Chapter Five

The Prosodic Nature of the Passive Participle in Casablanca Moroccan Arabic

1. INTRODUCTION

One of the most productive morphological operations in MA is the derivation of the passive participle (PP). It has received different treatments according to different linguists. The difference resides in the nature of the PP morpheme. Some linguists (see Marsil 1988, for example) assume that the PP is obtained via the affixation of the discontinuous morpheme [m...u...] to the base, which is assumed to be the verb root. [m-] is prefixed to the root while [-u-] is infixed after the second segment of the base. Others (Youssi 1986, and Boudlal 1993) assume that the PP morpheme is simply the morpheme [m-] which is prefixed to the base.

This chapter gives further support to the stress pattern of CMA and consequently the foot types proposed in chapter 3. The idea defended here is that the PP marker is [m-] and that the prefinal vowel that appears in some forms is the lexical default segment /u/ which is epenthesized to conform to an iambic foot of the type LH. It will be shown that the LL foot type arises only in cases where the epenthesis of /u/ does not take place, something that suggests which there are other constraints that outrank those governing foot types. In particular it will be shown that the PP forms that do not end up in a heavy syllable can only be obtained by making recourse to constraints on output-output correspondence much in the spirit undertaken in chapter four.

The chapter is divided into three major sections. In section 2, a taxonomic survey of the PP forms is offered. The verb bases considered include: sound verbs, geminated verbs, assimilated verbs and verbs whose segments contain high vocoids. Both derived and non-derived trisegmental and quadrisegmental verbs are considered. Section 3 deals with previous account of the PP. Therein we expose two different approaches and show the limitations of each. In section 4, we present an alternative analysis couched within the OT framework. Here two hypotheses will be advanced to explain the behavior of the PP: the first says that there are prosodic constraints on the PP verb stem; the second, which is adopted in the present work, maintains that these constraints hold on the PP word rather than the verb stem. Throughout the chapter, it will be argued that the analysis that works best for CMA is one where the output of the PP corresponds to an iambic foot of the type LH or else LL.

2. A TAXONOMIC SURVEY OF THE PASSIVE PARTICIPLE

This subsection will give a survey of all PP forms obtained from both derived and non-derived transitive verb bases. The word base is taken here to be a root, a stem or a word.

2.1 The PP of Trisegmental Verb Bases

2.1.1 Non-Derived Verbs

Consider the sets in 1 below. The base in 1a represents the class of sound verbs; 1b represents the class of verbs whose medial segment is one of the high vocoids /i/ or /u/; 1c represents the class of assimilated verbs; 1d is that of final geminated verbs, and finally 1e represents the class of verbs whose second and/or third segment is a glide or a high vocoid.

-1-

	Base	*PP*	*PP Gloss*
a.	ktb	məktub	written
	lʕb	məlʕub	played
	ʃrb	məʃrub	drunk
b.	ʃuf	məʃyuf	seen
	biʕ	məbyuʕ	sold
	dir	mədyur	done
c.	wqf	məwquf	stopped
	wzn	məwzun	weighed
	wld	məwlud	born
d.	sdd [1]	məsdud	locked
	ʕDD	məʕDuD	bitten
	hzz	məhzuz	taken

[1] The final consonant in these items is doubled to show they behave like the rest of trisegmental verbs and also to encode the notion of the Two-Root Theory of geminates proposed in Selkirk (1990, 1991). See chapter two and section three in this chapter for details about the representation of geminates.

e.	ʃri	məʃri	bought
	kri	məkri	rented
	ʃwi	məʃwi	roasted

A comment about roots containing a high vocoid is in order. In chapter four, we assume, following Rosenthall (1994), that verbs with medial high vocoids such as /fiq/ and /dub/ are represented underlyingly with the vowels /i/ and /u/ and that the non-moraic realization of these vowels as glides in words such as [fəyyəq] and [dəwwəb] is the result of constraint interaction. This assumption works for verbs with medial vocoids as has already been shown in chapter four and also with verbs with final high vocoids such as /ʃri/, and /kri/ (Cf. [ʃərray] "buyer"and [kərray] "tenant", where the input high vowel is realized as the glide [y]). Other examples that exhibit a vowel/glide alternation are given below:

-2-

	Verb	*Causative*	*Agent Noun*	*Gloss*
a.	dub	dəwwəb	—	dissolve
	ʃuf	ʃəwwəf	ʃəwwaf	see
	bul	bəwwəl	bəwwal	urinate
	gul	gəwwəl	gəwwal	say
	nuD	nəwwəD	—	get up
	fiq	fəyyəq	fəyyaq	wake up
	Tiħ	Təyyəħ	—	fall down
	biʕ	bəyyəʕ	bəyyaʕ	sell
b.	ʃri	—	ʃərray	buy
	kri	—	kərray	rent
	bki	bəkki	bəkkay	cry
	ʒri	ʒərri	ʒərray	run

For all these cases where there is a vowel/glide alternation, we will continue to assume that high vocoids are underlyingly represented with /i/ and /u/.

As to the cases where the distribution of high vowels and glides cannot be attributed to an alternation between the two, Rosenthall (1994) posits glides in the underlying representation. This could be the case of trisegmental verbs whose initial segment is a high vocoid and verbs whose second and third segments are vocoids as shown in the examples below:

-3-

	Vb Root	*Vb Stem*		*Gloss*
a.	wzn	wzən	*ʔuzən	weigh
	wld	wləd	*ʔuləd	give birth to
	wqf	wqəf	*ʔuqəf	stand
	wSl	wSəl	*ʔuSəl	arrive
	wħl	wħəl	*ʔuħəl	get stuck
	ybs	ybəs	*ʔibəs	get dry
b.	lwi	lwi	*luy	twist
	kwi	kwi	*kuy	burn
	dwi	dwi	*duy	speak
	Twi	Twi	*Tuy	fold
	nwi	nwi	*nuy	intend

The asterisked forms show that the initial glide in 3a and the medial glide in 3b never alternates with the corresponding high vowel, at least in CMA[2]. In 3a the initial glide can never surface as a vowel (the glottal stop is prothetic and serves as an onset). Similarly, the medial glide in 3b is always realized as non-moraic. For verbs like these ones, we assume that the glide is part of the underlying form.

The derived verb bases of the forms corresponding to the ones in 1a-e form their PP in the same way as the non-derived counterparts. Thus derived trisegmental verb bases such as [təktəb], [tʃədd] and [təwzən] have the forms [məktub], [məʃdud] and [məwzun] as their respective PP.

The patterns of the PP forms of non-derived verbs are listed in 4 below. The period marks syllable boundary; G stands for glide; the subscript means that the two segments are identical and finally the letters correspond to those of the sets given in 1 above:

-4-

a. CəC.CuC

b. CəC.GuC

[2] Benkaddour (1982) assumes that in Rabati MA, high vocoids are allowed to surface as vowels in initial position. Thus, for the author, forms such as [ʔuSəl] and [ʔibəs] are attested in this variety.

c. CəG.CuC

d. CəC.C_iuC_i

e. CəC.Ci / CəC.Gi

2.1.2 Derived Verb Bases

The forms in 5 below are derived either by medial gemination of the second segment of the root or by the prefixation of the medio-passive morpheme [t-] to the geminated form:

-5-

	Vb Base	*PP*	*PP Gloss*
a.	kəttəb	mkəttəb	written
	tkəttəb	mkəttəb	
	ləʕʕəb	mləʕʕəb	played
	tləʕʕəb	mləʕʕəb	
b.	ʃəwwəf	mʃəwwəf	seen
	tʃəwwəf	mʃəwwəf	
	dəwwəz	mdəwwəz	examined
	ddəwwəz	mdəwwəz	
c.	wəqqəf	mwəqqəf	stopped
	twəqqəf	mwəqqəf	
	wəlləf	mwəlləf	be accustomed to
	twəlləf	mwəlləf	
d.	rəqqəq	mrəqqəq	made thin
	trəqqəq	mrəqqəq	
	nəZZəZ	mnəZZəZ	toasted
	tnəZZəZ	mnəZZəZ	
e.	ʕərri	mʕərri	uncovered
	tʕərra [3]	mʕərri	
	γəTTi	mγəTTi	covered
	TγəTTa	mγəTTi	

[3] Verbs of this type show an alternation between the vowel [i] and the vowel [a]. Thus they have two allomorphs; one with [i] as in the passive [mʕərri], the other with [a] as in [tʕərra]. (For i/a and u/a allomorphy in MA, the reader may refer to works such as Al Ghadi (1990), Bennis (1992), Boudlal (1993) and Meliani (1995).

Notice that the medio-passive morpheme [t-] takes on the voicing feature of the root initial consonant if it is coronal as is the case with the verb [ddəwwəz]. Note also that whether or not the mediopassive morpheme is prefixed to the base, the PP obtained is always the same. The patterns of the PP forms in 5 are listed below:

-6-

a. $CC\text{ə}C_i.C_i\text{ə}C$

b. $CC\text{ə}G_i.G_i\text{ə}C$

c. $CG\text{ə}C_i.C_i\text{ə}C$

d. $CC\text{ə}C_i.C_i\text{ə}C_i$

e. $CC\text{ə}C_i.C_i i$

There is a second category of the PP obtained from derived verb bases. These verb bases are themselves derived by the infixation of the consonant [-t-] (and possibly the vowel [-a-] that follows it) after the first segment as shown below:

-7-

	Vb Base	*PP*	*PP Gloss*
a.	htəmm	məhtəmm	be interested in
	ħtəʒʒ	məħtəʒʒ	protesting
b.	ħtaʒ	məħtaʒ	be in need of
	rtaħ	mərtaħ	relaxed
c.	xtarəʕ	məxtarəʕ	invented
	ħtarəm	məħtarəm	respected

Most of the forms in 7 are classicized forms, reported to be used in MMA (Youssi, 1992). The patterns of the items in 7 are given in 8:

-8-

a. $C\text{ə}C.C\text{ə}C_iC_i$

b. CəC.CaC

c. CəC.Ca. CəC

One final category of derived verbs which deserves special attention is the one given below:

-9-

zyan	to become nice	*məzyan
sman	to become fat	*məsman
byaD	to become white	*məbyaD
ħmaR	to become red	*məħmaR
kħal	to become black	*məkħal

These forms do not have a PP simply because they are all intransitive, and as it has already been pointed out, only transitive verbs allow the PP.

2.2 The PP of Quadrisegmental Verb Bases

Again here both non-derived and derived verbs will be considered. The only type of derived verbs obtained is by the prefixation of the medio-passive prefix [t-] or [tt-], depending on the variety under study.

2.2.1 Non-derived verb bases

The PP is obtained by simple prefixation of the morpheme [m] to the verb base as shown in 10 below:

-10-

	Base	*PP*	*PP Gloss*
a.	TəRʒəm	mTəRʒəm	translated
	kərkəb	mkərkəb	rolled
	fərgəʕ	mfərgəʕ	exploded
b.	ʃawər	mʃawər	consulting
	SafəR	mSafəR	Traveling
	sayən	msayən	waiting for
c.	quləb	mquləb	deceived
	surət	msurət	locked
	SifəT	mSifəT	sent

d.	sərbi	msərbi	quickly done
	SəqSi	mSəqSi	asking for
e.	sali	msali	finished
	qadi	mqadi	finished

The patterns that could be obtained from the items in 10 are the following:

-11-

a. CCəC.CəC

b. CCa.CəC

c. CCu.CəC/CCi.CəC

d. CCəC.Ci

e. CCa.Ci

2.2.2 Derived Verb Bases

These verb bases behave much like those in 10 with respect to the formation of the PP. Consider the items in 12 for illustration

-12-

	Vb Base	*PP*	*PP Gloss*
a.	TTəRʒəm	mTəRʒəm	translated
	tfərgəʕ	mfərgəʕ	exploded
	tquləb	mquləb	deceived
	tsurət	msurət	locked
b.	TSəqSa	mSəqSi	asked
	tsərba	msərbi	quickly done
	tsala	msali	finished
	tqada	mqadi	finished

Since the derived verbs in 12 have the same PP as their corresponding non-derived forms, it follows that their patterns do not differ from those given in 11 above.

It should be noted that the PP of some medio-passive verbs may be realized differently if [tt] is prefixed instead of [t]. Consider the items below for illustration:

-13-

	Vb Base	PP	PP Gloss
a.	ttwəqqəf	m(ət)wəqqəf	stopped
	ttrəqqəq	m(ət)rəqqəq	made thin
	ttnəZZəZ	m(ət)nəZZəZ	made crunchy
b.	TTγəTTa	m(əT)γəTTi	covered
	ttʕərra	m(ət)ʕərri	uncovered
c.	ttquləb	m(ət)quləb	cheated
	ttsurət	m(ət)surət	locked

These examples show that if the medio-passive prefix is [tt], the PP will have two realizations: one with two major syllables, the one which is widely used in CMA, the variety under consideration; the other with three. Notice also the degemination of [tt-] in the PP. The patterns of the trisyllabic realizations are given below:

-14-

a. CəC.CəC.CəC

b. CəC.CəC.Ci

c. CəC.CV.CəC

To sum up the different patterns of the PP in CMA have been reduced to the ones in 15. C stands for consonant (geminate or non geminate) and V stands for any of the full vowels [a, u, i].

-15-

Pattern	*Examples*
a. CəC.CVC	məktub, məʕDuD
b. CəC.CV	mək.ri, məʃri
c. C.CV.CV	msali, mqa.Di
d. C.CəC.CəC	mdəwwəb, mrəqqəq
e. C.CəC.CV	mγəTTi, mʕərri
f. C.CV.CəC	mquləb, mSifəT
g. CəC.CəC.C	məhtəmm, məħtəʒʒ
h. CəC.CəC.CəC	məTTəRʒəm, mətwəqqəf
i. CəC.CəC.CV	mətγəTTi, mətʕərri
j. CəC.CV.CəC	mətquləb, məxtarəʕ, məħtarəm

Note here that the more regular and frequently used pattern in CMA is the disyllabic one (15a-g) and that the trisyllabic one is generally another variant of the first type which is used instead (15h-j).

3. PREVIOUS ACCOUNT OF THE PASSIVE PARTICIPLE

In this section we expose two different pre-OT analyses undertaken within two different theoretical frameworks and disclose the limitations of each. The first is represented by Marsil (1988). Marsil assumes that the PP morpheme has two allomorphs: [m] and [m...u...]. The allomorph [m...u...] is attached to non-derived trisegmental verb bases, whose final segment is not a glide while the allomorph [m] is affixed to non-derived quadrisegmental bases, derived trisegmental bases and non-derived trisegmental bases whose final segment is a glide. Marsil has to posit a segmental template with five positions for trisegmental roots and assume a morphologically restricted rule that applies to verbs whose final segment is a vocoid. This rule has the effect of deleting a segmental position from the template so as to block the epenthesis of the prefinal [u].

The analysis undertaken in Marsil (1988) does not have an explanatory power and therefore cannot be considered adequate. Apart from the criticism leveled at the nature of the template chosen (i.e. a segmental template), the analysis fails to explain the presence of [-u] in some forms and its absence in some others. In so doing, it treats the PP of non-derived trisegmental verb bases differently.

Boudlal (1993) offers a different analysis to the effect that the PP morpheme is systematically [m] in all the forms. According to the author, the segment [-u-] (which he represents with the archisegment /U/), appearing before the final segment of the base, is not part of the PP morpheme; rather, it is the lexical default segment which is realized as [u] in the nucleus position of a syllable and as [w] in the margin position. According to Boudlal, the presence of [u] in the PP forms is dictated by the Template Satisfaction Condition (McCarthy and Prince, 1986) which requires that all the positions of a template be satisfied. For example, the items [məʃri], [məktub] and [msali] would be derived in Boudlal’s (1993) model as follows:

-16-

<u>Stratum 1</u>

```
Input:      XX[X]X          XX[X]X          XX[X]X

            ʃ r   I          k  t   b        s  a  l  I
```

The mapping of the melodic elements on to the template positions proceeds from the edges inward by associating the non-marked positions first (the marked positions, being the bracketed X's). The bracketed X is associated only when it finds an available melodic element; otherwise it is filled by the lexical default segment as a result of the Template Satisfaction Condition (TSC):

-17-

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Assoc:      XX[X]X          XX[X]X          XX[X]X
            | |   |          | |   |         | |  |  |
            ʃ r   I          k t   b         s  a  l  I

               U               U
               |               |
TSC         XX[X]X          XX[X]X          __
            | |   |          | |   |
            ʃ r   I          kt    b


TC          XXXX            XXXX            XXXX
            | | | |          | | | |         | | | |
            ʃ r UI           k t Ub          s a l I
```

In order not to generate an ungrammatical form, Boudlal (1993) has to posit a rule which assimilates /U/ to /I/ before another /I/, and then another rule which deletes one of the two contiguous **I**'s as a result of a dissimilation process which is independently justified. The forms obtained are then subject to CV-syllabification. After the prefixation of the PP marker at stratum 2, and schwa epenthesis at the post-lexical stratum, we obtain the phonetic representations:

-18-

	σ	σ	σ σ
CV-syll.	XXX	XXXX	XXXX
	s ‡ r I	k t U b	s a l I

	σ σ	σ σ	Ap σ σ
-Aff.& syll.	XXXXX	XXXXXX	XXXXX
	m ə ʃ r I	m ə k t U b	m s a l I

The analysis provided in Boudlal (1993) is advantageous in many respects. First, it gives a unitary morpheme to all the PP forms. Second, it provides a unitary analysis for all the participles, regardless of whether they are derived or non-derived, trisegmental or quadrisegmental. Third, it shows that the segment [-u-], found before the final segment of the verb base, is no more than the lexical default segment which fills positions that would otherwise be subject to Stray Erasure. However nice this analysis seems to be, it is not unquestionable. First it posits templates that consist of timing units (X's) whose prefinal slot is marked. Development in Prosodic Morphology (McCarthy and Prince 1986) has shown that morphological rules have access not to segmental skeleta but to prosodic categories such as the syllable and the foot. Second, an input form has to go through different stages before reaching the phonetic representation. This complicates the grammar of CMA since the lexical default segment has to be epenthesized to obey the TSC, and then deleted to attain the attested output. Third and more importantly, the analysis presented above fails to capture the relationship between prosody and morphology, namely that the PP as a morphological operation is to a large extent governed by constraints on the prosodic structure of CMA.

In a later work, Boudlal (1996) reanalyzes the PP in the framework of Prosodic Morphology conceived within early OT (McCarthy and Prince, 1993). The core of the analysis rests on the fact that Prosody dominates Morphology (P>>M). Boudlal proposes that the PP in CMA should consist of exactly an iamb of the type LL and that the possible PP patterns of the language are the ones grouped in 16 below:

-19-

a. CəC.CVC

b. (C)CəC.CV

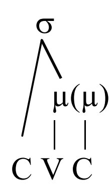
c. CCV.CəC

d. CCV.CV

Following McCarthy and Prince (1990b), Boudlal (1996) assumes that the number of consonants the onset consists of does not bear upon syllable weight, something that finds its justification in the stress system. He further assumes that the final consonant in a final CVC syllable is associated with an extrasyllabic mora as shown below:

-20-

Extrasyllabicity in final position:

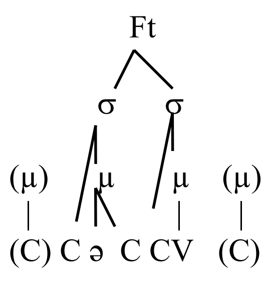


Assuming the representation in 20 has led Boudlal (1996) to conclude that all the PP's in CMA must conform to an LL iamb as shown in 21 (the brackets indicate extrasyllabic material):

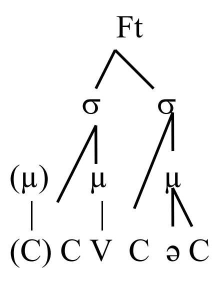
-21-

LL iamb in MA:

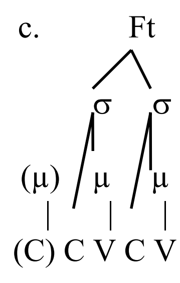
a.



b.



c.



The foot in 21a corresponds to the items which have the pattern in 19a and 19b; the feet in 21b and 21c correspond respectively to the items which have the pattern in 19c and 19d. The extrasyllabic consonants in 21a are mutually exclusive; the presence of one entails the absence of the other.

The analysis above tries to give a unified account of the PP formation by making recourse to the foot. However, assuming that heavy syllables do not occur word finally would neutralize weight distinctions in final position, thus wrongly predicting that only monomoraic light syllables occur in this position. Facts about word stress at the end of a PPh show that final heavy syllables do occur and because they are heavy, they bear stress.

4. ALTERNATIVE OT ANALYSIS

4.1 Introduction

In this section, we attempt to reanalyze the PP in CMA within the OT framework. In particular, we will show that an adequate analysis of this morphological category could be attained by the ranking of faithfulness constraints requiring that the input be identical to the output and prosodic constraints requiring that the output of this category conforms to an iambic foot of the type LH in the ideal cases or an iamb of the type LL in the worst cases but never an iamb of the type H or a minor LH iamb whose light syllable is minor.

The assumption underlying the analysis of the passive forms is that the morpheme marker is [m-] and that the prefinal vowel [u] that shows up in forms such as [məktub] is epenthesized for prosodic purposes. Boudlal (1993) has argued that this epenthesized vowel is no more than the default segment transcribed as /U/ which shows up as either [u] or [w] depending on its position in the syllable. Within a lexical-phonology framework, the author assumes that MA distinguishes between two default segments; the lexical default segment which is /U/ and the postlexical default segment which is the schwa [ə]. That /U/ is the lexical default segment is corroborated by data from CMA as the cases below show:

-22-

a.	*Base*	*Diminutive*	*Gloss*
	Dar	dwira	house
	sarut	swirit	key
	ħanut	ħwinit	shop
	RaS	RwiyyəS	head

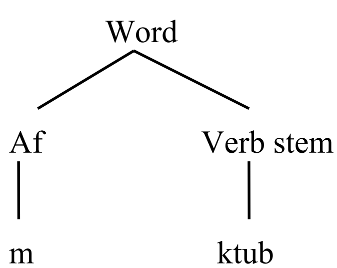
b.

Singluar	*plural*	*Gloss*
sarut	swarət	key
ħanut	ħwanət	shop
saʕa	swayəʕ	hour
Tabla	Twabəl	table

From the descriptive point of view, the data above show that both the diminutive and the broken plural start with an initial CC cluster, where the second C is [w]. Given the fact that the base starts with a single consonant, recourse is made to the lexical default segment of the language to fill in the gap and satisfy the required prosodic shape. (See chapter 6 for a detailed analysis of the diminutive and the need for positing a constraint forcing epenthesis of the default segment of the language).

In the present work, we assume that CMA has two default segments: the schwa ([ə]), which is epenthesized for syllabic purposes, and the lexical default segment, which is represented underlyingly as /u/. In the passive participle, /u/ is always realized as a vowel, whereas in cases such as the diminutive and the plural, it loses its moraic status and gets realized as a glide. Assuming the PP maker to be [m-] and /u/ to be epenthesized for prosodic requirement, it remains to explain the nature of the verb base to which the PP prefix is attached. The data presented in section 2 above show that it is the verb stem which serves as a base to the PP. Thus the structure of the PP form [məktub] is the one given in 23 below:

-23-



This structure shows that the constituent which is sister to the PP morpheme is the verb stem and that that stem has undergone u-epenthesis. In OT terms, u-epenthesis means violation of DEP-IO. At this stage, it is worthwhile to ask the following question: what is it that forces the epenthesis of /u/ in items such as [məktub] rather than [ə]? In other words how should we distinguish between a trisegmental stem such as /ktub/ in 23, where /u/ is epenthesized and a trisegmental verb root such as [ktəb], where it is the schwa [ə] rather than /u/ which is epenthesized?

To answer this question, one has to know how the language distinguishes syllable weight. In chapters two and three, we have shown that CVC syllables formed with a schwa are light, whereas those with full vowels like /u/ are heavy. This points out to the fact that weight is the crucial factor in deciding which vowel to epenthesize. That it is a schwa rather than /u/ which is epenthesized in [ktəb] suggests that there must be a domination relation between the constraints that penalize epenthesis. Here there should be a distinction between DEP-ə and DEP-u. Consider the following tableau for the derivation of the verb root [ktəb]. Recall from chapter 2 that the constraint PARSE-seg, which requires segments to be organized into syllables along with constraints on possible syllables is what forces epenthesis.

-24-

/ktb/	PARSE-seg	DEP-ə	DEP-u
a. ktb	****!		
b. k.təb		**!	
💣c. k.tub			**

The ranking in 24 wrongly predicts that the correct output is [ktub] rather than [ktəb]. This result calls for a reranking of the constraints; the correct ranking would be one where
DEP-u outranks DEP-ə as shown in the tableau below:

-25-

/ktb/	PARSE-seg	DEP-u	DEP-ə
☞a. ktəb			*
b. k.tub		*!	

Having shown that DEP-u must dominate DEP-ə and that an input such as /ktb/ can never surface as [ktub], an explanation of why it surfaces as such in the PP is in order. As a matter of fact, the constraints in 25 predict that the PP of an input form like /m-ktb/ would be [məktəb] rather than [məktub] as the tableau below shows:

-26-

/m-ktb/	PARSE-seg	DEP-u	DEP-ə
a. mk.tub	**!	*	
b. mək.tub		*!	*
☞c. mək.təb			**

The account given in 26 shows that the passive forms need more than just these three constraints which wrongly predict that the output is [məktəb] and not the correct form [məktub] [4]. Although these constraints predict that it is the schwa rather than the default vowel /u/ which is epenthesized in trisegmental verb roots such as /ktb/ and /krkb/, they fail to explain why in quadrisegmental and derived trisegmental verb bases, u-epenthesis is blocked from applying in the PP (cf. [mkərkəb] "rolled" but not *[mkərkub] and [mkəttəb] "written" but not *[mkəttub]) while it is allowed to apply in certain trisegmental verb bases (cf. [məktub] "written" but not *[məktəb]). Perhaps the explanation is to be sought in the morphology, and more particularly in its interaction with prosody.

4.2 Verb Prosodization

Recent work on MA (Al Ghadi 1990, Imouzaz 1991, El Himer 1991, Bennis 1992, among others) shows that verb syllabification is governed by prosodic templates instead of structure building syllabification rules of the type proposed in Benhallam (1990a). Non-derived trisegmental verbs such as [ktəb] "write" and [wləd] "give birth to" would have the representations in 27a.i whereas non-derived trisegmental verbs such as [dir] "do", [ʃuf] "see" and [ʕəDD] "bite" would have the representation in 27b.ii. On the other hand all non-derived

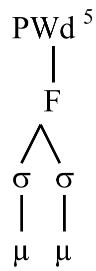
---

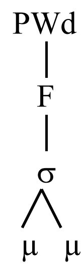
[4] The item [məktəb] exists but as a noun with the meaning "desk/office" and is used in MMA (Youssi 1992). Instead of [məktəb], the word used in CMA is [biru].

quadrisegmental verbs will have the structure in 27b . Examples of such verbs include [kərkəb] “roll”, [SifəT] “send” and [sala] “finish”.

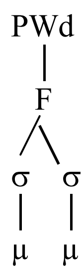
-27-

a. Non-derived Trisegmental verbs

(i) 

(ii) 

b. Non-derived quadrisegmental verbs



The first generalization that could be made about the representations in 27 is that they are all bimoraic. This derives from the constraint FT-BIN which requires that a foot be binary under syllabic or moraic analysis (McCarthy and Prince 1993a, and Prince and Smolensky 1993). The second generalization that could be made about the structures in 27 is that non-derived trisegmental verbs, unlike quadrisegmental ones, always surface with one major syllabe, a fact which is determinant in the derivation of the PP.

The fact that non-derived verb roots in CMA proceed to the epenthesis of a schwa rather than a full vowel is a result of the requirement that a verb be exactly bimoraic. Thus the grammar of CMA should incorporate a constraint of the type VERB ROOT = [μ μ], already seen in chapter two and repeated in 28 below:

[5] This template looks like that of non-derived quadrisegmental verbs. However, this is not true because in trisegmental verbs, one of the two monomoraic syllables (either the left or the right syllable) is dominated by a minor syllable.

-28-

VERB ROOT = [μ μ]

A verb root must correspond to two moras.

In 29 below, we show how a trisegmental verb is obtained. The bold face **V** stands for any of the full vowels [i, u, a]:

-29-

/ktb/	VERB ROOT = [μ μ]	DEP-**V**	DEP-ə
☞a. k^{μ}.$təb^{\mu}$			*
b. $kə^{\mu}$.$təb^{\mu}$			**!
c. k^{μ}.t**V**$b^{\mu\mu}$	*!	*	
d. k.t**V**$b^{\mu\mu}$		*!	

Candidate 29b is ruled out because it incurs two violations of the constraint DEP-ə. Candidate 29c is also ruled out because it makes recourse to a full-vowel epenthesis, thus violating bimoraicity. Finally candidate 29d epenthesizes a full vowel instead of a schwa, a fact that causes a fatal violation of DEP-V.

The same analysis could be extended to non-derived quadrisegmental verbs. Consider the tableau below for the derivation of [kərkəb].

-30-

/krkb/	VERB ROOT = [μ μ]	DEP-**V**	DEP-ə
☞a. $kər^{\mu}$.$kəb^{\mu}$			**
b. $kə^{\mu}$.$rək^{\mu}$.b^{μ}	*!		*
c. k**V**$r^{\mu\mu}$.k**V**$b^{\mu\mu}$	*!	**	

It is clear that any analysis that does not take into consideration the moraic quantity of the root will fail to account for the verbal morphology of CMA.

The effect of the bimoraicity constraint could be seen even if we adopt Prince and Smolensky's (1996) notion of richness of the base and posit verbs with underlying full vowels in the input. Thus, any proposed system of constraint interaction must rule out forms that surface with a full vowel and allow only forms that epenthesize a schwa. Consider an input with an underlying full vowel such as /ktVb/. To get the correct output [ktəb], the constraint VERB ROOT = [μ μ] must dominate MAX-V to make sure that the vowel will delete:

-31-

/ktVb/	PARSE-seg	*COMPLEX	VERB ROOT = [μ μ]	MAX-V	DEP-ə
☞a. k^{μ}.$tәb^{\mu}$				*	*
b. k^{μ}.$tVb^{\mu\mu}$			*!		
c. k.$tVb^{\mu\mu}$	*!				
d. $ktVb^{\mu\mu}$		*!			

Candidate 31b has maintained the vowel of the input, something that causes a fatal violation of bimoraicity. Candidate 31c satisfies bimoraicity at the expense of PARSE-seg, another undominated constraint in the language. Finally candidate 31d satisfies both PARSE-seg and bimoraicity but is ruled out on the ground that it violates *COMPLEX.

Next, consider a quadrisegmental verb such as /kVrkVb/ with underlying full vowels. The constraints in 32 would derive the correct output [kərkəb]:

-32-

/kVrkVb/	PARSE-seg	*COMPLEX	VERB ROOT = [μ μ]	MAX-V	DEP-ə
☞a. $kәr^{\mu}$.$kәb^{\mu}$				**	**
b. $kVr^{\mu\mu}$.$kVb^{\mu\mu}$			*!		
c. $kәr^{\mu}$.$kVb^{\mu\mu}$			*!		*
d. k.$rkVb^{\mu\mu}$	*(!)	*(!)		*	
e. k^{μ}.$rәk^{\mu\mu}$.b $^{\mu}$			*!	**	*

Candidates 32b, 33c and 32e are all ruled out because they fatally violate bimoraicity. Candidate 32d could be ruled out either because it violates PARSE-seg or *COMPLEX. The winner candidate spares all the higher-ranked constraints although this has been done at the expense of MAX-V and DEP-ə, two lower-ranked constraints.

The constraints developed above could not only account for verbs with underlying full vowel but also for hypothetical five-consonant verbs as could be seen from the tableau in 33. For such verbs we need to assume that bimoraicity also dominates MAX-C:

-33-

/CCCCC/	*COMPLEX	VERB ROOT = [μ μ]	MAX-C	MAX-V	DEP-ə
☞a. $C\text{ə}C^{\mu}.C\text{ə}C^{\mu}$			*		**
b. $C^{\mu}.CVC^{\mu\mu}.CVC^{\mu\mu}$		*!			
c. $C^{\mu}.C\text{ə}C^{\mu}.CVC^{\mu\mu}$		*!			*
d. $C.C^{\mu}.CCVC^{\mu\mu}$	*(!)	*(!)			
e. $C\text{ə}C^{\mu}.C\text{ə}C^{\mu\mu}.C^{\mu}$		*!			**

To recapitulate, it has been shown that verbs in CMA abide by a prosodic constraint which requires that the output be exactly bimoraic. This bimoraicity requirement explains why a sequence such as /ktb/ surfaces as [ktəb] while the same sequence in a form such as /m-ktb/ surfaces as [məktub], with an epenthesized /u/ rather than a schwa. The first is a root and is subject to the bimoraicity constraint; the second is an affixed stem which together with the PP morpheme must conform to a prosodic constraint requiring that the foot be iambic as will be shown in the next section.

4.3 <u>An Iamb-Based Analysis of the Passive Participle</u>

The assumption defended here is based on the idea that the output of the PP is governed by a prosodic constraint which demands that it conform to an iambic foot. Prince and Smolensky (1993) and McCarthy and Prince (1993a) maintain that there should be a hierarchy among foot types in the grammar of languages. This means that a domination relation should be established among iambic feet in CMA. Since the epenthesis of /u/ creates a final heavy syllable, we assume that the most harmonic type of iambic foot is LH and as such should dominate LL. Incorporating such constraints (i.e. LH and LL) in the grammar of CMA along with other markedness and faithfulness constraints will allow us to explain u-epenthesis in the PP's obtained from non-derived trisegmental verb bases and its absence in PP's obtained from derived trisegmental verb bases and quadrisegmental verb bases. It will be shown that when LH is dominated, the foot obtained is of the type LL but never H or a minor LH iamb where the first syllable is minor. It will also be shown that these constraints operate on the output of the PP rather than on the verb stem which serves as a base for derivation.

At a first stage, let us explore the possibility that the constituent which is the sister to the PP prefix is what needs to be counted as the stem and that this stem is governed by a prosodic constraint requiring that it conform to an iambic foot. To see whether this is actually the case, consider representative items for the possible PP patterns in CMA.[6]

-34-

i. PP of trisegmental verb stems

a. m-C.CuC	mə-k.tub
b. m-C.CaC	mə-r.taħ
c. m-CəC$_i$.C$_i$ əC	m-kət.təb
d. m-C.CV.CəC	mə-x.ta.rəʕ
e. m-C.CəC$_i$.C$_i$	mə-h.təm.m
f. m-C.CV	mə-k.ri

ii. PP of quadrisegmental verb stems

a. m-CəC.CəC	m-kər.kəb
b. m-CV.CəC	m-su.rət
c. m-CV.CV	m-sa.li

The first generalization that could be made about the items in 34 is that all quadrisegmental verb stems and few cases of trisegmental stems (34i.c and 34i.d) conform to a bisyllabic iambic foot of the type LL, where both syllables are major syllables. The second generalization concerns some

[6] The list does not include verb stems such as [tkəttəb], [tkərkəb], [tsurət] and [tsala] which are derived by the prefixation of the medio-passive morpheme [t-].

of the trisegmental verb stems such as 34i.a and 34i.b which conform to an iambic foot of the type LH, where the light syllable is minor. In 34i.a the heavy syllable is obtained by u-epenthesis; in 34i.b the heavy syllable is part of the base. The rest of trisegmental verb stems, i.e. 34i.e and 34i.f conform to an iambic LL foot where one of the two syllables is minor.

At this stage, it is reasonable to ask why u-epenthesis applies in 34i.a but not in the rest of the items. In 34i.b, this epenthesis does not apply because the final syllable is already heavy and as such does not need to be augmented. In 34a. u-epenthesis applies to avoid output forms such as *[məktəb], where the verb stem is still iambic but consists of a minor syllable. This points out to the fact that the language distinguishes between bad iambs such as C.CəC that are improved by u-epenthesis and good iambs which consist of two light major syllables. If this is the case, one may wonder why verb stems on the pattern C.CV, and consequently all vowel-final verbs, do not make recourse to u-epenthesis to achieve a good iamb. Why is it the case that u-epenthesis is blocked in certain trisegmental verbs such as 34i.d and 34i.e and all quadrisegmental verbs ending in consonant (34ii.a and 34ii.b)?

One can argue that u-epenthesis is blocked from applying to vowel-final verbs because of the various constraint violations that would be incurred if the vowel of these verbs were juxtaposed with /u/ (see section 4.3.1 below for these constraints). In the trisegmental verbs in 34i.d and 34i.e and quadrisegmental verbs ending in a consonant, there is nothing that would block this epenthesis from applying, thus leading to the most harmonic iambic LH foot type and resulting in forms such as *[mhətmum], *[məxtaruʕ], *[mkərkub] and *[msurut], which do not correspond to the optimal output forms. However, if we assume that iambic requirement is a constraint that holds on the derived PP word rather than on its verb stem, the non-epenthesis of /u/ in quadrisegmental verbs and certain trisegmental verbs could be accounted for in a straightforward manner. Such is the hypothesis that will be pursued below in the alternative analysis of the prosodic shape of the PP.

4.3.1 Augmented Passive Participle Forms

This subsection will consider representative items from all the possible trisegmental verb bases of the language: sound verbs, medial weak and final weak verbs (i.e. verbs that contain vowels and/or glides), assimilated verbs, and geminated verbs.

To start with, the category of non-derived trisegmental verbs exhibits a special behavior which resides in the fact that the PP form shows a prefinal vowel [u]. The passive marker, being the prefix [m-], is attached to the base which is the verb root here. Given the fact that a foot of the type LH is more harmonic than LL, it follows that LH must dominate LL. The two constraints on foot type must dominate DEP-u which in turn dominates
DEP-ə. Thus an input form like /m-ktb/ would be obtained as in 35 below:

-35-

/m-ktb/	LH	LL	DEP-u	DEP-ə
☞a. (mək.tub)		*	*	*
b. mək.(tu.bu)	*!		**	*
c. (mək.təb)	*!			**

The analysis above could well be extended to passives obtained from other non-derived trisegmental verbs, namely glide-medial verbs, that is verbs whose second segment is the vocoid /i/ or /u/. Thus a word such as [məbyuʕ] is derived as in 36. Since all augmented forms must conform to an LH iamb, the constraint LL won't play any role in deciding about the optimal candidate and as such it won't be included in tableaux unless it bears on the argument.

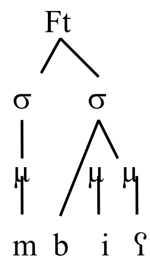
-36-

/m-biʕ/	LH	DEP-u	DEP-ə
a. (məb.yuʕ)		*	*
b. m.(bu.yəʕ)	*!	*	*
c. (məb.yəʕ)	*!		
d. məb.(yu.ʕu)	*!		
💣e. (m.biʕ)			

The constraints in 36 wrongly predict that the optimal candidate is *[mbiʕ] which conforms to an iambic foot of the type LH, where the light syllable is a minor syllable attached to a consonant.

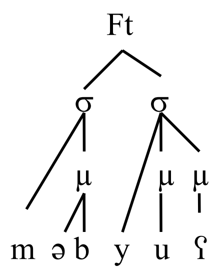
Given the assumption made about syllable structure in chapter 2, such a word would have the representation in 37 below:

-37-



The actual optimal candidate [məbyuʕ] has the structure in 38:

-38-



To exclude a candidate such as [mbiʕ], there should be a way of distinguishing between the iamb in 37 and the iamb in 38. It has been shown in chapter 2 that CMA distinguishes between a major syllable, whose nucleus is a full vowel or a schwa and a minor syllable which consists solely of a consonant. In the same spirit, the language should also be allowed to carry out this distinction to the foot level. Thus we should distinguish between a true LH iamb of the type in 38 and a minor LH iamb of the type in 37. Also a distinction, which is irrelevant for the PP cases here, should be made between an iamb of the type LL and a minor iamb of the same type but where one of the two syllables is associated with a minor syllable.

To get the optimal output, we need to include a constraint of the type *Min-LH which must dominate LH (the true iamb) to rule out a candidate such as [mbiʕ]:

-39-

/m-biʕ/	*Min-LH	LH	DEP-u	DEP-ə
☞a. (məb.yuʕ)			*	*
b. (m.biʕ)	*!			
c. m.(biʕ)		*!		

The constraint *Min-LH will be included below only when it is relevant. We assume that any PP form that violates this constraint is excluded. (See chapter 6 for the relevance of the constraint *Min-LH in the analysis of the diminutive). Note here that the base vowel loses its moraic status and is realized as a glide to serve as an onset to the epenthesized [u]. Assuming that high vowels are [-consonantal] and that glides are [+consonantal], the realization of the high vowel in 39 as a glide causes violation of the constraint IDENT-IO [cons], given in chapter four, and repeated in 40 below:

-40-

IDENT-IO [cons]

Featural specification for [cons] must be preserved in the input/output mapping.

In order to derive the optimal form, ONSET must be allowed to dominate IDENT-IO [cons] to avoid output forms such as *[mbiuʕ] or *[mbiwəʕ].

The other type of forms that need additional constraints are verb bases whose second segment is the vocoid /u/. Assuming the prefinal epenthesis of /u/ gives rise to two u's, the second of which is the root segment. Thus, from an input form such as /m-ʃuf/, Gen supplies the competitive candidates listed in the following tableau:

-41-

/m-ʃuf/	*Min-LH	LH	DEP-u	DEP-ə
☞a. (məʃ.wuf)			*	*
b.m.(ʃəw.wəf)		*!	*	**
c. m.(ʃuf)		*!		
d. (m.ʃuf)	*!			

Both candidates 41c and 41d are excluded because they do not conform to the most harmonic iamb. Candidates 41a and 41b have resorted to u-epenthesis to create that final heavy syllable required for the iamb. However, this epenthesis results in a sequence of two vowels which need to be syllabified as one syllable. In 41b, both vowels lose their moraic status and get realized as glides, a fact that incurs a double violation of DEP-IO and a fatal violation of LH. In 41a, the first vowel is realized as non-moraic and thus surfaces as a glide that serves as an onset to the epenthetic [u].

Although candidate 41a conforms to an iambic foot of the type LH, it is not optimal not because the constraint hierarchy established above is wrong but because the form violates a constraint which prohibits two contiguous rounded segments. This markedness constraint, dubbed *ROUND ROUND after Bensoukas (1999), is formulated as follows:

-42-
*ROUND ROUND (henceforth *RdRd)

Sequences of round segments are prohibited.

This constraint is observed not just in the PP but also in other morphological categories as the following examples show:

-43-

a.	*Base N*	*Unattested Nisba*	*Nisba*	*Nisba Gloss*
	?aməzzru	*məzzruwi	məzzriwi	from Amezrou
	SəfRu	*SəfRuwi	SəfRiwi	from Sefrou
	bzu	*bzuwi	bziwi	from Bzou
b.	*Sg*	*Unattested Pl.*	*Pl.*	*Gloss*
	raS	*ruuS/*rwuS	ryuS	head
	DaR	*DuuR/*Dwur	DyuR	house

In 43a the addition of the nisba suffix gives rise to a hiatus that the language resolves by inserting a glide which shares the features of the preceding vowel. Since the constraint *RdRd bans sequences of identical rounded segments, the final vowel of the stem dissimilates to [i]. In 43b, the plural morpheme [u] is juxtaposed with another [u] which we assume to be the lexical default segment of the language needed for a constraint requiring the plural (and other morphological categories such as the diminutive) to start with a sequence of two consonants. The realization of the first [u] as non-moraic results in forms that violate *RdRd. This state of affairs is remedied by dissimilating the first rounded segment, thus getting the correct output.

Now, let us return to the passive forms of verbs with a medial vocoid to see how items like [məʃyuf] could be derived from the input /m-ʃuf/. Such a form necessitates the constraints on foot types developed above along with the markedness constraint *RdRd to account for the dissimilation of the root /u/ into the glide [y]. The dissimilation process causes violation of the constraint IDENT-IO [round] which penalizes an output form that alters the input specification for the feature [round]. Therefore, in order to get the optimal output, *RdRd must be allowed to dominate IDENT-IO [round] for dissimilation to apply:

-44-

/m-ʃuf/	*RdRd	IDENT-IO [round]
☞a. məʃ.yuf		*
b. məʃ.wuf	*!	
c. m.ʃu.wəf	*!	
d. m.ʃu.wuf	*!	

Although the optimal candidate in 43a violates IDENT-IO [round] by virtue of the fact that the medial segment of the verb base [u] is realized as the glide [y], it is the winner because it conforms to the most preferred iamb. The other candidates satisfy IDENT-IO [round] at the expense of a higher-ranked constraint, namely *RdRd. Apart from the constraint *RdRd, the third candidate is suboptimal because it violates LH, a higher-ranked constraint. Note further that all the candidates in 44 violate the constraint IDENT-IO [cons] by virtue of the fact that the input high vowel is realized a glide to serve as an onset to the epenthetic [u]. Next, we consider the PP of assimilated verbs, that is verbs whose first segment is essentially the glide [w] [7]. The assumption underlying this work is that the initial segment in such verbs is a glide underlyingly. Thus a form such as [məwlud] from the input /m-wld/ could be obtained using the same constraints developed for the analysis of the PP forms derived from sound bases.

-45-

/m-wld/	*Min-LH	LH	DEP-u	DEP-ə
☞a. (məw.lud)			*	*
b. (məw.ləd)		*!		**
c. mə.(wə.lud)			*	**!
d. m.(w.lud)	*!			

Candidate 45b is excluded because it violates LH. As to candidate 45c, it is ruled out for having made recourse to many ə-epenthesis instances, thus violating DEP-ə. Finally, 45d is ruled out because of the constraint *Min-LH. It can also be ruled out on the ground that it incurs two violation marks of *Min-σ by allowing the segments [m] and [w] to attach to a minor syllable.

Another candidate that deserves special consideration is [mulud]. This form corresponds to an LH iamb and spares DEP-ə and leads one to wonder why it cannot be the optimal candidate rather than [məwlud]. The form [mulud] is attested in other varieties of MA, especially the southern varieties. In the variety under study, this form may frequently be heard in rapid speech, but the form used in normal speech is the one that preserves the initial underlying glide and epenthesizes a schwa between this glide and the

PP prefix. The relevant constraint penalizing featural change of the underlying glide is IDENT-IO [cons]. To derive [məwlud], the constraint IDENT-IO [cons] will have to be dominate constraint DEP-ə. The tableau below shows how [məwlud] is chosen over [mulud].

[7] The only verb whose first segment is [y] is [ybəs]. All other glide initial verbs in MA start with the glide [w] in most of the varieties.

-46-

/m-wld/	IDENT-IO [cons]	DEP-ə
a. məwlud		*
b. mulud	*!	

In varieties where [mulud] is optimal, DEP-ə must outrank IDENT-IO [cons]. (For a more detailed analysis of variation in MA, the reader is referred to Rguibi, forthcoming).

The final case that shows a prefinal [u] is that of geminated verbs such as [ʃədd] "hold" and [həzz] "lift" which get their PP form by epenthesizing [u] between the two parts of the geminate to get [məʃdud] and [məhzuz], respectively. Given that the verb base is the root which is bisegmental by virtue of the fact that geminates are represented by a single melodic element (McCarthy's 1986 OCP), the constraints developed so far in this chapter are incapable of generating the correct output. The constraints we have would allow candidates such as the ones given in 47 below:

-47-

/ m-ʃd/	LH	DEP-u	DEP-ə
☞a. (məʃ.du)	*	*	*
b. mə.(ʃu.du)	*	**!	*

This constraint tableau wrongly predicts that the optimal candidate is 46a. Candidate 47b is excluded because it makes recourse to u-epenthesis twice and allows the schwa to occur in open syllables, something the language does not allow.

Confronted with such a situation like the one in 47, two solutions emerge in order to satisfy the optimal foot. First, epenthesize the segment /u/ and then lengthen it to have a heavy syllable that conforms to the desired iamb. The result is the form *[məʃduu] which is suboptimal because it contains long vowels that the language bans. The constraint ruling out long vowels is stated as follows:

-48-

NO-LONG-V (McCarthy and Prince 1993a, Rosenthal 1994)

Long vowels are prohibited.

The second solution to achieve an LH iamb is to close the syllable whose nucleus is the epenthesized /u/ by the labiovelar glide [w], thus getting the output [məʃduw]. This form is ruled out because it incurs a fatal violation of the constraint DEP-C:

-49-

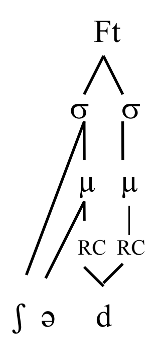
DEP-C

Every consonant in the output must be in the input.

We assume that this constraint should be allowed to dominate LH so that no epenthesis could take place to satisfy the iamb requirement.

The third solution which will be adopted in the analysis of verbs like [ʃədd] and [həzz] is the one suggested in chapter 2 and whereby geminates have two root nodes (Selkirk 1990, 1991). Adopting the Two-Root Theory of geminates, verbs such as [ʃədd] would have the structure in 50 below:

-50-



The structure in 50 is written as /ʃdd/ to encode the notion of the Two-Root Theory of geminates. The addition of another root node and the spreading of the final consonant results in the violation of the anti-structure constraint *STRUCTURE, but since this constraint is violated in all candidates, it should be ranked low in the constraint hierarchy.

In the constraint tableau below we expose the three possibilities suggested for the PP of geminated verbs and show how the form [məʃdud] is the only optimal candidate of the three.

-51-

/m-ʃdd/	DEP-C	NO-LONG-V	LH	DEP-u
☞a. (məʃ.dud)				*
b. (məʃ.duu)		*!		**
c. (məʃ.duw)	*!			**

What is not shown in the tableau above is that candidates 51b and 51c fail to realize the two-root nodes associated with the geminate, thus incurring another fatal violation of the constraint MAX-RC, requiring the preservation of the root consonants of the input (see chapter two). Notice also that the optimal candidate splits up the geminate, a fact which points out that LH has to dominate the constraint NO-SPLITTING, which in turn has to dominate DEP-u as shown in the tableau below:

-52-

	LH	NO-SPLITTING	DEP-u
☞a. (məʃ.dud)		*	*
b. m.(ʃəd.d)	*!		

In chapter two, it has been shown that NO-SPLITTING is violated in quadrisegmental verbs to secure the higher-ranked constraint on verb root bimoraicity. Similarly, items such as [məʃ.dud] show that the NO-SPLITTING constraint can be violated if the output obtained conforms to an iambic foot of the type LH.

To sum up, it has been shown that there are two different ways through which CMA PP forms achieve an iambic foot of the type LH: first by epenthesizing /u/ in sound verbs, assimilated verbs and verbs whose medial segment is a vocoid; second, by epenthesizing /u/ between the two parts of a final geminate in geminated verbs, something that is possible only under the Two-Root Theory of geminates.

Next, we consider the class of passives derived from verbs whose final segment is a vocoid. The output form does not show the epenthesis of a prefinal /u/. Does that mean that these bases (along with bases such as /kwi/, i.e. bases whose second and/or final segments are vocoids) behave like derived trisegmental and quadrisegmental verbs which do not show any augmentation? Or is it some other higher-ranked constraint that prevents the prefinal /u/ from surfacing?

At considering a passive form such as [məʃri] we notice that it does not conform to the most harmonic LH iamb. It has already been shown that making recourse to final-vowel lengthening would not work as the language bans any structure with long vowels. Since the verb base ends up in /i/, the only way to make the final syllable heavy is by closing that syllable with a glide sharing the same features of the base final segment, thus getting the word *[məʃriy], or by epenthesizing the prefinal /u/ and realizing the final base segment as a glide, thus getting the output *[məʃruy]. *[məʃriy] could be excluded because it violates DEP-C, a constraint that prohibits consonant epenthesis. As to *[məʃruy], it could be argued that it violates IDENT-IO [cons] since the input vowel /i/ is realized as the consonantal [y].

To see how a form such as [məʃri] is obtained, consider the constraint tableau below where DEP-C, NO-LONG-V and IDENT-IO [cons] dominate LH. Here the optimal foot is of the type LL.

-52-

/m-ʃri/	DEP-C	NO-LONG-V	IDENT-IO [cons]	LH	LL	DEP-u
☞a. (məʃ.ri)				*		
b. (məʃ.riy)	*!				*	
c. (məʃ.ruy)			*!		*	*
d. (məʃ.rəy)			*!	*		

Although the candidates in 52b and 52c end up in an LH iamb, they are excluded because the first violates the constraint in DEP-C while the second violates IDENT-IO [cons]. Candidate 52c is also excluded because it fails to preserve the identity of the input vocoid. The optimal candidate does not conform to an ideal iamb and yet it is the winner simply because it satisfies all the three higher-ranked constraints.

Bases whose second and third segments are vocoids can be treated much in the same way. The second segment of these verbs is a glide underlyingly while the third is a vowel. The tableau below lists some of the candidates obtained from the input /m-ʃwi/:

-53-

/m-ʃwi/	DEP-C	NO-LONG-V	IDENT-IO [cons]	LH	LL	DEP-u
☞a. (məʃ.wi)				*		
b. məʃ.(wiy)	*!				*	
c. məʃ.(wuy)			*!		*	*
d. (məʃ.wəy)			*!	*		

It has become clear by now that any candidate resorting to consonantal epenthesis or to a change in the identity of the base vocoid to achieve the LH iamb will be excluded.

To conclude this subsection, it has been shown that the PP morpheme in CMA is [m-] and the prefinal vowel /u/ is the lexical default segment that is epenthesized to achieve the ideal LH iambic foot. In contexts where this epenthesis would violate other higher-ranked constraints such as DEP-C, NO-LONG-V or IDENT-IO [cons], for example, the foot that emerges as the optimal one is of the type LL.

4.3.2 Unaugmented Passive Participle Forms

There is a class of passive forms derived from verb bases that does not show augmentation by the epenthesis of /u/. This class comprises the passive form of medial geminated verb bases such as [mkəttəb] and the passive of all quadrisegmental verbs such as [mTəRʒəm] “translated”, [msali] “finished”, [mSifəT] “sent” and [mSəqSi] “asking”

4.3.2.1 Derived Trisegmental Verb Bases

These forms along with the other quadrisegmental verb bases constitute a testing ground for the constraints we have advanced so far. As the passive forms do not show augmentation by u-epenthesis, they all violate LH because they end up in a vowel or a schwa and consonant, which are both dominated by a single mora.

Given a PP form such as [mkəttəb] from the input /m-ktb/, one should wonder why [məktub] is not the optimal output. Put differently, what is the base of derivation for [mkəttəb]? Is it /ktb/ or [kəttəb]? Assuming that it is /ktb/ would allow us to derive the passive via u-epenthesis and therefore get a form that is similar to those in 1a-d above. However the target this time is different; it is the PP of medial geminated verb bases, that is to say forms that have already undergone some derivation. In OT terms this means an output form.

In chapter four above we have shown that forms like [kəttəb] are forms which involve what Imouzaz (forthcoming) calls partial reduplication. We have argued that in order to better understand these forms, an output-output relation of the type Base/Reduplicant should be invoked. Such a relation relates two output forms produced simultaneously: the base and the reduplicant. (See chapter 4, for details about the base form).

Assuming that the base can be an output form would allow us to account for PP forms obtained not only from derived trisegmental bases but also quadrisegmental verb bases. To derive the correct output, We need a morphologically-grounded output-output constraint (Basri et al 1998 and Selkirk 1999) preserving the initial edge of the base foot in the derived form. This constraint is formulated in the correspondence model of McCarthy and Prince (1995) as in 54:

-54-

OO_{Stem} ANCHOR (Ft, Ft, Initial)

> A foot-initial segment in the affiliate output form must correspond to a foot-initial segment in the base output form.

We also need an output-output constraint requiring the preservation of weight identity in the base syllables of the stem. This constraint is given in 55:

-55-

OO_{Stem} IDENT-σ

Light/heavy syllables in the affiliate output form must correspond to light/heavy syllables in the base output.

The constraint in 55 makes sure that the left edge of the base foot remains intact while the constraint in 55 makes sure that the stem syllables of the base and those of the output correspond to each other in terms of weight. Both constraints must dominate the constraints on foot type. In the constraint tableau in 56, we show how the output [mkəttəb] is chosen as the optimal candidate:

-56-

/m-ktb/ base:(kət.təb)	OO_{Stem} IDENT-σ	OO_{Stem} ANCHOR (Ft, Ft, Initial)	LH	LL	DEP-u	DEP-ə
a. mə.(kət.təb)			*			***!
b. m.(kət.tub)	*!			*	*	*
c. (mək.tub)		*!		*	*	*
☞d. m.(kət.təb)			*			**

The base [kəttəb] consists of one foot and since the constraint OO_{Stem} ANCHOR (Ft, Ft, Initial) is undominated, it follows that the optimal candidate has to be identical to the base. Such is the case with candidate 56d where the foot initial segment of the base (that is the segment [k]) corresponds to the foot initial segment of the output [mkəttəb]. Notice that the passive marker in the output candidate lies beyond the domain of the foot; it is dominated by a minor syllable which is directly associated with the prosodic word. Candidate 56a fails although it perfectly matches the foot initial segment of the base. The reason is that it incurs too many violations of DEP-ə. Finally candidate 56b is ruled out because it satisfies LH at the expense of higher-ranked OO_{Stem} IDENT-σ and 55c is also excluded on the ground that it violates both OO_{Stem} IDENT-σ and OO_{Stem} ANCHOR (Ft, Ft, Initial).

Although the PP forms of derived trisegmental verbs do not conform to the prototypic iamb in CMA, they are nonetheless optimal because they their foot-initial segments correspond to the foot-initial segments of the base, and this explains why OO_{Stem} ANCHOR (Ft, Ft, Initial) must outrank the constraint LH on foot type.

Verb bases whose final segment is a geminate are derived much in the same way. Consider the candidates that could be derived from the input
/m-nZZ/. Each candidate is evaluated on how good it matches the base [nəZZəZ]:

-57-

/m-nZZ/ Base: (nəZ.ZəZ)	OO_{Stem} IDENT-σ	OO_{Stem} ANCHOR (Ft, Ft, Initial)	LH	LL	DEP-ə
☞a. m.(nəZ.ZəZ)			*		**
b. (mən.ZəZ)		*!	*		**
c. (mən.ZuZ)	*(!)	*(!)		*	*

Candidate 57a is the winner because the foot-initial segment corresponds to that of the base. Candidates 57b and 57c are excluded because they don't perfectly match the foot-initial segment of the base, which is the stem [nəZZəZ]. In 57b, for example, the initial segment of foot (i.e. the segment [m] of the passive) does not correspond to the initial segment of the base (i.e. the segment [n]).

There is yet another output form which might compete with the optimal candidate. The output *[mnəZZ], footed as m(nəZ.Z), incurs a single violation of both LH and DEP-ə and therefore should win over the optimal candidate. To exclude this possibility, it should be noted that there is a domination relationship that holds among iambic feet. Thus for example, LH is better than LL. Given that CMA contain both major and minor syllables, it follows that feet have to be divided into major and minor. Thus we have already shown that *Min-LH must dominate LH to distinguish *[mbiʕ] and [məbyuʕ]. Similarly, with a constraint such as *Min-LL, being outranked by LH, one could argue that the form *[mnəZZ], consisting of a foot of the type LL where the right-hand L is a minor syllable associated with the second part of the geminate, is ruled out exactly because it violates * Min-LL.

The PP of verb bases derived by the infixation of [t] such as [məhtəmm] and [məħtaʒ] (cf. roots /hmm/ and /ħaʒ/) or by [t] and [a] infixation such as [məxtarəʕ] (cf. root /xrʕ/) is obtained by making recourse to the base, i.e. an output form. The tableau below presents different candidates for the input /m-htmm/:

-58-

/m-htmm/ base: h.(təm.m)	OO_{Stem} IDENT-σ	OO_{Stem} ANCHOR (Ft, Ft, Initial)	LH	LL	DEP-u
☞a. məh.(təm.m)			*		
b. mə.(hət.mum)	*(!)	*(!)		*	*
c. (məh.tum)m	*(!)	*(!)		*	*
d. m.(hət.məm)		*!	*		

In 58a, the foot initial segment of the derived form (i.e. [t]; the segment [h] being associated with a minor syllable attached directly to the PWd) corresponds to the foot initial segment in the base. In 58b and 58c both candidates are excluded because they have made recourse to u-epenthesis and therefore fail to match the base syllable identity. Finally, 58d is ruled out because of a mismatch in foot between the initial segments of the base and the derived output.

A final case which deserves special attention is that of PP forms whose verb bases contain the prefinal vowel /a/. These forms end up in a heavy syllable, something that obviates the need for u-epenthesis. However, they present a testing ground for the constraint OO_{Stem} ANCHOR (Ft, Ft, Initial). Take for example the form [mərtaħ]. This form consists of a single iambic LH foot whose initial segment is the PP prefix [m-] but the initial segment of the foot containing the verb stem serving as a base for derivation is the segment [r] (cf. the foot (r.taħ)). Therefore the optimal candidate [mərtaħ] violates the constraint OO_{Stem} ANCHOR (Ft, Ft, Initial) by virtue of the fact that the initial segment of the affiliate output form does not correspond to the initial segment of the base output. Notice here that the foot of the verb stem corresponds to a minor LH foot which has been argued to be dominated by the true LH. Thus in order for the candidate [mərtaħ] to be optimal, *Min-LH has to outrank the constraint OO_{Stem} ANCHOR (Ft, Ft, Initial) as the tableau below shows:

-59-

/m-rtaħ/ Base: (r.taħ)	*Min-LH	OO_{Stem} ANCHOR (Ft, Ft, Initial)	LH	DEP-IO
☞a. (mər.taħ)		*		*
b. mə.(r.taħ)	*!			*
c. m.(r.taħ)	*!			

In the optimal candidate, the foot initial segment does not correspond to the foot initial segment in the simple base output form. But the ranking argued for in 59 shows that avoiding minor LH iambs is better than achieving total correspondence between the foot initial segments in the derived and simple output forms.

Further support of the analysis undertaken for the PP of derived trisegmental verb bases comes from participle forms derived from quadrisegmental verbs to which we turn in the following subsection.

4.3.2.2 Quadrisegmental Verb Bases

The forms considered in this subsection include passive forms of sound verbs such as [TəRʒəm] "translate" and [bərgəg] "he spied (on someone)", verbs whose second segment is i/u such as [SifəT] "he sent" and [surət] "he locked", verbs whose fourth segment is [i] such as [SəqSi] "(you) ask" and finally verbs whose second segment is [a] and fourth is [i].

A common feature among all these verb bases is that they are all disyllabic. The base foot is of the type LL which means that the constraint LH is violated in all the passive forms of these verb bases. Given this fact, the only decisive constraints are higher-ranked constraints on output-output-correspondence between the foot-initial segment of the base and the foot-initial segment of the derived output, and also the constraint on the identity of the base syllables and those of the derived output.

In tableau 60 below, we evaluate the different candidates for the input /m-TRʒm/.

-60-

/m-TRʒm/ Base: (TəR.ʒəm)	OO_{Stem} IDENT-σ	OO_{Stem} ANCHOR (Ft, Ft, Initial)	LH	LL	DEP-u
a. mə.(TəR.ʒum)	*!			*	*
b. (məT.Rəʒ)m		*!	*		
c. mu.(TəR.ʒəm)			*		*!
☞d. m.(TəR.ʒəm)			*		

The winner is candidate 60d which consists of a foot whose initial segment perfectly matches that of the base. Candidate 60c corresponds perfectly to the base except that it incurs a fatal violation of DEP-u. Candidate 60b fails to satisfy OO_{Stem} ANCHOR (Ft, Ft, Initial). Candidate 60a is excluded because it resorts to u-epenthesis and therefore incurs a violation of OO_{Stem} IDENT-σ. It should be noted here that an output such as (mTəR.ʒəm) where the consonant [m] belongs to the first syllable is ruled out for violating either of the two constraints: first, it violates the constraint OO_{Stem} ANCHOR (Ft, Ft, Initial) because the initial segment of the foot in the output form (that is [m]) does not correspond to the initial segment of the base foot; second it violates the constraint *COMPLEX which has been shown to be dominated.

Not surprisingly enough, the constraints developed above could also account for final geminated verbs such as [bərgəg] and [fərtət]. Notice that with these verbs the geminates are split up under pressure from the constraint on the foot type, a fact which has led us to rank NO-SPLITTING below LH and LL. Consider an input such as /m-frtt/ for illustration.

-61-

/m-frtt/ Base: (fər.tət)	OO_{Stem} IDENT-σ	OO_{Stem} ANCHOR (Ft, Ft, Initial)	LH	NO-SPLITTING	DEP-ə
☞a. m.(fər.tət)			*	*	**
b. mə.(fər.tət)			*	*	***!
c. (məf.rət).t		*!	*		**
d. (məf.rətt)		*!			**

Although candidate 61b satisfies the two higher-ranked constraints, it is ruled out because it incurs too many violations of DEP-ə. Candidates 59c and 59d are both excluded because the foot initial segment in each does not correspond to the foot initial segment of the base. 61d could also be excluded on the ground that it violates *COMPLEX by virtue of the fact that the final geminate belong to the same syllable.

Once again, showing complete correspondence of the foot initial segments of the derived output and the base as well as preserving the nature of syllables constituting this foot is the only way of deriving the correct output. This is established by ranking OO_{Stem} IDENT-σ and OO_{Stem} ANCHOR (Ft, Ft, Initial) on the top of the other constraints, namely the ones on the foot types of the output.

Verb bases of the type [sali] and [SəqSi] do not need any additional constraints. Their PP forms can be derived much in the same manner as shown in the tableau below where we list some of the candidates obtained from the input /m-SqSi/.

-62-

/m-SqSi/ Base:(Səq.Si)	OO_{Stem} IDENT-σ	OO_{Stem} ANCHOR (Ft, Ft, Initial)	LH	LL	DEP-ə
☞a. m.(Səq.Si)			*		*
b. mə.(Səq.Si)			*		**!
c. məS.(qəS.wi)		*!	*		**

Candidate 62b is suboptimal because it incurs one violation mark of DEP-ə than the optimal candidate. Candidate 62c is excluded because it has resorted to the epenthesis of a prefinal /u/ that is realized as the glide [w] to serve as an onset to the base final vocoid. This epenthesis leads to a gratuitous violation of the constraint DEP-u and OO_{Stem} ANCHOR (Ft, Ft, Initial).

Verbs whose second segment is /i/ or /u/ such as [SifəT] and [surət] are somehow different from the previous quadrisegmental bases because they end up in two consonants, a potential environment for epenthesizing the segment /u/ and therefore establishing an iamb of the type LH. Consider the competing candidates given in tableau 63 for the input /m-SifT/.

-63-

/m-SifT/ base: (Si.fəT)	OO$_{Stem}$ IDENT-σ	OO$_{Stem}$ ANCHOR (Ft, Ft, Initial)	LH	LL	DEP-ə
☞a. m.(Si.fəT)			*		*
b. mə.(Si.fəT)			*		**!
c. (məS.yəf)T		*!	*		**
d. m.(Si.fuT)	*!			*	

Candidate 63b is suboptimal for a reason that has now become obvious. Although the constraint DEP-ə is ranked low in the ranking hierarchy, it is still decisive. The candidate in 63c is excluded because it violates OO$_{Stem}$ ANCHOR (Ft, Ft, Initial). The constraint IDENT-IO [cons] is also violated in 63c because the base [i] loses its moraic status and gets realized as the corresponding glide in the output. Finally, candidate 63d is excluded because of the weight mismatch between the final syllable of the base and that of the derived output.

Now, consider a quadrisegmental verb base whose second segment is the vocoid /u/. The following tableau lists candidates derived from the input /m-surt/:

-64-

/m-surt/ Base: (su.rət)	OO$_{Stem}$ IDENT-σ	OO$_{Stem}$ ANCHOR (Ft, Ft, Initial)	LH	LL	DEP-ə
☞a. m.(su.rət)			*		*
b. mə.(su.rət)			*		**!
c. m.su.rut)	*!			*	

The constraints in 64 correctly predict that the optimal candidate is the one in 64a which preserves weight identity of the base syllables as well as the position of the initial segment of the base foot.

The final case of PP we will consider is that of forms derived from verb bases which are themselves derived by the prefixation of the medio-passive morpheme [t-]. These items should not pose any problem to the analysis presented in this chapter. The stem consists of three syllables the first of which is minor and is adjoined directly to the PWd. Only the major syllables in such items are part of the only existing foot. The tableau in 65 below lists some competing candidates from the input /m-t-qulb/:

-65-

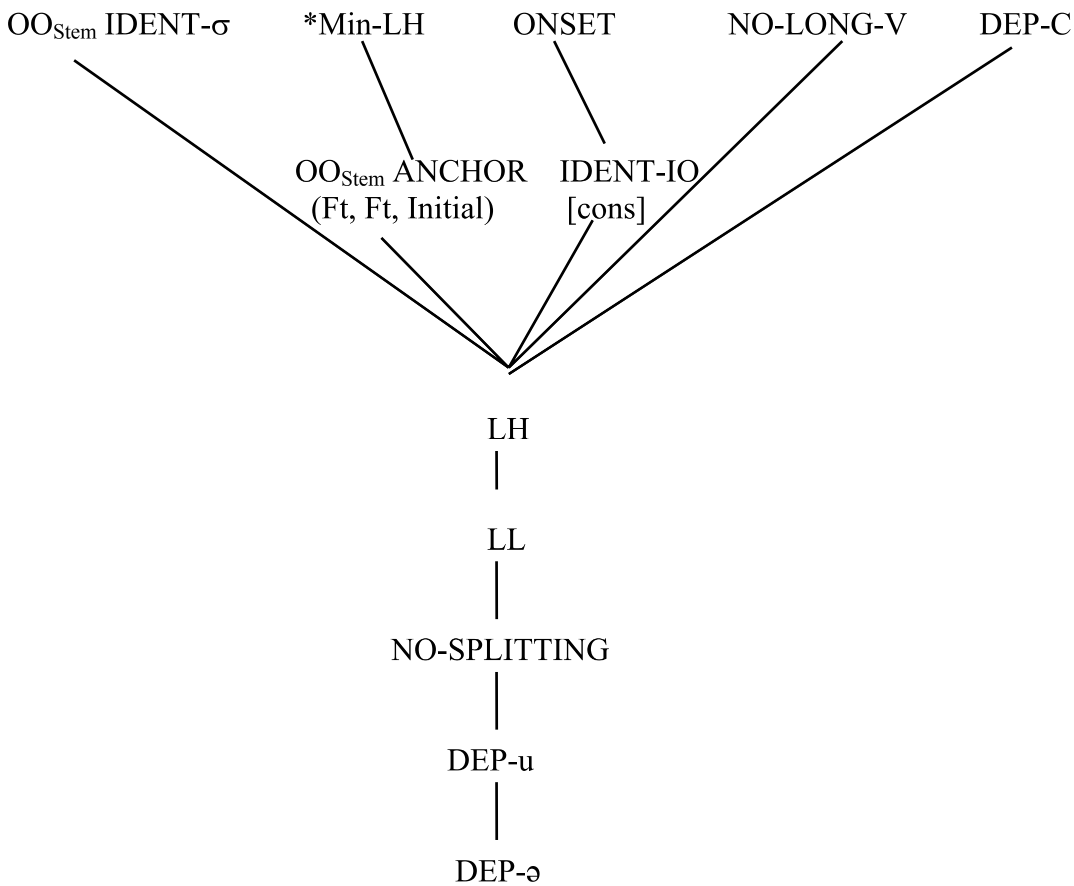
/m-t-qulb/ Base: t.(qu.ləb)	OO_{Stem} IDENT-σ	OO_{Stem} ANCHOR (Ft, Ft, Initial)	IDENT-IO [cons]	LH	DEP-ə
☞a. mət.(qu.ləb)				*	**
b. (mət.qu).ləb		*!		*	**
c. mət.(qəw.ləb)			*!	*	***
d. mət.(qu.lub)	*!				*

Clearly candidate 65b is excluded because it violates OO_{Stem} ANCHOR (Ft, Ft, Initial): the initial segment of the foot in the derived output form does not correspond to the initial segment in the base foot. Candidates 65c and 65d are both suboptimal because the first violates IDENT-IO [cons] by virtue of a change in the identity of the base input vocoid, while the second violates OO_{Stem} IDENT-σ by virtue of epenthesizing /u/ to achieve the LH iamb.

Once again, grouping both derived trisegmental and quadrisegmental verb bases under the same rubric proves to be well-founded since their PP forms do not show augmentation by u-epenthesis. They show that in case there is a conflict between a prosodic constraint and a faithfulness constraint, it is the latter which is worth satisfying.

The constraint hierarchy needed to account for the PP in CMA is given in 66 below:

-66-



The constraints *RdRd and IDENT-IO [round] are not included in 66 because they don't interact with the rest of the constraints.

5. CONCLUSION

This chapter has offered an OT analysis of CMA PP forms. The idea maintained throughout is that the PP morpheme is the prefix [m-] and that the PP forms fall into two classes based on their behavior vis-à-vis /u/ epenthesis. We have argued that the segment /u/, found prefinally in some forms is the lexical default segment of the language and that its epenthesis is dictated by prosodic constraints, namely the need for the output to conform to an iambic foot of the type LH. Forms that make recourse to u-epenthesis include the class of non-derived trisegmental verb bases with the exception of verb bases whose second and/or final segments are vocoids. For these forms, we have shown that if u-epenthesis were to apply, we would end up with forms that violate the constraint DEP-C, banning the epenthesis of a consonant or the constraint NO-LONG-V, prohibiting long vowels or else IDENT-IO [cons], requiring featural identity between the input and the output.

Other classes that do not show u-epenthesis include PP forms derived from a class of trisegmental verb bases and all the quadrisegmental verb bases. The foot structure of such forms still conforms to an iamb but of the type LL, a clear violation of the constraint demanding that the most harmonic PP foot be of the type LH. These forms constitute a strong evidence for the account proposed in terms of output-output correspondence. In particular, we have shown that if we are to derive the optimal output, the constraint OO_{Stem} ANCHOR (Ft, Ft, Initial), demanding left-anchoring of the initial segment of the foot in the derived output and the initial segment of the base foot, and OO_{Stem} IDENT-σ, demanding the conservation of weight identity, have to outrank the constraints on the optimal foot types.