Stress Related Vowel Deletion in Maltese

Sagie Maoz
Department of Linguistics
Tel Aviv University

sagiemao@mail.tau.ac.il

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1 Introduction

As a Semitic language, Maltese uses a very structured verb morphology to denote inflection on top of items from its stem lexicon. This allows us to inspect the phenomenon of vowels being deleted from the stem in particular positions, and the interaction of such process with the Maltese stress system. Namely, we would notice how adding different suffixes to a verb can change the production of the stem segments and the resulting stress of the final product word.

1.1 Background

Maltese is the national language of Malta. It is a Semitic language spoken by almost 400,000 people (Borg and Azzopardi-Alexander 1997). Maltese is a descendant of the *Siculo-Arabic* dialect developed in Sicily and Malta, later to be heavily influenced by Italian, Sicilian and English vocabularies.

Below we list the Maltese phonetic inventory:

(1) Consonants

	Labial	Dental	(Post-) Alveolar	Velar	Palatal	Laryngeal
Nasals	m		n			
Stops	p b	t d		k g		ʔ
Affricates		t͡s d͡z	t͡ʃ d͡ʒ			
Fricatives	f v	s z	ʃ			h
Trills		r				
Approximants	l				j	

Additionally, the voiced labial-velar approximant /w/.

(2) Vowels

a. Monophtongs:

	Front		Central		Back	
High	ɪ	ɪː iː			ʊ	ʊː
Mid	ɛ	ɛː			ɔ	ɔː
Low			ɐ	ɐː		

b. Diphthongs: Seven diphthongs exist in Maltese: /ɐʊ/, /ɐɪ/, /ɛʊ/, /ɛɪ/, /ɪʊ/, /ɔɪ/ and /ɔʊ/.

(3) Syllable structures

	Word Initial		Word Medial		Word final	
V	ʊ̲.nʊːr	'honour'	—		—	
CV	kɪ̲.tɛp	'he wrote'	mɐh.mʊ̲.d͡ʒiːn	'dirty (pl.)'	ip.kɪ̲	'cry (Imp.)'
CCV	dgɛ̲.tsʊ	'to hoard (2pl.)'	bɪ-ʔzɪɪ̲.ʔɛs	'with pigs'	dgɛ.tsʊ̲	'to hoard (2pl.)'
CCCV	ptrɐː.vʊ	'with a beam'	dɪs.tɪm.tsjɔː.nɪ	'distinction'	dgɛ.tsɪ.tsnɐ̲	'to hoard (1pl.)'
VC	ip.kɪ	'cry (Imp.)'	—		—	
CVC	pɛt.nɛ	'comb'	ɔ.rɐn.d͡ʒɔ	'orange'	ɪː.bɛs	'hard'
CCVC	tlɪf.tɐ	'I lost it (f.)'	lɪs.trɐm.bɛ.riː.ja	'the oddity'	ʔɔ.rɔ.blɔk	'it (m.) has drawn nearer in time'
CCCVC	sfrɔn.dɐ	'to collapse' (Mifsud 1997)	—		—	
VCC			ɛːnt	'I helped'		
CVCC	—		ɪ.t͡ʃɛjn.stɔr	'the chain-store'	wed͡ʒ.d͡ʒɐjt	'I hurt (Inf-pl.)'
CCVCC			tlɐpt	'I prayed'		
CCCVCC			strɐht	'I rested'		

From the syllable inventory above, we can draw some generalisations on syllable structure:

- Onset-less syllables are only allowed on word initial positions. – $^*V]_\sigma\sigma$
- Only complex codas with 2 consonants are allowed word-finally. – $^*CCC]_w$

(4) Stress system

Setting aside loan words, the original Maltese stress system is as simple as: (Wolf 2012)

(a) Stress on the ultima, if it is superheavy (or the word is monosyllabic), else

(b) Stress on the penult, if it is heavy (or the word is bisyllabic), else

(c) Stress on the antepenult.

1.2 Theoretical Background

Let's consider the Maltese suffixes for the 2nd person singular subjects; the empty suffix +Ø for 'he' and the suffix *+ɛt* for 'she' (Brame 1974).

Using these, we can now assume the UR for the following forms of the verbs *hɐtɐf* 'to grab' and *bɛzɐʔ* 'to spit':

(5)

	UR	PR	Gloss
(1a)	/hɐtɐf+Ø/	ˈhɐtɐf	'he grabbed'
(1b)	/hɐtɐf+ɛt/	ˈhɐtfɛt	'she grabbed'
(2a)	/bɛzɐʔ+Ø/	ˈbɛzɐʔ	'he spit'
(2b)	/bɛzaʔ+ɛt/	ˈbɛzʔɛt	'she spit'

It is immediately visible that the stem's original form is not preserved in forms (b) in the above examples. Specifically, the second vowel is deleted when a suffix is attached to the stem.

One would be tempted to suggest a straightforward explanation to the data, such as for example a vowel deletion rule on two-sided open syllables.

This kind of analysis, however, is bound to be challenged; firstly, we can clearly see in chart (3) several examples of open syllables in word medial positions, so it seems the said rule would not account for these examples.

An additional challenge with such analysis arises when reviewing the data for the *+t* suffix for the 1st person singular subject:

(6)

	UR	PR	Gloss
(1a)	/hɐtɐf+Ø/	ˈhɐtɐf	'he grabbed'
(1b)	/hɐtɐf+ɛt/	ˈhɐtfɛt	'she grabbed'
(1c)	/hɐtɐf+t/	ˈhtɐft	'I grabbed'
(2a)	/bɛzɐʔ+Ø/	ˈbɛzɐʔ	'he spit'
(2b)	/bɛzaʔ+ɛt/	ˈbɛzʔɛt	'she spit'
(2c)	/bɛzaʔ+t/	ˈbzaʔt	'I spit'

In the (c) forms above, we again notice a deletion of a stem vowel; but this time, it is the first stem vowel that is removed, to create a *CCVCC* syllable.

This new data set forces us to rethink our analysis. While it's possible to draw up a different rule to explain the deletion in (c), the two vowel deletion processes appear to have some common motivation, especially noticing that the deleted vowel is always un-stressed.

Thus, it would be ideal if we could formulate some unified system, that explains these alternations, in relation to their motivation. That is precisely the kind of issues that are better handled by Optimality Theory (OT) which makes use of constraints and their underlying order to explain phonological phenomenons and conspirations.

2 OT to the rescue

2.1 Unstressed vowel deletion

As mentioned, we speculate that the two vowel deletions we witnessed are related to the vowels originally being unstressed. Therefore, let's formulate a constraint that would express this:

(7) *V[-STRESS] - No unstressed vowels (syllables).

Looking at table (5), this constraint would indeed explain the deletions in examples (b), but alone it would fail to explain why the vowel wasn't deleted in examples (1a), resulting for example in [**hɐtf*]. It's easy enough to think of a constraint that would avoid this form, though:

(8) *COMPLEXCODA - Syllables do not end with a consonant sequence.

Let's add a rather obvious constraint that would account for the stress system always being present in PR.

(9) MAXSTRESS - Maximize input stress in the output.

Combining these three constraints we can explain both *+t* and *+Ø* inflected forms of the verb quite easily.

(10)

/ˈhɐtɐf+ɛt/		MAXSTRESS	*V[-STRESS]	*CC
a. ˈhɐtɐfɛt			**!	
b. ˈhtɐfɛt		*!	*	
c. → ˈhɐtfɛt			*	
d. ˈhɐtɐft			*	*!

We can identify in (10) that MAXSTRESS dominates the two other constraints, because otherwise candidate (10b) would surely be selected.
However, there is no obvious order between *V[-STRESS] and *CC. Switching these two around would not affect the system's outcome.
Thus, we have so far been able to establish a ranking:

(11) MAXSTRESS >> *V[-STRESS], *CC

2.2 No vowel deletion

Let's now analyse the *+Ø* inflection in examples (a), where vowel deletion does not occur.

[hɐtɐf] does include an unstressed vowel, and so violates *V[-STRESS], and that would prove a domination of *CC over *V[-STRESS].

In order to inspect candidate d in tableau (13) below, let's formulate the constraint we assume in semitic languages that protects the stem segments from deletions:

(12) MAXSTEM - Maximize stem segments in the output.

(13)

/hɐtɐf+Ø/			MAXSTRESS	MAXSTEM	*CC	*V[-STRESS]
a.	→	ˈhɐtɐf				*
b.		htɐf	*!			
c.		ˈhɐtf			*!	
d.		ˈhɐtɐ		*!		

Here in (13) we indeed witness that *CC dominates *V[-STRESS]. If we would have ordered these 2 constraints the other way around, then candidate (13a) would have been rejected in favour of candidate (13c), but that is not the case in PR.

In addition, we notice that MAXSTEM dominates both of these, because otherwise none of the constraints in (13) would have rejected candidate (13d). Generally, we must assume MAXSTEM has a high priority, to maintain the existence of stems in Maltese. So our constraints ranking so far are:

(14) MAXSTRESS, MAXSTEM >> *CC >> *V[-STRESS]

2.3 Stressed vowel deletion

The ranking we have established so far seems to be pretty straightforward and to explain the two first examples quite clearly. However, moving on to the third and last example, */hɐtɐf+t/*, we encounter a serious problem.

Using the system defined so far, we would have assumed an output **[hɐtɐft]*. Yet the actual output turns out to be *[htɐft]*, which violates *CC and is a result of deleting the first *[ɐ]* vowel.

Taking into account rule (a) of the stress system in (4), we can conclude that the main stress in */hɐtɐf+t/* falls on the second syllable, and so *V[-STRESS] is not violated in *[htɐft]*.

We are left with the question of ranking between *CC and *V[-STRESS], and how it might affect */hɐtɐf+Ø/* and */hɐtɐf+t/*.

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