Stress Related Vowel Deletion in Maltese

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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 (Borg and Azzopardi-Alexander 1997):

(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			w	j	

(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[1]

	Word Initial		Word Medial		Word final	
V	ʊ.nʊːr	'honour'	—		—	
CV	kɪ.tɛp	'he wrote'	mɐh.mʊ.d͡ʒiːn	'dirty (pl.)'	ip.kɪ	'cry (Imp.)'
CCV	dgɛ.tsʊ	'to hoard (2pl.)'	bɪ-ʔzɪː.ʔɛs	'with pigs'	dgɛ.tsʊ	'to hoard (2pl.)'
CCCV	ntrɐ.mɐ[2]	'to assemble'	dɪs.tɪm.tsjɔ.nɪ	'distinction'	dgɛ.tsɪ.tsnɐ	'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[2]	'to collapse'	—		—	
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. – $^*{}_\sigma[V$
- Only complex codas with 2 consonants are allowed word-finally. – $^*CCC]_w$

[1]Unless otherwise noted, examples taken from Borg and Azzopardi-Alexander (1997)
[2]Mifsud (1997)

(4) Stress system

Setting aside loan words, the original Maltese stress system is as follows (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.

This is in fact the same stress system observed in Standard Arabic (Halpern 2009).

1.2 Theoretical Background

Let's consider the Maltese suffixes for the 2nd person singular subjects; the zero suffix *+Ø* for 'he' and the suffix *+ɛt* for 'she' (Brame 1974). Using these, we can 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; first of all, we can easily find occurrences of open syllables in word medial positions, such as in *bɪ-ʔzɪ̲ː.ʔɛs* 'with pigs', *mɐh.mʊ̲.d͡ʒiːn* 'dirty (pl.)' and other examples from chart (3). It would seem the said rule would not account for such 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 (Kager 1999) which makes use of constraints and their underlying order to explain phonological phenomenons and conspiracies (Kisseberth 1970).

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 (a), resulting for example in *[*hɐtf*]. It's easy enough to think of a constraint that would avoid this form, though:

(8) *ComplexCoda - Assign one violation-mark for every complex coda (Prince and Smolensky 1993), i.e., a coda containing two or more consonants.

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

(9) Head(PrWd) - Each prosodic word has a unique head (McCarthy 2002, 78) and therefore, it has stress.

Combining these three constraints we can now explain the *+ɛt* inflected form of the verb quite easily.

(10)

/ˈhɐtɐf+ɛt/		Head(PrWd)	*V[-stress]	*CC
a.	ˈhɐtɐfɛt		**!	
b.	htɐfɛt	*!	*	
c. →	ˈhɐtfɛt		*	
d.	ˈhɐtɐft		*	*!

We can identify in (10) that Head(PrWd) 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. The ranking we have established, then, is described in (11):

(11) Head(PrWd) >> *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].

(12)

/hɐtɐf+Ø/	HEAD(PRWD)	*CC	*V[-STRESS]
a. → ˈhɐtɐf			*
b. htɐf	*!		
c. ˈhɐtf		*!	

Here in (12) we indeed witness that *CC dominates *V[-STRESS]. If we would have ordered these 2 constraints the other way around, then candidate (12a) would have been rejected in favour of candidate (12c), but that is not the case in PR.

So we have been able to confirm a tighter constraints ranking:

(13) HEAD(PRWD) >> *CC >> *V[-STRESS]

2.3 Protecting the stem from deletion

The ranking we have established so far seems to be fairly straightforward, and explains the first two examples quite nicely. Moving on to the third and final example, */hɐtɐf+t/*, we are facing another constraint required for the system to be complete.

The *+t* suffix, when attached directly to the stem, necessarily creates a complex coda if the stem ends with a consonant. In other words, *CC is violated unless one of the stem segments is deleted. Let's formulate a constraint to protect such stem segments from being deleted:

(14) MAXSTEM - Every segment of the input stem has a correspondent in the output stem (Chatzopoulos 2008).

Generally, we might assume that MAXSTEM has a high priority, to maintain the existence and semantics of stems in Maltese.

We can now suggest a tableau explaining /*hɐtɐf+t*/:

(15)

/hɐtɐf+t/		HEAD(PRWD)	MAXSTEM	*CC	*V[-STRESS]
a. hɐˈtɐft				*	*!
b. → ˈhtɐft				*	
c. htɐft		*!		*	
d. ˈhɐtft				**!	
e. hɐˈtɐt			*!		*

Our constraints system is indeed able to reject candidates (15a), (15c), (15d) and (15e), selecting the remaining (15b) [*ˈhtɐft*]. This candidate, while violating *CC, is still the optimal candidate in (15).

Notice that in order for tableau (15) to be valuable, we must conclude that the new constraint MAXSTEM dominates both *CC and *V[-STRESS]. Otherwise, candidate (15e) would surely be selected. That being said, we do not have any information about the ranking between HEAD(PRWD) and MAXSTEM, and they seem interchangeable.

(16) HEAD(PRWD), MAXSTEM >> *CC >> *V[-STRESS]

2.4 Possible vowel epenthesis

We have explained so far how Maltese chooses to preserve its stress system and syllable structure by deleting certain vowels when presented with morphological changes. Another obvious solution would have been the insertion of epenthetic vowels. To account for the lack of such insertions, we would have to consider the ranking of yet another constraint:

(17) DEP-IO - Every segment of the output has a correspondent in the input. (Prohibits phonological epenthesis.) (McCarthy and Prince 1995)

Re-analysing /*hɐtɐf+t*/ with the epenthesis option in mind, we must consider a new candidate (18f):

(18)

/hɐtɐf+t/	Head(PrWd)	MaxStem	Dep-IO	*CC	*V[-stress]
b. → ˈhtɐft				*	
f. hɐˈtɐfɛt			*!		*

Without the new Dep-IO constraint, candidate (18f) would only violate *V[-stress] which we have already established is ranked lowest within the discussed constraints, and so it would be the optimal candidate. This reflects the need to discuss Dep-IO and its ranking. From tableau (18) we conclude that Dep-IO necessarily dominates *CC (otherwise, epenthesis would have been selected). As in 2.3, we have no evidence for the ranking of Dep-IO against Head(PrWd) and MaxStem, and from the analysed examples it seems the three are perfectly interchangeable.

Our constraints ranking is finalised, then, as in (19) below.

(19) Head(PrWd), MaxStem, Dep-IO >> *CC >> *V[-stress]

3 Conclusion

In this paper we have observed the phenomenon of vowel deletion in Maltese verbs, and saw examples of deletion of different vowels in different environments, suggesting some common motivation driving these alternations to preserve the properties of the language.

We have suggested Optimality Theory as a theoretical framework best suited to explain such broad set of alternations, and indeed were able to explain these by defining three constraints: (7) V[-stress], (8) *ComplexCoda and (9) Head(PrWd), which indicate unstressed vowels are generally deleted. A strict inner ranking of these constraints successfully explains the survival of unstressed vowels in some cases. Other types of deletions were avoided by defining (14) MaxStem which protects the stem segments from deletion. Additionally, we ruled out vowel epenthesis by setting a high ranking for constraint (17) Dep-IO, which prohibits insertion.

It seems that while Maltese has a tendency to prohibit unstressed vowels, other preferences might take precedence over the deletion of such vowels. This paper has shown that the Maltese stress and stem systems, as well as the language's syllable structure, are all factors that influence the occurrence of unstressed vowel deletion. Optimality Theory's application of the ranking order of constraints allowed us to examine and define this hierarchy in a comprehensive manner.

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