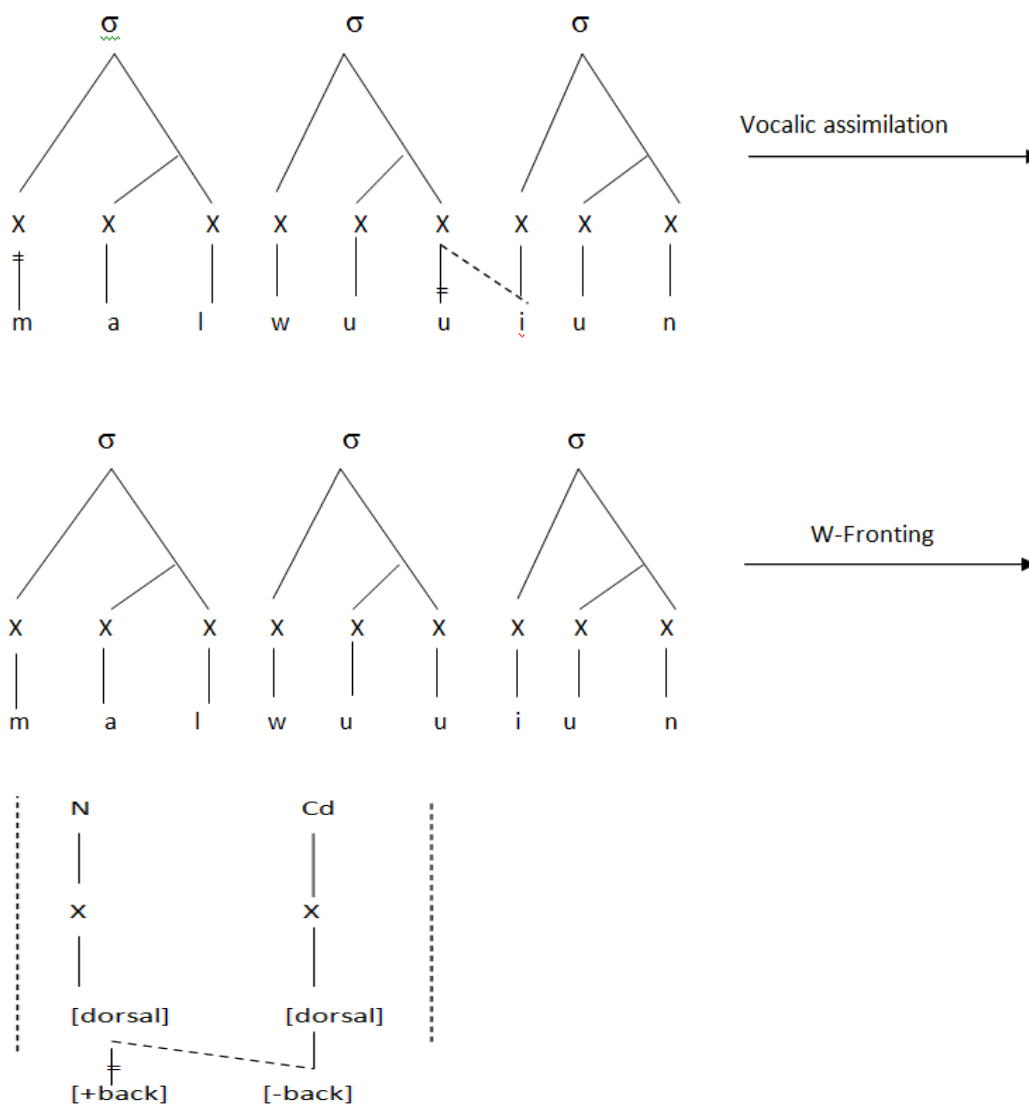
Doubly weak verbs

The pattern of the passive participle of doubly weak stems is /maCwiyy+un/. For instance, the phonetic representations of /yašwi:/ "to roast" and /yalwi:/ "to twist" are /mašwiyy+un/ 'roasted' and /malwiyy+un/, respectively. As Table (5) shows, the derivation of doubly weak verbs is similar to that of finally weak verbs:

Table 5. *The Passive Participle of Triliteral Doubly Weak Verbs*

The stem	/ya-šwiy+u/ to roast	/ya-lwiy+u/ to twist
Underlying form	/mašwuwy+un/	/malwuwy+un/
W-fronting	/mašwuyy+un/	/malwuyy+un/
Vocalic assimilation	/mašwiyy+un/	/malwiyy+un/
Surface form	/mašwiyy+un/ roasted	/malwiyy+un/ twisted

In autosegmental approach, the derivation of [malwiyyun] "twisted" can be represented as:

17) [malwiyyun] "twisted" from the verb [yalwi:] "to twist"

The same analysis which we provide for finally weak verbs applies to doubly weak verbs. The outcome of w-fronting (doubled glides) prevents syllabic assimilation in the second syllable. In addition, the doubled glides /yy/ prevent G-metathesis which has been suggested by Brame (1970: 453).

Glottalized verbs

Glottalized verbs (mahmu:z verbs) refer to verbs that have the glottal stop (hamza) among their radicals such as /ya-ʔmuru/ 'to order', /ya-sʔalu/ 'to ask', and /yaqraʔu/ 'to read' (Wight, 1996). The passive participle of triliteral, glottalized verbs is usually derived in the same way as that of strong verbs.

Table 6. *The Passive Participle of Triliteral Glottalized Verbs*

	The stem	The passive part	Pattern
Initially glottalized stem	/ya+ʔmur+u/ 'to order'	/maʔmu:r+un/ 'ordered'	/maCCu:C/
Initially glottalized stem	/ya+ʔðan+u/ 'to permit'	/maʔðu:n+un/ 'permitted'	/maCCu:C/
Medially glottalized stem	/ya+sʔal+u/ 'to ask'	/masʔu:l+un/ 'asked'	/maCCu:C/
Medially glottalized stem	/ya+yʔis+u/ 'to despair'	/mayʔu:s+un/ 'hopeless'	/maCCu:C/
Finally glottalized stem	/ya+qraʔ+u/ 'to read'	/maqru:ʔ+un/ 'read'	/maCCu:C/
Finally glottalized stem	/ya+ljaʔ+u/ 'to refuge'	/malju:ʔ+un/ 'refuged'	/maCCu:C/

The table shows no deviation from the general pattern of passive participle /maCCu:C/ despite the fact that the glottal stop /ʔ/ is deleted in some phonological environments: According to (18), the glottal stop in initially glottalized verbs is deleted and compensated by vowel lengthening when preceded by the prefix /ʔV-/ and followed by a consonant. For example, the verb /ʔaʔmanu/ "to believe" is pronounced as /ʔa:manu/ as it has the glottal stop /ʔ/ between the prefix /ʔa-/ and the consonant /m/. In (19), however, the glottal stop is assimilated to a preceding vowel /i/ or /u/, and thus a word as /biʔr/ "well" becomes /biyr/. Nevertheless, the resulting sequence /iy/ becomes /i:/ (i.e., /bi:r/) because of syllabicity assimilation.

18) Compensatory lengthening: ʔV#ʔC $\longrightarrow$ ʔV:C   (Mahadin,1982:295)

19) Glottal assimilation: ʔ $\longrightarrow$ Y/ i   — C, and ʔ $\longrightarrow$ W/ u   — C (Mahadin, 1996:3)

However, since the conditions of compensatory lengthening and assimilation are not met in the pattern of passive participle, no phonological change can occur to the glottal stop in passive participle.

As for autosegmental approach, the derivation of the passive participle [masʔu:lun] "asked" can be represented as the following:

20) [mas?u:lun] "asked" from the verb [yas?alu] "to ask"
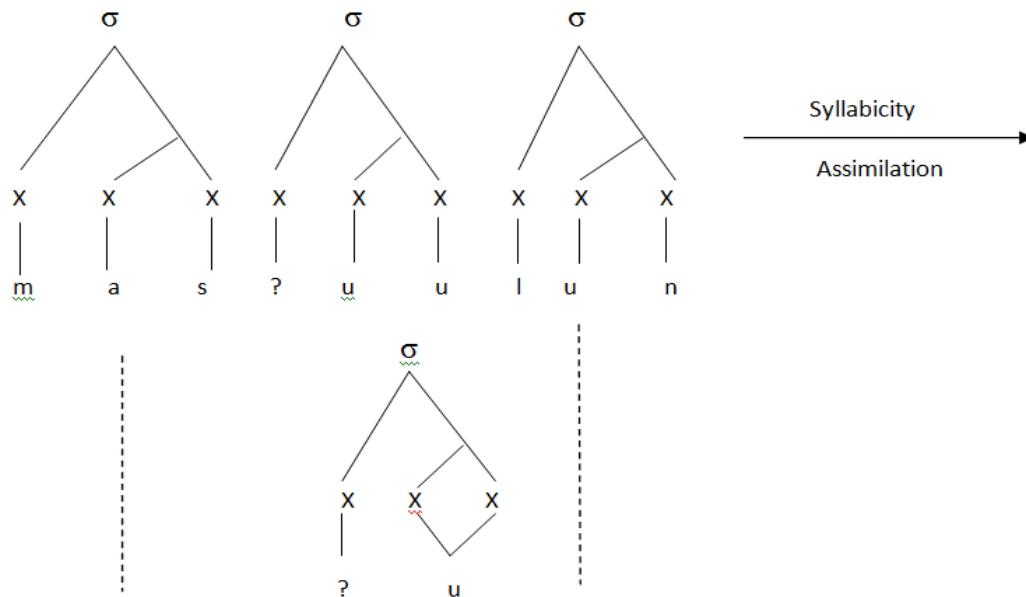

Geminated verbs

Geminated or doubled verbs are those which have two identical sounds in their stem. As strong verbs, the passive participle of glottalized verbs is derived by applying syllabicity assimilation and vowel lengthening.

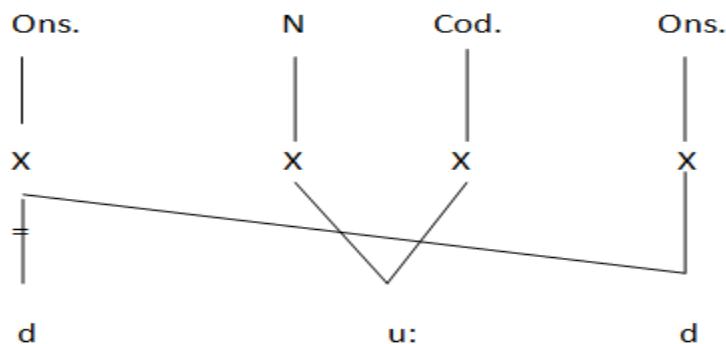Table 7. *The Passive Participle of Triliteral Geminated Verbs*

The stem	/ya+'dud+u/ to count	/ya+mdud/ to stretch
Underlying representation	/ma'duwd+un/	/mamduwd+un/
Syllabicity assimilation	/ma'duud+un/	/mamduud+un/
Vowel lengthening	/ma'du:d+un/	/mamdu:d+un/
Surface form	/ma'du:d+un/ written	/mamdu:d+un/ stretched

In autosegmental approach, on the other hand, the derivation of [ma'du:dun] "counted" can be represented in one phonological rule:

21) [ma'du:dun] "counted" from the verb [ya'uddu] "to count"
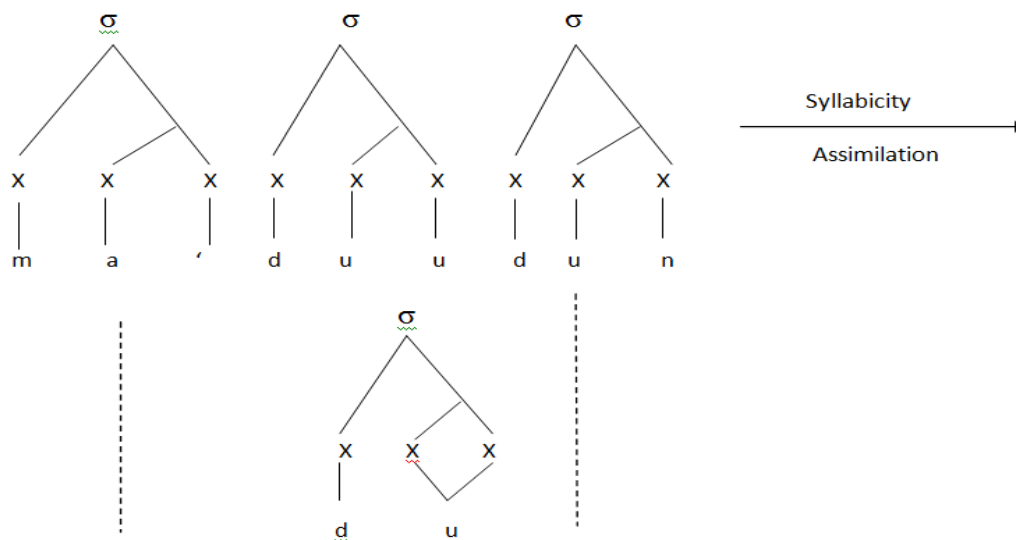
The above derivation of the passive participle /ma'du:dun/ shows that we cannot geminate the second and the third radicals because crossing association lines is prohibited in the mapping process as it can be seen below:

Conclusion

The above discussion provides phonological analysis of the passive participle of triliteral, non-derived verbs in Standard Arabic. The analysis indicates that Arabic passive participle should be derived from the stem of the imperfect not that of the perfect. Also, it accounts for the phonological behavior of strong, weak, geminated, and glottalized stems and reveals that strong, geminated, and glottalized stems exhibit the regular pattern /maCCu:C/. However, this is not true with medially, finally, and doubly weak verbs which deviate from the regular pattern. As for the best framework to examine passive participle, the study highlights the superiority of autosegmental approach over the traditional linear approach. Finally, the study recommends investigating the passive participle of derived forms in order to have a complete phonological analysis of the passive participle in Standard Arabic.

About the authors
Radwan Salim Mahadin is a Professor of linguistics at the University of Jordan, Amman, Jordan. He received his BA in English Language and Literature from the University of Jordan in 1976 and his PhD in Linguistics from the University of Pennsylvania in 1982.
Majd Saleem Abushunar is a PhD student in linguistics at the University of Jordan, Amman, Jordan. She received her BA in English Language and Literature from the Hashemite University in 2010 and her MA in Linguistics from Yarmouk University in 2012.

References
Brame, M. K. (1970). *Arabic Phonology: Implications for Phonological Theory and Historical Semitic*. Doctoral dissertation, M.I.T., Cambridge, Massachusetts.
Durand, J, &Katamba, F. (2014). *Frontiers of Phonology: Atoms, Structures and Derivations*. New York: Routledge.
Johnson, W., & Roca, I. (1999). *A Course in Phonology*. USA: Blackwell Publishing.
Mahadin, R. S., & El-Yasin, M. (1998). Identity of Vowel Length in Arabic: An Autosegmental Analysis. *Damascus University Journal,* 14, (13), 59-92.
Mahadin, R. S. (1996). Phonemic Representation of Long Vowels in Arabic. *Language Forum: Journal of Language and Literature*, (22), 41-62.
Mahadin, R. S. (1994). An X-Skeleton of Some Phonological Processes in Arabic. *Al-Abhath,* American University of Beirut, 42, 49-95.
Mahadin, R. S. (1982). *The Morphophonemics of the Standard Arabic Triconsonantal Verbs*. Doctoral dissertation, University of Pennsylvania, Philadelphia.
Majma' Allu'ahAl'arabiyaam. (2004). *AlwaSiiT Dictionary* (3[rd]ed.). Cairo: Author.
Massey, K. (2008). *Intermediate Arabic for Dummies*. New Jersey: John Willey and Sons, Inc., Hoboken.
Mustafawi E. (2011). The OCP as a Synchronic Constraint in Arabic. *The Canadian Journal of Linguistics/ La Revue Canadienne de Linguistique*, 56 (2),229-246.
van Oostendorp, M., Ewen, C. J., Hume, E. V., & Rice, K. (Ed.). (2011). *Companion to Phonology, Volume I: General Issues and Segmental Phonology*. Cambridge, Boston: Wiley-Blackwell.
Ryding K. C. (2005). *A Reference Grammar of Modern Standard Arabic*. Cambridge: Cambridge University Press.
Spencer, A. (1996). *Phonology: Theory and Description*. Oxford: Blackwell.
Schulz, E. (2008). *A Student Grammar of Modern Standard Arabic*. Cambridge: Cambridge University Press.
Watson, J. E. (2002). *The Phonology and Morphology of Arabic*. New York: Oxford University Press, Inc.
Wright, W. D. (1996). *A Grammar of the Arabic Language*. Beirut: Librairei du Liban.
Wher, H. (1994). *Arabic-English Dictionary: The Hans Wehr Dictionary of Modern Written Arabic* (4[th]ed.). J. M. Cowan (Eds.). Ithaca, N.Y.: Spoken Language Services.