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LEXICAL STRATA IN MALTESE

Introduction

Research on morphology and lexicon has repeatedly pointed out the complexity of morphological processes in word-formation. A number of morphological theories have tried to explain this complex word-formational processes by incorporating the theories of phonology and syntax into a lexical model. Among these, the theory of lexical phonology (Kiparsky, 1982a, 1985; Mohanan, 1982, 1986) took up this challenge by presenting an integrated theory of phonology and morphology. Since then, this theoretical model has been adopted to study the lexicon of many languages (Borowsky, 1986; Hargus, 1985; Paradis, 1986). This paper is an attempt to look into the lexicon of Maltese[1] which has a rich system of phonological and morphological rules interacting in the word-formational process.

Apart from the traditional grammars[2], there are, also, some linguistic studies of the Maltese language within the generative framework. A descriptive study about some aspects of Maltese phonology within the generative framework was done by Michael K. Brame (1972)[3]. Brame's paper was mainly aimed at bringing into discussion one particular abstract phonological segment[4] in Maltese. Taking the k ~ č alteration in Sanskrit as a premise, Brame argued that the rule feature approach that was used to explain the palatalization of the voiceless velar stop in Sanskrit would not be desirable in explaining the underlying segments in Maltese phonology. In his study Brame also formalized some of the phonological rules in Maltese. This study will also incorporate some of Brame's analyses of Maltese phonological rules.

Theoretical Assumptions

Within theoretical parameters, lexical phonology argues that morphological operations are level ordered and thus the lexicon consists of several levels called strata. Phonological rules can operate at more than one level as their application is determined by domains which allow one phonological rule to operate more than once in the lexicon. Cyclicity is defined either in relation to strata or in relation to rule interaction within one stratum. In the latter case a stratum can be cyclic or non-cyclic while the former allows a wider perspective to the Strict Cycle Condition given the assumption that each lexical item entering a new stratum starts

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1. Maltese is a semitic language spoken in the Maltese archipelago.
2. These grammars usually follow the system of traditional Arabic grammar.
3. On the Abstractness of Phology: Maltese ʕ
4. Voiced pharyngeal fricative (ʕ).

a new cycle. By utilizing these assumptions, this paper will examine some basic word-formations in Maltese and thereby argue that the phonology morphology interaction in Maltese can be better explained on the basis of stratal ordering in the lexicon.

Discussion

Some patterns of Maltese word formation can be observed in the following forms.

1. (a) stem + affix (tálb+et 'she asked')
    (b) affix + stem (níkteb 'I write')
    (c) stem + affix + affix + (tàlb+ít+u 'she asked him')
    (d) affix + stem + affix (ní+ktb+u 'I write it')

Brame pointed out that the stress assignment in Maltese is cyclic. Accordingly, he categorized pronouns as belonging to two cycles: subject pronouns in the first cycle and object pronouns in the second cycle. Subject pronouns can either be prefixed or suffixed to the stem whereas object pronouns are always suffixed. Hierarchically, object pronouns always follow subject pronouns.

In 1a, the suffix is the subject pronoun *it*. Perfective verbs are derived by suffixing the subject pronoun while imperfectives are derived by prefixing the subject pronoun to the stem as can be seen from 1b. Like in Arabic, Maltese stems consist of root consonants that do not change their position. Vocalic segments in the stem go through changes such as apocope and vowel reduction. 1c and 1d correspond to 1a and 1b respectively and they represent the object pronouns which are always added by suffixation.

Vocalic stress plays a major role in Maltese phonology. The stress assignment in Maltese is disjunctively ordered as follows:

$$V \ [+stress] \ / \ \_\_ \ C_0 \ ((VC) \ VC_0^1)]$$

In *tálbet* 'she asked' and *níkteb* 'I write' the underlying forms are /talab+it/ and /ni+ktib/ respectively. Obviously, it can be seen that on the surface forms the underlying unstressed vowels are either reduced or lost. The two phonological processes are Vowel reduction and Apocope.

Vowel Reduction: $i \rightarrow e/VC_0$ ____

Apocope $V \rightarrow \emptyset/ \_\_CV$
[−str]

The following derivations illustrate these processes:

2. [talab] [it]   [ni] [kitib]   Underlying Forms

    [[talab] [it]]   [[ni] [kitib]]   Affixation

    [[tálab] [it]]   [[ní] [kitib]]   Stress Assignment

[[tálb] [it]]	[[ní] [ktib]]	Apocope
[[tálb] [et]]	[[ní] [kteb]]	Vowel Reduction
[tálbet]	[níkteb]	Bracket Erasure

What is also evident from this derivation is that Apocope and Vowel Reduction follow the Stress Assignment, even though it is not clear from the examples in (2), there is other evidence to show that Vowel Reduction has to follow Apocope.

The point to be illustrated next is the derivation of forms in (1c) and (1d). The two surface forms talbitu and niktbu present two contradicting situations if one were to assume that the object pronoun u is suffixed following the subject formation. For talbitu it will be correct to assume that the object pronoun suffixation is secondary as can be seen in derivation (3).

3.

[talab] [it] [u]	UR
[[talab] [it]]	Affixation
[[tálab] [it]]	Stress Assignment
[[tálb] [it]]	Apocope
[[tálb] [it] [u]]	Affixation
[[tàlb) (ít] [u]]	Stress Assignment[5]
_____	Apocope
_____	Vowel Reduction[6]
[tàlbítu]	

In (3) after the second cycle of stress assignment, the rules of Apocope and Vowel Reduction have not applied as the environment for their application is lost. Now, following the same pattern of derivation as tàlbítu, the derivation of níktbu will not yield the same results. See (4) below.

4.

[ni] [ktib] [u]	UR
[[ni] [ktib]]	Affixation
[[ní] [ktib]]	Stress Assignment
_____	Apocope
[[ní] [ktib] [u]]	Affixation
[[nì] [ktíb] [u]]	Stress Assignment

5. Following Stress Assignment in the second cycle, the stress on 'a' has been reduced. However, the level of this stress reduction has yet to be established phonetically.
6. In this derivation Vowel Reduction after Apocope in the first occurrence has been skipped and this point will be discussed later.

_____	Apocope
_____	Vowel Reduction
[nìktíbu]	

The result of the derivation is nìktíbu but the correct surface form is níktbu. In the correct form, the main stress is on the antepenultimate vowel and the penultimate V segment is lost obviously as a result of Apocope. Clearly, these two forms (tàlbítu and níktbu) show that they have not followed the same pattern of derivation. After the second affixation, both forms have the pattern CVCCVCV. However, only tàlbítu has undergone the second cycle of stress assignment and as a result of which the main stress is on the penultimate vowel. Thus the main stress has stopped vowel reduction of i to e. Moreover, the antepenultimate vowel is not elided by Apocope. This is due to the fact that this antepenultimate vowel had received main stress in the first cycle.

Examples such as the above give evidence to argue that in Maltese, the lexicon consists of at least two strata, namely stratum 1 and stratum 2. Thus, it can be assumed that in níktbu the affixation took place in stratum 1 and tàlbítu underwent affixation in strata 1 and 2. The following derivation should illustrate this stratal ordering:

5. **Stratum 1**

[ni] [ktib] [u]	[talab] [it] [u]	UR
[[ni] [ktib] [u]]	[[talab] [it]]	Affixation
[[ní] [ktib] [u]]	[[tálab] [it]]	Stress Assignment
[[ní] [ktb] [u]]	[[tálb] [it]]	Apocope
[níktbu]	[tálbit]	Bracket Erasure

Stratum 2

_____	[[tálbit] [u]]	Affixation
_____	[[tàlbít] [u]]	Stress Assignment
	_____	Apocope
	_____	Vowel Reduction
[tàlbítu]		Bracket Erasure

It is also clear that in tàlbítu the affixation could not have taken place for both it and u at the same time. If this were the case, the stress assignment would have been on the wrong V segment resulting in incorrect surface form.

Thus it is evident in Maltese morphology that multiple affixation can take place when it involves a prefix and a suffix. However, when two suffixes are involved, the second suffix would be added in the second stratum. Obviously, there is a constraint on the morphological process in Maltese. Accordingly, affixation belongs

to two domains. For example, the suffix u has strata 1 and 2 as its domains of application. Whether it is applied in stratum 1 or stratum 2 will be decided by the rules of morphology[7]. Among the phonological rules, Stress Assignment is applied in both strata 1 and 2. It is evident that apocope follows the Stress rule. Otherwise in a word like *tàlbítu*, the i would be lost if Apocope applied before the stress rule. The domain of application for the rule of Apocope has to be both stratum 1 and stratum 2. This is again necessary for the correct application of the stress rule. From the examples discussed so far, it is obvious that Vowel Reduction is applied in stratum 2. If Vowel Reduction applied in stratum 1, it would have lowered /i/ of *talbit* to /e/. This means that another rule of vowel raising would be necessary to raise this /e/ to /i/ again after stress assignment. To say that Vowel Reduction applies in stratum 2 will eliminate this necessity of adding another rule and also the principle of rule economy will be adhered to.

Metathesis is another frequent phonological rule in Maltese. Brame has pointed out two different Metathesis rules in Maltese language; one which is called the. Identical Consonant Metathesis (I.C. Metathesis) and the other just Metathesis. For the purpose of this paper only the latter rule will be discussed.

6. Metathesis: CRVCV → CVRCV (R=r, l, m, or n)
   e.g. nídneb 'I sin' nidinbu 'we sin'

According to Brame, this rule applies in the second cycle. However, the derivation of *nitlóbu* 'we pray or ask' and *nitílfu* 'we lose' in his examples contradicts with the derivations that do not involve metathesis. Brame shows the following derivations:

7.
[[ni+tlob] u]	[[ni+tlif] u]	
ní+tolb	ní+tlif	Stress Assignment
ní+tolb+u	ní+tilf+u	Metathesis
nì+tólb+u	nì+tílf+u	Stress Assignment
———	———	Apocope

(Brame: Page 40)

If derivation (7) were to follow to illustrate [nîktbu] 'we write', the resulting surface form would be [nìktíbu) as shown in (8).

7. This in turn is due to the syntax and morphology interaction in Maltese word-formation. It seems that the Maltese verb has the following internal structure:

V'' → V' (Affix)
V' → (Affix) V (Affix)

8.
[[ni+ktib] u]	
ní+ktib	Stress Assignment
———	Metathesis
nì+ktíb+u	Stress Assignment
———	Apocope

However, this situation would not have arisen according to the analysis shown in (5). Following the illustration in (5), it was pointed out that Maltese morphology allows simultaneous affixation of two affixes as long as it involves a prefix and a suffix. The suffix [u] has strata 1 and 2 as its domains. Because there is not any subject suffixation involved the word syntax in Maltese allows the object suffix [u] to be added. Thus (7) and (8) can be replaced by (9).

9.

Stratum 1

[ni] [tlob] [u]	[ni] [tlif] [u]	[ni] [ktib] [u]	UR
[[ni] [tlob] [u]]	[[ni] [tlif] [u]]	[[ni] [ktib] [u]]	Affixation
[[ní] [tlob] [u]]	[[ní] [tlif] [u]]	[[ní] [ktib] [u]]	Stress Assginment
[[ní] [tolb] [u]]	[[ní] [tilf] [u]]	———	Metathesis
———	———	[[ní] [ktb] [u]]	Apocope
[nítolbu]	[nítilfu]	[[nîktbu]	BE

Stratum 2

———	———	———	Affixation
[nìtólbu]	[nìtílfu]	———	Stress Assignment
———	———	———	Apocope

In (9), Metathesis has applied in stratum 1 and it has stopped the rule of Apocope from being applied on the medial vowel of the two words [nìtólbu] and [nìtílfu]. These undeleted vowels receive stress again in stratum 2. Thus the stress on both vowel segments in each form has prevented Vowel Reduction from applying on them. Within the theory of lexical phonology, each stratum is cyclic and therefore any lexical item entering each stratum is treated as new form. When the two forms [nìtólbu] and [nìtílfu] enter stratum 2, there is the environment for the stress assignment rule to apply again. Theoretically, [nîktbu] enters the stratum 2 but it is not affected by any of the rules as there is no environment available for them.

So far, evidence was provided to the argument that Maltese lexicon is level ordered and accordingly two levels were established. However, examples like the following give evidence to argue for a third stratum in Maltese. As Brame pointed out, Maltese has a rule of Vowel Prothesis where an [i] is added before r, l, m, n (=R) in a certain environment. Consider the following examples.

10.

hátf+et	'she grabbed'	htáf+t	'I grabbed'	/hataf/
kítb+et	'she wrote'	ktíb+t	'I wrote'	/kitib/
mášt+et	'she combined'	imšát+t	'I combed'	/mašat/
néf'+et	'she spent'	infá'+t	'I spent'	/nefa'/

The examples in (10) represent the 3rd person (fem.) and 1st person forms in perfective singular forms. Significantly, the 1st person forms have an extra vowel [i] preceding sonorants. Traditional grammar explains this as an euphonic vowel. Phonologically, the environment for this prothetic vowel rule is as follows.

11. Prothesis: Ø → i/[__RC

What is not clear as yet is the domain where this rule applies. Obviously, this rule has to apply after Stress Assignment and Apocope. Stress Assignment feeds Apocope and Apocope creates the environment for Prothesis to apply. All the forms in (10) derive at stratum 1. Prothesis cannot apply in stratum 1 as well because if it is the case, then in stratum 2 the prothetic [i] will be reduced by Vowel Reduction. For the time being it is assumed that Prothesis applies at stratum 2 following Vowel Reduction. This in turn explains that Prothesis is a cyclic rule and with the evidence that will be shown below it will be clear that Prothesis rule in stratum 2 is subject to Strict Cycle Condition.

12.

Singular	Gloss	Plural	Gloss	CV-Pattern	
				Sing.	Plu.
tífel	boy	tfal	boys	CVCVC	CCVC
kbír	great large	kbár	great large	CCVC	CCVC
fének	rabbit	fníek	rabbit	CVCVC	CCVVC
ġífen	ship	ġfíen	ships	CVCVC	CCVVC
dénb	tail	dníeb	tails	CVCC	CCVVC
séna	year	snín	years	CVCV	CCVC
hm á r	donkey	hm í r	donkeys	CCVC	CCVC
ġíld	skin	ġlúd	skins	CVCC	CCVC
xáhar	month	xhúr	months	CVCVC	CCVC

13.

Singular	Gloss	Plural	Gloss
b á hha r	seaman	b a hhar + ín	seamen
b á hr i	sailor	bahrí+n	sailors
hálliel	thief	hallil+ín	thieves
xéwqa	wish	xewq+át/xewq+íet	wishes
xébba	young lady	xebb+íet	young ladies
a hb á r	news	ahbar+ijíet	news (pl)
kastéll	castle	kastéll+i	castles
plátt	plate	plátt+i	plates
púbbliku	public	pubblíc+i	public (pl)
grammátika	grammar	grammatík+i/ grammatíc+i	grammars

The forms in (12) and (13) represent another aspect of Maltese lexicon. The plurals in (12) are derived by changing the internal CV structure, whereas those in (13) have undergone suffixation in the plural forms. Stem variations in (12) have to be addressed by means of a mechanism such as Morpho-Lexical Rules[8] and unless counter evidence is found it is apparent that these forms are derived in stratum 1. However, the forms in (13) present a different situation. For example in the forms *ahbar+ijíet grammatík+i/grammatíc+i* there is the ideal environment for Apocope to apply and furthermore the unstressed [i] remains unchanged. The fact that Apocope and Vowel reduction do not apply on these forms shows that these forms belong to a different stratum. This and some other evidence that will be discussed below will support a third stratum in the Maltese lexicon.

In Maltese the definite article is explained to be either [l] or [il]. If the word starts with a vowel it is [l], otherwise it is [il].

14. il-bieb 'the door'   l-arja 'the air'

In turn this [l] assimilates with the following consonant as illustrated in (15).

15.

il-ċirasa	→	iċ-ċirasa	*the cherry*
il-dar	→	id-dar	*the house*
il-nar	→	in-nar	*the fire*
il-ras	→	ir-ras	*the head*
il-silġ	→	is-silġ	*the ice*
il-trab	→	it-trab	the dust
il-xahar	→	ix-xahar	*the month*
il-żarbun	→	iż-żarbun	*the shoe*
il-zokkor	→	iz-zokkor	*the sugar*

8. See Lieber, 1981, 'On the Organization of the Lexicon'

In this process of L-Assimilation, the [l] assimilates with sounds that have the feature [−ant], [+cor]. However, what is significant in this assimilation is that the [l] assimilates with the whole segment that bears the above features[9]. This l-assimilation is assumed to take place in stratum 3 following the L-Affixation which is argued to take place in stratum 3 as well. Moreover, it will be shown that the [i] associated with [L] in such examples as in (14) is a result of a Prothetic-i rule application at post-lexical level.

In addition to this there are several other assimilatory processes[10]. One of them is the [t] assimilation which is similar to the L-assimilation in the sense that it is a segmental assimilation rather than a feature assimilation[11]. Consider the following examples:

16.

t+ċempel	ċ+ċémpel	iċ+ċémpel	*you/she ring/s*
t+ġedded	ġ+ġédded	iġ+ġédded	*you/she renew/s*
t+xandar	x+xándar	ix+xándar	*you/she broadcast/s*
t+sensel	s+sénsel	is+sénsel	*you/she tie/s or hang/s*
t+żanżan	ż+żanżan	iż+żanżan	*you/she put/s on something new*
t+zappap	z+záppap	iz+záppap	*you/she limp/s*

9. This in fact supports Brame's segmental approach in Maltese phonology.
10. A very common assimilatory process in Maltese is the Voicing Assimilation. Consider the following examples:

1. irbaħn a   [irbaħna]   'to win'   r e b ħ a   [repha]   'victory'
2. ktieb   [ktiip]   'book'   kotba   [kodba]   'books'
3. hobża   [hobza]   'bread'   hobż   [hops]   'bread' (Abstract noun)
4. sabih   [sabiih]   'beautiful'   s b i e ħ   [zbiih]   'beautiful' (pl.)

In examples 1 and 3, [b] becomes [p] when the [b] is in a [−voice] environment whereas in 2 and 4, [t] and [s] have assimilated with the [+voice] quality of the following consonant and accordingly become [d] and [z] respectively. This voice assimilatory process can be stated as follows:

Voicing Assimilation:

$$C \rightarrow \quad C/\_\_\_\_C$$
$$[son] \quad [\beta\ voice] \quad [\beta\ voice]$$

Final consonant devoicing is a common phonological rule that feeds Voicing Assimilation in Maltese.

Final Consonant Devoicing:

$$C \rightarrow \quad C/\_\_\_\_]$$
$$[\text{- son}] \quad [-vd]$$

In example 2 above, the word *ktieb* [ktiip] has its final consonant [b] devoiced in the singular form as opposed to the appearance of the [b] sound in the plural when [b] is no longer the final consonant. Looking at example 3, it is evident that the final consonant devoicing has influenced on the devoicing of the [b] sound in the plural form. Apparently, the final consonant devoicing precedes Voice Assimilation as illustrated below

/hobz/   UR
hobs   Final Consonant Devoicing
hops   Voice Assimilation
[hops]   PR

In fact, Voicing Assimilation is a rule that spreads over to the neighbouring consonants in a cluster. For example in [níktbu] the phonetic representation is [nígdbu] showing that [t] first assimilated with the voice quality of [b] and afterwards [k] became [g]
11. A feature analysis of Maltese will be presented in a separate paper.

In L-assimilation, the [l] assimilated with any one of the consonants in (17).

17.

Orthography	t	d	n	ċ	z	x	s	ż	r
Phonetic	t	d	n	č	ts	š	s	z	r

and in [t] assimilation the liquid sounds are excluded as the following table shows.

28.

Orthography	ċ	ġ	z	x	s	ż
Phonetic	č	ǧ	ts	š	s	z

Both assimilatory processes in (15) and (16) produce two identical consonants in the word initial position according to the pattern $C_i C_j \rightarrow C_j C_j$ and the prothetic vowel [i] is added afterwards. However, the prothetic vowel in (15) is deleted when it occurs next to another vowel as the following example shows.

19.

ir-raġel u il-mara → ir-raġel u l-mara 'the man and the woman'
ġibli il-ktieb → ġibli l-ktieb 'bring me the book'

In comparison, the prothetic [i] of the examples in (16) remain undeleted in such phrases as follows.

20.

(a) (hija) ti-ktieb u iċċempel '(she) writes and (she) phones'
(b) (jiena) ni-kteb u in-ċempel '(I) write and (I) phone'

Contrary to (19), (20b) shows that the Prothetic-i (mentioned in (11)) remains unchanged in a C V V C sequence at phrase level.

These examples show that one [i] is different from the other and therefore it is necessary to differentiate one Prothetic-i from the other. Viewing this through the framework of lexical phonology, it can be argued that the Prothetic-i in (20) is a result of a lexical process whereas the other is a post lexical process. A breakthrough in the investigation into the nature of this Prothetic-i is possible by looking into the internal prosodic structure of the words in (16). In fact, they are all verb forms with a CVCCVC structure. Even the traditional Maltese grammar treats them as a separate group called quadriliterates. In these words there are two rhyming slots both of which are centered by an onset and a coda and the melodic tier has its peak at the syllable which receives the primary stress. When the onset

of the syllable which carries the melodic peak has a long consonant segment, there seems to be a rule which adds a prothetic vowel to simplify the simplify the onset by breaking it into two morae. The reason that this prothetic vowel is not elided in situations explained in (20) shows that it is already a part of the internal melodic structure of the word by the application of resyllabification to rebuild the word internal structure. Thus it becomes the case that the Prothetic-i in these forms is more a part of the whole structure than it is for the Prothetic-i in the examples (15). It is assumed that the domain of Prothetic-i is strata 2 whereas the Resyllabification rule applies as strata 2 and 3. This will be explained in the following illustration.

21. **Stratum 1**

[ti] [ċempel]	[l] [dar]	UR
[[ti] [ċempel]	_____	Affixation
[[ti] [ċémpel]]	_____	Stress Assignment
[[t] [ċémpel]]	_____	Apocope
[tċémpel]	_____	BE

Stratum 2

_____	_____	Affixation
_____	_____	Stress Assignment
_____	_____	Apocope
_____	_____	Vowel Reduction
[ċċémpel]	_____	t-Assimilation
[ċċémpel]	_____	Resyllabification
[iċċempel]	_____	i-Prothesis

Stratum 3

_____	[[l] [dar]]	L-affixation
_____	[[d] [dar]]	l-Assimilation
[iċċémpel]	[[d] [dar]]	Resyllabification

As (21) shows the two words enter the post lexical module as phonological phrases at the end of stratum 3. In [ddar), the long consonant at the onset position however remains hindering the melodic peak of the syllable. This is however readjusted only at the post lexical level either by the presence of a vowel segment immediately preceding the phrase or by applying the Prothetic-i as a postlexical rule. Notice that the Prothetic-i applies only in the absence of any other vowel segment immediately preceding the long onset. In other words, it is clear that the phonological phrase that immediately precedes [ddar] is a determining factor for the Prothetic-i rule

to apply at the postlexical level. This, in turn, supports the argument that the [i] which appears before the [l] is postlexical. This is also further evidence to say that the domain of Prothetic-i is lexical as well as postlexical.

Conclusion

As a preliminary study into word-formation of Maltese, this paper has argued for the existence of level ordering in the Maltese lexicon. It was also pointed out that the constraints in morphology can be captured by admitting the hierarchial distribution of the affixes which seem to be governed by the rules of word-syntax in Maltese. However, there is still a vast area in the whole of Maltese lexicon that needs to be explored in future. Eventually, future studies should further explain the issues as to the number of strata the lexicon consists of and the nature of each stratum as to cyclicity or non-cyclicity of rule application. Moreover, further investigations are necessary to determine the characteristics of the CV-structure and the prosodic structure of Maltese phonology and the nature of the rules of word-syntax in Maltese morphology.

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