

OT Analysis of Tri-consonantal Imperative Verbs in Standard Arabic

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Abstract

This study sheds light on imperative verbs in Standard Arabic. It discusses the different types of tri-consonantal imperative verbs within the OT framework, with focus on the epenthesis that takes place word-initially in these verbs. It is shown that an epenthetic /i/ is inserted to satisfy *complex^{ons} when the verbal stem starts with a consonant cluster. The study also deals with certain verbs that are considered as exceptions. These verbs are initially glottalized verbs with /u/ vowel in the verbal stem. The study reveals that these verbs undergo deletion of a primary consonant with no epenthesis in order to satisfy GLOTTAL SIMILARITY* constraint that outranks MAX-IO and DEP-IO.

Keywords: Optimality Theory, Standard Arabic, Imperative, Tri-consonantal, Complex Onset

1. Introduction

Verbs in Standard Arabic (SA), as in other Semitic languages, have a rich verbal system. This verbal system includes different forms and patterns which are produced by means of affixation that add markers to the stem (Wintner 2014). Verbs have different affixation for *number*, *gender* as well as *person* within different tenses. In consequence, this affixation is considered a rich system that is worth studying. In addition to the phonological variation of Semitic languages in general and Arabic language in particular, root and patterns' morphology is a main distinguishing feature in the language. These derivational and inflectional patterns are described mainly in terms of three or, sometimes, four consonants. These consonants are constant and unchangeable in all derivatives. Therefore, the description of morphology is based on these consonants which are considered as word roots. The vocalic pattern, in turn, differs from one derivation to another. In addition to vowels, affixes such as suffixes, prefixes and infixes are often added.

In the relevant literature, verbs in SA are classified according to different criteria (Brame 1970, Mahadin 1982, Al-Rajih 1992, and Wright and Caspari 2011). Firstly, with reference to time, Arabic verbs are classified into perfective and imperfective. The *imperfective* is divided into four moods that are distinguished by their case endings (Mahadin 1982 and Al-Fadli (n.d). The *indicative* mood verb for singular has an /u/ marker as in /jaktub-u/ 'writes', the *subjunctive* mood is marked by an /a/ as in /lan jaktub-a/ 'he will not write' while *jussive* mood is marked by a zero marker as in /lam jaktub- Ø / 'he didn't write'. In addition, the *imperative* is also considered as a mood and it is inflected for gender since it is used with second person only.

Secondly, verbs could be classified according to the number of consonants: *tri-consonantal* and *quadri-consonantal* verbs. The former are verbs which have three consonants in their roots like /*kataba*/ ‘write’. By contrast, quadri-consonantal verbs could evolve either from reduplication of the original stem consonants like /*zalzala*/ ‘shake strongly’, or they can be formed without reduplication like /*daḥradza*/ ‘roll’.

In general, verbs in SA consist of stems, which include mainly three consonants (root) and vocalic patterns. The three consonants carry the core meaning. The vocalic patterns are responsible for the formation of the derivation (Wright and Caspari 2011 and Mahadin 1982). For instance, in /*darasa*/ ‘studied’ the root consonants /d-r-s/ has the meaning of “study” in all its occurrences, e.g. /*jadrus*/ ‘he studies’, /*madrasa-t*/ ‘school’, /*ad-dira:sah* ‘study (n.)’, /*durisa*/ ‘was studied’ etc. The consonants /d-r-s/ share the same core meaning ‘study’, but they have different formations because of the vocalic augmentation patterns which are the dominant factor in determining the word form and inflection (McCarthy 1979, 1981).

Finally, verbs are classified according to the consonant type in the root: verbs can be classified into *strong* and *weak* (Owens 1988, Wright and Caspari 2011, among others). The former are verbs which have at least three true consonants in their stems i.e. consonants except the glides /w, j/. On the other hand, weak verbs have a glide or a glottal stop /ʔ/ in their root consonants. Weak verbs can further be classified according to the position of /w,j,ʔ/ in the root or in the geminated verbs. They are described as *initially*, *medially* or *finally* weak. A weak verb with a glide in an initial position are called *initially weak verbs* like /*waḥada*/ ‘promised’, verbs with a glide in the middle are *medially or hollow weak verbs* like /*ba:ḥa*/ derived from /*bajaḥa*/ ‘buy’, verbs with a glide in final position are *finally or lame weak verbs* like /*raʔa:*/ derived from /*raʔaja*/ ‘saw’ and verbs with more than one glide are *doubly weak verbs* such as /*ʔawa:*/ from /*ʔawaja*/ ‘to shelter’. In addition, weak verb includes geminated stems in which the second or the third consonants are identical as in /*dawwa*/ ‘roared’.

This study is concerned with the imperative forms in the positive. Specifically, the researcher analyzed the epenthetic environment for these forms from an optimal point of view. The significance of the study lies in the fact that it will highlight an epenthetic process among imperative verbs and their relation to jussive verbs and the verbal stem. Despite the significant rise and spread of phonological processes studies in all its fields and branches, according to the researcher’s knowledge, studies, which have tackled imperative verb from OT perspective, are limited. Therefore, this study has attempted to investigate phonological processes that take place in the imperative verb, specifically verbs which are considered as exception by Arab linguistics from OT point of view.

The Optimality theory (OP) is a quite recent theory in the field of phonology. Evidently, phonological processes within the field of OT have become a field of interest for linguists in all languages and dialects; therefore, many studies were conducted within the OT framework. The importance of this study lies in applying OT to imperatives in Arabic since few studies have tried to account for morphophonemic vowel change of imperative verbs in SA from an OT point of view.

OT as a universal theory in phonology tackles all the phonological aspects through having constraints and rules for all aspects. Thus, syllables and syllable structure have their constraints within OT. Both *markedness* and *faithfulness* constraints have a number of constraints that rule out the syllable structures in a language which could be different or have different ranking from the ones allowed in the language. Prince and Smolensky (2008) pinpoint that the main *markedness* constraints for a syllable are:

NUC each syllable must have a nucleus

ONS each syllable must have an onset

*CODA syllables must not have codas

*COMPLEX^{ONS} A syllable must not have more than one onset segment.

*COMPLEX^{CODA} A syllable must not have more than one coda segment.

According to these constraints, CV syllables satisfy all these constraints as they do not violate any of them. So, they are the least marked syllable structures. Moreover, there are other constraints that are related to syllable structures which interact with *markedness* constraints in order to produce the desired or the optimal syllable which comply with *faithfulness* constraints. The most common *faithfulness* syllable constraints are: MAX that prohibits deletion and DEP that prohibits insertion.

The syllable structure in SA includes CV, CVC, CVV and super heavy syllables that occur word finally: CVVC and CVCC. All syllables in Arabic do not have onset cluster, which means that onset cluster is not allowed in SA, *COMPLEX^{ONS}: onsets are simple (Prince and Smolensky 2008). Moreover, there are no syllables in SA without onset, i.e. Arabic satisfies ONS constraint (syllable must have onset).

2. Literature Review

Researchers tackled verbs in Standard Arabic throughout different eras and from different perspectives. Verbs were first tackled in a systematic and comprehensive description by Sibawayh (n.d.) in *Al-Kitab* where he addressed different phonological processes such as assimilation, substitution and deletion. Al-Fadli, (n.d), Bin Jinni (1954) and Al-Rajih (1992) also used a descriptive approach in order to describe the morphological variations among verb conjugations. However, other researchers like Al-Najjar (2012) considered verbal inflection in SA as highly complex in that the tri-consonantal verbs have nineteen inflections compared to four inflections in English verbs. However, he described the vocalic patterns of verbs without trying to analyze them.

Bin Jinni (1954), Brame (1970) and Benmamoun (1996) studied the relationship between the imperative and the imperfective. They noticed that these two forms are strongly related because both share the same stem vowels (the main vowel in the stem). Ben Jinni (1954) proposed that according to this intimate relationship, the imperfective is the basic form from which the imperative is derived by removing the person prefix and adding a glottal stop instead. For instance, /ja-ktub/ 'he writes' is the basic form for the imperative verb /ʔu-ktub/ 'write!'. This form is derived by removing person prefix /ja/ and adding /ʔu/ instead to avoid consonant cluster in onset position. Similarly, Brame (1970) explained that the origin of the imperative form is also the imperfective. He stated that both imperative and imperfective forms are identical with respect to the stem: both have CCVC stem as in /ja-ktub/ 'writes'

and /ʔu-ktub/ ‘write!’. Moreover, imperative and imperfective both take the same stem vowels whereas the perfective is different with regard to the stem vowels since it takes CVCVC stem shape form. Brame (1970) elucidated that in order to form the imperative from the imperfective, two rules are mainly incorporated, i.e. elision and prosthesis. The former deletes the person prefix and the latter ensures avoiding the consonant cluster as mentioned in Bin Jinni (1954) above. For instance, to form the imperative form from the imperfective /ja-ktub/ ‘writes’, first we need to drop the third person prefix /ja/ and apply a prosthesis rule in which a vowel is inserted after the glottal stop to avoid having two consonants, hence having a VCCVC form. The added vowel is /u/ if the stem vowel is /u/ while if the stem vowel is /i/ or /a/, /i/ is inserted. He assumed that a latter rule could be at play inserting a glottal stop /ʔ/ at the beginning of a word that starts with a vowel, because all words and syllables in SA should have one consonant in the onset of the syllable. For instance, /ja-dʒlis/ ‘sits’ becomes ʔi- dʒlis and /ja-ktub/ ‘writes’ becomes /ʔu-ktub/.

Brame (1970) treated the negative commands as another evidence for considering the imperfective as an underlying representation for the imperative where the second person morpheme /ta/ shows up, e.g. /la ta-lʔab/ ‘don’t play’.

On his part, Benmamoun (1996) proposed that the imperfective is the basic form of the imperative. More specifically, it is derived from the indicative mood which is one of the imperfective moods. He explained how the imperative could be derived from the indicative but not from the subjunctive mood. He considered the imperative form is closer to the indicative than the subjunctive because the imperative and the indicative do not retain a glide while the glide in the subjunctive is retained. Benmamoun did not mention the third imperfective mood in his study which is the jussive mood. This mood should have been recognized besides the other moods before determining if the indicative is really the basic form or not. However, Abdo (2008) stated that the imperative is derived from the jussive form using a general simple rule based on evidence from the negative imperative which has the jussive form of the verb.

In another study, Benmamoun (1999) investigated the role and nature of the imperfective form in Arabic. He considered that the imperfective is not only specified for tense but it could also be the default form of verbs that do not have temporal feature. As a result, the imperfective could be considered as an input to Arabic derivational morphology such as nominal locatives and other verbs.

Benmamoun also stated that the imperative and imperfective forms have the same vocalic melody, while the perfective forms have different vocalic melody or stem vowel. For instance, the vowel in the imperfective and imperative forms in /ja-drus/ ‘studies’ and /ʔu-drus/ ‘study!’ is /u/ while the vowel in the perfective form of the verb /darasa/ ‘studied’ is /a/. Consequently, he concluded that the imperative could be derived from the imperfective, mainly from the indicative mood.

Abu Rakhieh (2009) analysed Maani dialect (MA) within the framework of OT. He derived the imperative form from the imperfective by deleting the imperfective marker /ji/ and inserting a prosthetic /i/. Since an onsetless syllable is not allowed in MA, a glottal stop /ʔ/ will be added to fill the onset position. However, there are words where the prosthetic /i/ exists only at the stem level but not at the

word level because when adding the morpheme /ʔi/, ALIGNN-L which ensures that the left edge of the grammatical word GrWd coincides with the left edge of the prosodic word (PrWd) is violated.

Abu Abbas (2003) discussed epenthesis in Jordanian Arabic (JA). He indicated that to break up an onset complex cluster in JA, a glottal stop or a high short vowel /i/ is epenthesized as in the Arabic imperative.

The imperfective form is considered as the citation form from which other forms are derived (Mahadin, 1982; Benmamoun, 2000; Abdo, 2008 among others). These authors consider that all imperfective verbs have this form (C₁C₂VC₃), whatever the affixes around it are. Ben Jinni (1954), Brame (1970) and Benmamoun (1996) perceive that the imperfective and the imperative are strongly related because both share the same stem vowels.

In proto-Semitic languages, Bravmann (1951) and Levin (2002) maintain that since the vowel scheme of the imperative and imperfective is the same, it is more natural to consider that the imperative is formed by adding *person*, *number* and *gender* suffixes to the verbal stem. In Hebrew, Bravmann (1951, 1977) explains that imperative is formed by inserting a vowel after the first consonant in the verb stem. He pinpoints that the imperative in Indo-European languages in general is similar to the simple form of the verbal stem. In addition, it is identical to the imperfective (when removing the prefix) in Semitic languages. Bar-Asher (2008) maintains that the basic form for the imperative and jussive is identical in Semitic languages, which is elaborated later under morphophonological rules. The structure of the aforementioned mutual basic form is CCVC. In this study, this basic form (the stem of the imperfective verbs) will be considered the input for the imperative.

2.1. Epenthesis in Imperative Tri Consonantal Strong Verbs

The imperative mood in SA has five forms according to *gender*, *number* and *person* markings. The imperative mood is used only with second person whether singular (masculine and feminine), dual or plural (masculine and feminine) as shown in (1):

Table (1): The Derivations of the Imperative verb /ʔiksir/ ‘break’

/ksir/verbal stem	Suffixes
ʔi-ksir- \emptyset	\emptyset singular masculine
ʔi-ksir-i:	-i: singular feminine
ʔi-ksir-a:	-a: dual masculine and feminine
ʔi-ksir-u:	-u: plural masculine
ʔi-ksir-na	-na plural feminine

The data in table (1) shows that the five imperative forms have the same structure (ʔi-CCVC- suffix). These suffixes are morphemes that distinguish *gender* and *number*: -i: is for singular feminine, -a: dual masculine and feminine, -u: plural masculine, -na plural feminine and \emptyset for singular masculine morpheme (The singular masculine form is representative of the data under discussion since it is assumed to be the underlying form from which all other forms are derived from it. We will see that /ʔi/ could not

be considered as an imperative prefix since there are some imperative verbs which do not have /ʔi/ such as /daʔ/ ‘put’ and /dzid/ ‘find’. In this case no epenthesis takes place in order to not violate highly ranked constraints.

As mentioned before, the syllable structure in SA includes CV, CVC, CVV and super heavy syllables, CVVC and CVCC, which occur word finally. The syllables mentioned do not have onset cluster, which means that onset clusters are not allowed in SA. In OT terms, this is represented by *COMPLEX^{ONS} which means that onsets are simple (Prince and Smolensky 2004). Moreover, there is no syllable in SA without onset, i.e. Arabic satisfies ONS constraint (syllable must have onset). Moreover, imperfective verbs start with a person prefix which triggers resyllabification of the word as [jaC.CVC]. For instance, the imperfective stem /ktub/ is resyllabified as [jak. tub] ‘writes’ when adding the 3rd person masculine prefix. On the other hand, the imperative, which does not have a prefix, enters the derivation as CCVC form as an input. Then, /ʔi/ is inserted.

Thus, it is possible to formulate a coherent description of the phonology of imperative verbs by taking into consideration some constraints interaction. At the core of analysis is a ranking for syllable constraints such as *COMPLEX and ONS. In addition, some faithfulness constraints such as MAX-IO which ensures that each segment in the input should have a correspondent in the output. DEP-IO ensures that output segments must have input correspondents. Below are the constraints used in this study:

*COMPLEX^{ONS}: A syllable must not have more than one onset segment.

ONS: Each syllable must have an onset

MAX-IO input segments should have correspondents in the output

DEP-IO output segments must have input correspondents

IDENT-IO (round [σ]): An output segment standing *in the initial syllable* has the same value for [round] as its input correspondent.

As shown in the description of syllables in SA, onsetless syllables and onset consonant clusters are not allowed. Consequently, *COMPLEX^{ONS} and ONS constraints are not violated when forming imperatives such as /ʔi-f-rab/ ‘drink’. Inserting the epenthetic vowel satisfies *COMPLEX^{ONS} constraint, then adding the glottal stop satisfies ONS constraint because every syllable in SA must have an onset. On the other hand, epenthetic /ʔi/ violates MAX-IO and DEP-IO. *COMPLEX^{ONS} and ONS conflicts with the faithfulness constraints (MAX-IO and DEP-IO). When comparing the input and the output, it is clear that the constraint hierarchy is as follows:

ONS >> *COMPLEX^{ONS} >> MAX-IO >> DEP-IO

Another constraint that is at play here is CONTIGUITY-IO, which ensures a contiguous string, i.e. no medial epenthesis or deletion of segments is allowed. Thus, the latter candidate /ʔi-rab/ violates CONTIGUITY-IO and DEP-IO constraints.

With this constraint, the hierarchical ranking for the constraints is as follows:

ONS >> *COMPLEX^{ONS} >> CONTIGUITY-IO >> MAX-IO >> DEP-IO

Tableau (1) presents the interaction between the constraints for the input /*frab*/:

(1)

	frab	ONS	*COMPLEX ^{ONS}	CONTIGUITY-IO	MAX-IO	DEP-IO
☐ /ʔif-rab/					*	*
if-rab		*!				*
frab			*!			
ʃi-rab				*!	*	*

In tableau (1), the candidate /*if-rab*/ violates an outranked constraints which is ONS, since there is no onset in the first syllable. In addition, it violates the faithfulness constraint DEP-IO, because of the /*i*/ vowel in the output that does not appear in the input. On the other hand, /*frab* / violates *COMPLEX^{ONS}. This constraints is highly ranked, consequently this candidate /*frab*/ is not accepted although it satisfy faithfulness constraints. There is another candidate in the tableau which is /*ʃi-rab*/. This candidate violates the highly ranked constraints MAX-IO, CONTIGUITY-IO as well as DEP-IO. The optimal candidate /*ʔif-rab*/ violates MAX-IO and DEP-IO. These violations are inconsequential because the other candidates violate high-ranking constraints, since the markedness constraints (*COMPLEX^{ONS} and ONS) outrank the faithfulness constraints.

On the other hand, epenthetic /*u*/ is found in the optimal candidate for some imperative verbs. These verbs have /*u*/ as a stem vowel. For instance, the stem vowel in /*ja-ktub*/ ‘write’ or /*ja-drus*/ ‘studies’ is /*u*/. By contrast, the stem vowel in /*ja-sʔal*/ ‘ask’ is /*a*/ and the stem vowel in /*ja-ksir*/ is /*i*/. The stem vowel plays a central role in determining the epenthetic vowel. Epenthetic /*i*/ is replaced with /*u*/ due to another constraint interaction as in tableau (2):

(2)

	drus	ONS	*COMPLEX ^{ONS}	IDEN (round [σ])	MAX-IO	CONTIGUITY-IO	DEP-IO
☐ /ʔud-rus/					*		*
ud-rus		*!					*
drus			*!				
du-rus						*!	*
ʔid-rus				*!			*

It is evident in tableau (2) that in some imperative verbs /*u*/ sound is inserted as in /*ʔu-ktub*/ ‘write’ and /*ʔursum*/ ‘draw’ since the stem vowel is /*u*/. As mentioned before, Kager (1999) pinpoints that in many languages vowels such as /*i*, *ɨ*, *ə*/ are selected for epenthesis, but he added that the choice of the epenthetic vowel is related to assimilation. In this context, the stem vowel /*u*/ triggers the epenthetic segment in accordance with the highly ranked: IDENT-IO (round [σ]) (Kager 1999:409):

An output segment standing in the initial syllable has the same value for [round] as its input correspondent. This constraint triggers the insertion of /*u*/ vowel to avoid complex onset. Then, the glottal

stop is added to avoid violating the highly ranked constraint *ONS*. Consequently, the optimal candidate is /ʔud-rus/ and not /ʔid-rus/.

Thus, the hierarchical ranking for constrains is as follows:

ONS >>*COMPLEX^{ONS}>>IDEN [round] >> CONTIGUITY-IO>> MAX-IO >> DEP-IO

In their analysis of insertion in Persian, Deghan and Kambuziya (2012) claim that no word in Persian starts with a vowel in the phonetic form; consequently, word-initial glottal stop insertion is needed in onset position in order to avoid onsetless syllables. For instance /abru/ ‘arm’ becomes /ʔabru/. The researchers consider that inserting the glottal stop opens the door for resyllabification across word boundary. Lombardi (2002) and De Lacy (2006) state that coronals are considered as unmarked consonants in epenthesis in specific situations where glottals/h/ and /ʔ/ are the ideal epenthetic consonant. Žygis (2010) affirms the same conclusion that glottalization is usually found when a prosodic constituent starts with a vowel in order to fulfill onset position.

2.2 Imperative of Geminated Tri-consonantal Verbs

Geminated verbs are those verbs whose C₂ and C₃ are identical. Interestingly, geminates have an imperative structure that is different from strong verbs. For instance, the imperative form of the jussive verb /ja-ʔinna/ ‘groan’ is /ʔinna/ and the imperative form of the jussive verb /ja-zʔunna/ ‘think’ is /zʔunna/.

The structure of the jussive and the imperative verbs is the same except the person prefix of the jussive. Whatever the stem vowel is, both verbs are similar in case of geminated verbs. Actually, the imperative verb has the same structure as the verbal stem. The imperative does not have the prosthetic /ʔi/. Since the verbal stem does not start with a consonant cluster, there is no need to insert a vowel and a glottal stop. The winning structure is, thus, the one without a prosthetic /ʔi/. For instance, the verbal stem for the jussive verb /ja-ʔaʔʔ/ is /ʔaʔʔ/ ‘bite’ after removing the person prefix. The form does not have a consonant cluster in the onset position. Thus, /ʔaʔʔ/ is the optimal candidate since it does not violate the aforementioned constraints. As shown in tableau (3)

(3)

ʔaʔʔ	ONS	*COMPLEX^{ONS}	MAX-IO	DEP-IO
ʔʔaʔʔ				
iʔaʔʔ	*!			*
ʔiʔaʔʔ			*!	*
aʔʔ			*	

2.3 Imperative of Tri-consonantal Initially Weak Verbs

Initially weak verbs in SA are the verbs that start with a glide /w/ or /j/. Most of the initially weak verbs in SA start with /w/ and few begin with /j/. Furthermore, an initial glide does not appear in all verb conjugations. It only appears in perfective verbs but in some verbs it does not appear in imperfective. For instance, the perfective /waʔaʔ/ ‘put’ has the glide /w/, while in the imperfective /ja-ʔaʔ/ does not.

Interestingly, the jussive as one of the imperfective moods does not have a glide in initial position; consequently, it does not surface in the imperative. Consider the following data and the relations between the jussive and the imperative:

Table (2): Perfective, Jussive and Imperative Forms for Some Initially Weak Verbs

Stem vowel	Verbal stem	Perfective	Jussive	Imperative	Gloss
/a/	ḍaʕ	waḍaʕ	ja.ḍaʕ	ḍaʕ	put
	zaʕ	wazaʕ	ja.zaʕ	zaʕ	prevent and deny
/i/	ʕil	waʕal	ja.ʕil	ʕil	arrive
	ʕid	waʕad	ja.ʕid	ʕid	promise

It is clear from the data that the glides appear in the perfective verbs but not in the jussive and the imperative forms. Second, both forms, the imperative and the jussive, have the same structure. Third, and most importantly, the epenthetic /ʕi/ is not needed in forming the imperative since the input (the jussive without person prefix) does not have consonant cluster in onset position.

(4)

ḍaʕ	ONS	*COMPLEX ^{ONS}	CONTIGUITY-IO	MAX-IO	DEP-IO
ʕḍaʕ					
iḍaʕ	*!				*
?ḍaʕ		*!		*!	*
waddaʕ			*!	*	*!

In tableau (4) candidates as /iḍaʕ/ and /ʔḍaʕ/ violate highly ranked constraint: the first candidate violates **ONS** constraint and the second candidate violates **COMPLEX^{ONS}**. Besides, /waddaʕ/ violates **CONTIGUITY-IO**, **MAX-IO** and **DEP-IO**. By contrast, the optimal candidate/ḍaʕ/ satisfies all markedness and faithfulness constraints.

2.4 Imperative of Tri-consonantal Hollow Verbs

Hollow verbs are verbs with a glide in medial position as a second primary consonant. As in initially weak verbs, the glide does not appear in all conjugations. More specifically, in the perfective the glide is replaced by a long /a:/ while in indicative imperfective it appears in different forms: /i:/, /a:/ or /u:/ depending on the stem vowel. Table (3) presents different hollow verbs of different stem vowels. In the indicative, there is a long vowel instead of a glide, in the jussive form a shortening takes place to have a CVC form. Consequently, the imperative does not need the epenthetic /ʕi/. For instance, /ja-bi:ʕ-u/ ‘sells’, the indicative is different from the jussive which is /ja-biʕ/. In both cases, there is no violation of *COMPLEX^{ONS} constraint while the imperative has a short vowel /biʕ/. Therefore, it becomes more related to the jussive form and similar to the verbal stem.

Table (3): Jussive and Imperative Forms of Some Hollow Weak Verbs

stem vowel	Verbal stem	Jussive	imperative	Gloss
/i/	biʃ	jabiʃ	biʃ	sell
/a/	bat	jabat	bat	sleepover
/u/	qul	jaqul	qul	say

2.5 Tri consonantal finally weak verbs

Finally weak verbs are those verbs with a glide in stem final position. However, the glide does not appear in the verbal conjugations. The jussive verb for finally weak verb, unlike other weak verbs, has person prefix regardless what the stem vowel. The syllabification for the jussive verb is [jaC.CVC] in which there are two closed syllables each of which has twomoras. To form the imperative verb, the input is the verbal stem that is CCVC structure without the person prefix. This structure form creates a conflict between markedness and faithfulness constraints because it has consonant cluster in onset position. Consequently, the optimal candidates has /ʔi/. Table (4) presents some examples of jussive and imperative finally weak verbs:

Table (4): Jussive and Imperative Forms of Some Finally Weak Verbs

Jussive	Verbal stem	imperative	Gloss
jarmi	rmi	ʔirmi	Throw
janha	nha	ʔinha	Forbid
jadʃu	dʃu	ʔudʃu	Invite

The markedness and faithfulness constraints here have the same order and rank as in the tri-consonantal strong verbs as shown in tableau (6).

(6)

rmi	ONS	*COMPLEX ^{ONS}	CONTIGUITY-IO	MAX-IO	DEP-IO
ʔir.mi				*	*
ir.mi	*!				*
rmi		*!			
mi			*!	*!	
rimi			*!		*

2.6 Glottalized verbs

Glottalized verbs are verbs with a glottal stop in the verbal stem, i.e. one of the primary consonants for these verbs is a glottal stop /ʔ/. Glottalized verbs are classified into three categories according to the position of the glottal stop: initially glottalized verbs like /ʔaxaða/ ‘took’, medially glottalized verbs like /saʔala/ ‘asked’ and finally glottalized verbs like /badaʔa/ ‘started’. With regard to imperatives, medially and finally glottalized verbs behave usually like strong verbs. Therefore, we will not discuss them here. However, imperative formation of initially glottalized verbs have different derivation and process, as we will see shortly

It is clear that the verbal stem could have one of the following vowels: /a/, /u/ or /i/. Interestingly, the imperative forms of initially glottalized verbs could be classified according to the vowel stem as shown in table (5) and (6):

Table (5): Vowel stem /i/ in initially glottalized verbs

Jussive	Imperative	Gloss
ja-ʔiθθa	ʔiθθa	grow and increase
ja-ʔinna	ʔinna	groan
ja-ʔti	ʔiʔti/	come
ja-ʔði:	ʔiʔði	hurt
ja-ʔwi	ʔiʔwi	shelter

Table (6): Vowel stem /a/ in initially glottalized verbs

Jussive	Imperative	Gloss
ja-ʔlah	ʔiʔlah	worship
ja-ʔðan	ʔiʔðan	allow
ja-ʔlaf	ʔiʔlaf	accustom
ja-ʔsad	ʔiʔsad	become angry like a lion
jaʔθam	ʔiʔθam	have a sin
ja-ʔsa	ʔiʔsa	become sad

The previous data shows that in table (5) and (6) the imperative is either formed with prosthetic /ʔi/, or is identical to the verbal stem and does not have prosthetic /ʔi/. Epenthesis depends on the consonant cluster in the verbal stem. When the input has a consonant cluster, constraints interact to satisfy *COMPLEX^{ONS}. Consequently, a candidate with prosthetic glottal stop and vowel is the optimal candidate as it has the least violations of constraints as shown in tableau (7) below with the verb /ja-ʔti/ ‘come’ representing /i/ vowel stem group and the verb /ja-ʔðan/ ‘allow’ representing /a/ stem vowel group in tableau (8):

(7)

ʔti	ONS	*COMPLEX ^{ONS}	CONTIGUITY-IO	DEP-IO
☛ʔiʔti				*
i ʔti	*!			*
ʔti		*!		
ʔiti			*!	*

(8)

	ONS	*COMPLEX ^{ONS}	CONTIGUITY-IO	DEP-IO
ʔðan				
ʔiʔðan				*
iʔðan	*!			*
ʔðan		*!		
ʔiðan			*!	*

The inputs in tableau (7) and (8) start with complex onsets that are not accepted in the language. Therefore, this kind of input will not be allowed to surface by ONS. The optimal candidate to look for a candidate which first does not have a complex onset to satisfy *COMPLEX^{ONS} and ONS. It is also should satisfy CONTIGUITY-IO. These constraints outranks other faithfulness constraints.

Geminated verbs with initial glottal stop in table (4) does not have epenthetic /ʔi/, since there is no consonant cluster in the onset in the input such as /ʔθθa/ ‘grow and increase’ and /ʔinna/ ‘groan’. Accordingly, the optimal candidate is the same as the input form, which does not violate any constrain. In these cases, there is no ONS or *COMPLEX^{ONS} constraints. The winning candidate is the one that satisfies the faithfulness constraint DEP-IO. In other words, DEP-IO here is highly ranked since there is no interaction between other constraints. As shown in tableau (9)

(9)

	ONS	*COMPLEX ^{ONS}	CONTIGUITY-IO	MAX-IO	DEP-IO
ʔinna					
ʔiʔinna					
iʔinna	*!				*
ʔiʔinna			*!		*
inna				*	
ʔinna			*!	*	

2.7. Initially Glottal Stop Verbs with Vowel Stem /u/

Imperatives with vowel stem /u/ have different formation processes. Let’s have a look at some verbs in table (7):

Table (7): Vowel stem /u/

Jussive	Verbal stem	Imperative	Gloss
ja-ʔkul	ʔkul	kul	eat
ja-ʔxuð	ʔxuð	xuð	take
ja-ʔmur	ʔmur	mur	order

In *kul*, *mur* and *xuð*, there is no prosthetic /ʔi/. *kul*, *mur* and *xuð* behave as strong verbs in all verbal derivation except in the imperative. The optimal candidate does not have a glottalization nor does it have a primary glottal stop. This means that there is a highly ranked constraint which does not allow /ʔu/ insertion and thus blocks ʔuʔCuC sequence. The verbal and nominal derivation in SA gives no evidence

for ʔuʔCuC sequence: two glottal stops with /u/ as a stem vowel. Other sequences for two glottal stops could be found but with different vocalic pattern, such as / ʔuʔkaʔ / 'eat passive, imperfective: 1sg'. Moreover, Arabic allows / ʔiʔCi / sequence as / ʔiʔtina / 'bring us with'.

McCarthy (1986: 208) proposes that there is a universal feature within languages called 'The Obligatory Contour Principle OCP':

At the melodic level, adjacent identical elements are prohibited

Thus, words such as / *sasam / is not found in Arabic while / samam / is permitted in the language, taking into consideration that spreading in Arabic is rightward.

In the literature, the appearance of a glottal stop as one of the laryngeals has restrictions. For instance, Yip (1988) states that in Seri, one of the Syriac languages, there is a rule of glottal degemination. This rule deletes a glottal stop in coda position preceded by another glottal stop. For example, / ʔi-ʔa:ʔkasni / becomes / ʔi-ʔa:-kasni / 'my being bitten'. Put differently, Seri language prohibits glottal stop sequence in the same syllable. Yip explains that deleting one of the two identical segments is to resolve OCP violation.

MacEachern (1999: 35) observed and analyzed laryngeal co-occurrence restrictions in many languages. She maintains that in Aymara, the official language in Bolivia and Peru, ejectives do not occur with glottal stops in one word. Moreover, sequence of two glottal stops has not been found in the language.

She also observes the same phenomenon in many other languages such as Hausa, an Afro-Asiatic language spoken in Nigeria and Niger. In Hausa, a glottal stop does not occur with ejectives or plosives. Moreover, a glottal stop in Aymara and Hausa occurs only in initial position in all the words that has an initial vowel in the underlying form. However, a glottal stop and /h/ sound have not been found in word medial positions (p.55).

Traditional Arab linguistics considered the derivation of words with a 'glottal stop' problematic. For instance, in *Al-kitab*, Sibawajh (n.d. vol. 3: 552) considers that the co-occurrence of two glottal stops in one word not acceptable in Arabic.

McCarthy and Keating (1994) studied the co-occurrence of the thematic vowels /i/, /a/ and /u/ in Semitic languages. They find that there is a strong preference for vowel lowering in guttural contexts in Semitic languages. For instance, the epenthetic vowel /i/ becomes /a/ when adjacent to a guttural segment such as / balaʔ / 'swallow' and / dʒarahʔ / 'injure' (The epenthetic vowel in the example above is /a/). In Hebrew, a vowel also has been lowered under the influence of a following guttural such as the /a/ vowel in / zeraʔ / 'seed'.

To sum up, there are universal restrictions against the co-occurrence of glottal stops and other laryngeal segments in many languages. Besides, other restrictions are found with the guttural sequence with high vowels. To the best of the researcher's knowledge, this subject has not been tackled within the framework of OT. The only constraint that has been found regarding the laryngeal co-occurrence is suggested by MacEachern (1999). She puts forward a constraint on non-identical laryngeally marked sounds:

*similarity: consonants should not be similar.

She explains that the *similarity constraint is subject to universal ranking and has a different degree of similarity. MacEachern (1999) introduces constraints that are related to all laryngeal segments and their homorganic co-occurrence restrictions. The gist of mentioning these constraints is to show that the glottal stop constraint, as one of the laryngeal segments, is universal. It is not language specific. However, the context and the way each language addresses it is language-specific.

With regard to the word /kul/ ‘eat’, the verbal stem for this verb is /ʔukul/ since it is an initially glottalized verb. A glottal stop is needed to fulfill the onset position before epenthesis /u/. However, there is a sequence of another glottal stop with a thematic /u/ vowel that has not been found in the language /ʔuʔkul/. Since the language tries to avoid violating certain structures, a new constraint is needed:

GLOTTAL SIMILARITY*: the high vowel /u/ and a glottal stop are prohibited in coda position of syllables with a glottal stop in the onset when the vowel in the following syllable is /u/.

Moreover, a complex onset is not allowed in SA; therefore, the solution for the outranking constraint interaction is a candidate with no primary glottal stop e.g. /kul/ ‘eat’. Tableau (6) below evaluates these candidates and their interaction for the input /ʔukul/:

(10)

ʔkul	/GLOTTAL */SIMILARITY/ /ʔu/	ONS	*COMPLEX ^{ONS}	MAX-IO	DEP-IO
ʔkul				*	*
ikul		*!			*
ʔikul			*!		
ʔuʔkul	*!				*
ʔukul					*

Thus, the constraint must block two glottal stops with round vowels, i.e. /ʔuʔCu/. Accordingly, the winning candidate deletes the imperative epenthetic /ʔu/. However, the primary glottal verbs in imperative appears when adding the particle /wa/ ‘and’ to the verb: /waʔmur/ ‘and order!’ This indicates that the primary glottal stop reappears when a segment fulfill onset position which is /w/ in this case. Consequently there is no need for the epenthetic glottal stop and the presence of /w/ in onset position means that there is no violation for ONS. Accordingly, there is no violation for /ʔuʔCu/* constraint. Based on that the primary initial glottal stop reappears on the surface as shown in /waʔmur/.

3. Conclusion

This study addressed the tri-consonantal imperative verbs in standard Arabic within the OT framework. It revealed that the imperative is tightly related to the jussive imperfective verb. Both verbs have the same stem (CCVC), but the jussive verb has additionally person prefix. More importantly, the analysis that the imperative is the surface form of the verbal stem. The verbal stem structure starts with a complex cluster in imperative. Therefore, constraints interact since complex onset cluster is not allowed

in the language. As a result of the constraints' interaction and their ranking, /ʔi/ is epenthesized when the verb stem is /a/ or /i/. However, when the stem vowel is /u/, a vowel harmony constraint inserts /u/ instead of /i/ and the result is /ʔu/ instead of /ʔi/. Moreover, initial glottalized verbs with vowel stem /u/ undergo deletion of the primary glottal stop in order to avoid /ʔuʔ.u/ co-occurrence in one word, hence satisfying GLOTTAL SIMILARITY* constraint.

تحليل فعل الأمر الثلاثي في اللغة العربية في ضوء النظرية الأمثل

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الملخص

يتناول هذا البحث أفعال الأمر الثلاثية في اللغة العربية في إطار النظرية الأمثل. تتمحور هذه الدراسة حول تحليل ظهور الهمزة في بداية فعل الأمر أو عدم وجودها، بالإضافة إلى تحليل بعض أفعال الأمر التي تُعتبر شاذة في اللغة وهي: كل، وخذ ومر. ويُظهر التحليل أن الهمزة تظهر في فعل الأمر لتجنب وقوع حرفين ساكنين متلاصقين في بداية المقطع، حيث تُضاف الهمزة مكسورة لتملأ بداية المقطع الأول. وأظهر التحليل أيضاً أن الأفعال مهموزة الفاء ومضمومة العين يُحذف الحرف الأول من الأمر منها وهو الهمزة لتجنب وقوع همزتين مضمومتين في نفس الكلمة في فعل الأمر.

الكلمات المفتاحية: النظرية الأمثل، فعل الأمر الثلاثي، الحرفين الساكنين المتلاصقين.

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