PROSODIC ALTERNATIONS IN MODERN HEBREW SEGOLATES

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1. Introduction

The inflectional paradigms of Modern Hebrew segolates exhibit three surface stems, CVCVC, CCVC-, and CVCC-, as in *dégel* 'flag', *dgal-ím* 'flags' and *digl-í* 'my flag' respectively. CVCVC appears in isolation (in the singular and the singular construct), while CVCC- and CCVC- are bound stems appearing with suffixes.

The data considered here include the plural and possessive forms of three types of paradigms, distinguished by their plural suffix: *-im*, *-ot*, and *-aim*. This distinction correlates with three paradigms, which differ in at least one stem of a particular suffix, as in *dgal-áy* 'my flags' in the *-im* paradigm (plural *dgal-ím*) vs. *karn-áy* 'my horns' in the *-aim* paradigm (plural *karn-áim*).

The selection of one of these two bound stems, CCVC- or CVCC-, is not only determined by the suffix, as can be seen from the contrast between the different stems of *dgal-éynu* 'our flags' and *karn-éynu* 'our horns'. It is also not only determined by the lexical item, as can be seen from the contrast between *digl-éx* 'your fm. flag' and *dgal-áv* 'his flags'. What then are the factors determining the prosodic structure of the stem in the inflectional paradigms of the segolates?

I argue for two types of factor: The first one is the input, which differs for suffixed forms within and across paradigms. Within paradigms, the input of the singular possessives is the surface form of the singular, while that of the plural possessives is the surface form of the plural. Across paradigms, the input of the plural in the *-aim* paradigm is the surface form of the singular, while the plural forms in the *-im* and *-ot* paradigms do not have an input.

The absence of an input does not mean that the plural forms in the *-im* and *-ot* paradigms are not derived. I argue that the segolate paradigms involve multiple relations, whereby output forms are related to one or two forms. In addition to the input just mentioned, which must be a surface form, all suffixes are attached to a CVCVC base. That is, all surface forms are derived from a base, while some are also affected by other surface forms.

The second factor that determines the prosodic structure of the suffixed stems is a hierarchy of constraints, which prohibit certain surface structures (markedness constraints) and require identity between the base/input and the output (faithfulness constraints) with reference to particular phonological properties. The constraint-hierarchy proposed here, together with the multiple relations, account for the grammar responsible for the selection of the suffixed stems.

The paradigms under consideration here are presented in §2, accompanied by generalizations regarding the distribution of the stems of the suffixed forms. A brief outline of the theoretical framework is presented in §3, followed by the paradigmatic relation among the surface forms in §4, which distinguishes between the *-im*/*-ot* paradigms and the *-aim* paradigm. The analysis in §5 starts with the possessive singular forms (§5.1), which uniformly take the CVCC- stem. It then proceeds with the plural forms (§5.2), where *-im* and *-ot* take the CCVC- stem while *-aim* takes the CVCC- stem. This distinction is attributed to a difference in the inputs. Finally, the plural possessive forms are considered (§5.3), where the selection of the stem is contingent upon the position of stress in the suffix. The paper ends with concluding remarks in §6.

It should be noted that the present paper is concerned with the prosodic structure only. The segolate paradigms exhibit a unique and rich alternation in the vocalic pattern, which cannot be considered here due to space limitation.

2. Data and generalizations

The data, drawn from a high register, include the plural and possessive forms of the segolate nouns. These are divided below into three different paradigms, distinguished by the plural suffixes: *-im*, *-ot* and *-aim*. This distinction correlates with three

paradigms, which differ in at least one stem of a particular category (e.g. *dgal-áy* 'my flags' vs. *ragl-áy* 'my legs'). The leftmost column in each paradigm in (1) provides the syllable structure of the suffix and the position of stress; some suffixes are monosyllabic, and others are disyllabic, with the latter having suffixes with final stress and the former having suffixes with penultimate stress. The gloss indicates the category of the suffix followed by the number of the noun (e.g. 'my SG' stands for a singular noun with the 1st person singular suffix). The data below present a sample for each type of suffix; a complete inventory of the suffixes is provided in the appendix. All the suffixes in the paradigms are inflectional, though the three plural ones are lexical/inherent while the possessive ones are grammatical/derived (Schwarzwald 1991, Anderson 1992).

(1) The paradigms

	CVCC-		CVCC-	CCVC-	
a.	The *-im* paradigm: *dégel – dgal-ím* 'flag sg.-pl.'				
-ˈσ				dgal-ím	'PL'
-ˈσ	digl-í	'my SG'		dgal-áy	'my PL'
-ˈσσ	digl-énu	'our SG'		dgal-énynu	'our PL'
-σˈσ	digl-exém	'your SG'	digl-eyxém		'your pl. PL'
b.	The *-ot* paradigm: *délet – dlat-ót* 'door sg.-pl.'				
-ˈσ				dlat-ót	'PL'
-ˈσ	dalt-í	'my SG'	dalt-ot-áy		'my PL'
-ˈσσ	dalt-énu	'our SG'	dalt-ot-énynu		'our PL'
-σˈσ	dalt-exém	'your SG'	dalt-ot-eyxém		'your pl. PL'
c.	The *-aim* paradigm: *kéren – karn-áim* 'horn sg.-pl.'				
-ˈσ			karn-áim		'PL'
-ˈσ	karn-í	'my SG'	karn-áy		'my PL'
-ˈσσ	karn-énu	'our SG'	karn-énynu		'our PL'
-σˈσ	karn-exém	'your SG'	karn-eyxém		'your pl. PL'

All singular forms (left columns), regardless of the paradigm and the type suffix, take the CVCC- stem. The diversity arises in the plural forms. In the *-im* paradigm (1a), all suffixed forms take the CCVC- stem, with the exception of the disyllabic suffixes with final stress. In the *-ot* paradigm (1b), all suffixed forms take the CVCC- stem, with the exception of the plural form. In the *-aim* paradigm (1c) all forms without exception take the CVCC- stem. Notice that unlike the other plural suffixes, the suffix *-ot* (1b) survives when a possessive suffix is attached.

3. Theoretical background

The analysis provided in this paper is couched within the constraint-based framework of Optimality Theory (Prince and Smolensky 1993/2004). According to this theory, speakers consider several candidates for a surface form, and select the optimal one on the basis of a language-specific hierarchy of universal constraints. The constraints are violable, but violation is not arbitrary; violation of a constraint is enforced by a competing higher-ranked constraint (for details about the theory, see Kager 1999).

The constraints are of two types, markedness and faithfulness. Markedness constraints refer to the output only, and require unmarked structures. They prohibit, for example, a complex syllable onset, or in general any structure. Faithfulness constraints require identity between input and output, and thus must refer to correspondence between input and output (McCarthy and Prince 1995). They prohibit, for example, deletion or epenthesis of a segment.

Faithfulness constraints can be further divided according to the type of the input. Following my proposal that the segolate paradigms involve multiple relations, I distinguish here between base-output (BO) constraints and paradigm uniformity (PU) constraints. The base-output constraints refer to the relation between the CVCVC base and the output. The paradigm uniformity constraints refer to the relation between an input that is a surface form and the output, where the relation is asymmetrical, i.e. from input to output but not vice versa (McCarthy 2005).

Candidates considered for a surface form are evaluated with reference to the constraint hierarchy, where the higher the constraint in the hierarchy the less likely it is to be violated by the surface form. The surface form is the optimal candidate, since when compared to the other candidates it has fewer violations of the high-ranked constraints.

4. Multiple paradigmatic relations

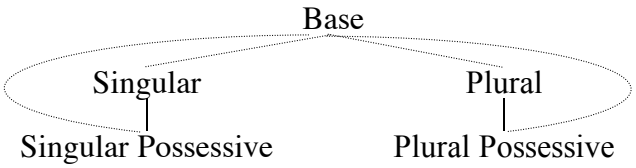
In most paradigmatic relations, an output has one input. However, there are also cases of "multiple correspondences". The English word *ɔˈtɒməˌtɪzəm* 'automatism', for example, is related to *ˌɔtəˈmætɪk* 'automatic' semantically but its stress pattern is derived from *ɔˈtɒməˌtɒm* 'automaton' (Steriade 1999). Similarly, Hebrew truncated imperatives are derived from the 2nd person future form, but also correspond to the past form. This explains why the future form *tikáx* 'you ms.sg. will take' has a truncated imperative *kax*, while the structurally similar *tiráʃ* 'you ms.sg. will inherit' does not have a truncated imperative **raʃ* (Bat-El 2002).

I also propose that the segolate paradigms involve multiple relations, where the outputs are related to a "base" and an "input". The relations in the paradigms are hierarchical, as illustrated in (2) and (3) below, where at the root of the hierarchy is the base, and every level below the base serves as an input to the immediately lower level. In addition, all forms in the paradigm, regardless of their level in the hierarchy, are also related to the base.

The form of the base is CVCVC, whose prosodic structure is identical to that of the underlying representation (Bat-El 1989, Bolozky 1995). The postulation of this base follows a general strategy in morphological analysis of paradigmatic alternations. Given the prosodic alternation among CVCVC, CVCC- and CCVC-, any of these structures is a potential base. However, both CVCC and CCVC are not good candidates due to the unmotivated epenthesis and deletion processes that would be required for deriving the forms in the paradigm. In particular, CVCC → CCVC or CCVC → CVCC would require both vowel deletion and vowel epenthesis (or vowel-consonant metathesis). With CVCVC as a base, only vowel deletion is required. The question as to what determines the site of deletion is addressed in the analysis (§5).

The inputs vary according to the category and the type of paradigm. As shown below for the *-im* and *-ot* paradigms, the singular and the plural forms only have a base. The possessive forms, however, have a base and an input, where the input is a surface form; the singular is the input of the singular possessive forms while the plural of the plural is the input of the plural possessive forms. Note that the base crucially differs from the singular input, since only the latter is specified for stress.

(2) Paradigmatic relations: *-im* and *-ot* paradigms



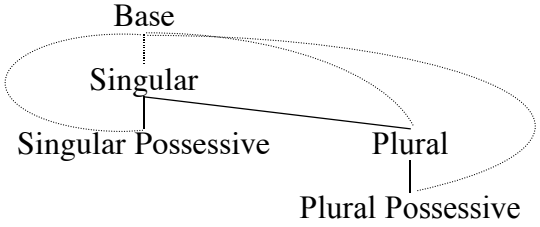
The *-im* and *-ot* paradigms both have the hierarchy in (2), but they are distinguished by the preservation of the suffix. In the *-ot* paradigm, the plural suffix is preserved when a possessive suffix is added (e.g. *dlat-**ót*** 'doors' – *dalt-**ot**-áy* 'my doors'). In the *-im* paradigm, the plural suffix is truncated in the same environment (e.g. *dgal-**ím*** 'flags' – *dgal-áy* 'my flags'). Remnants of the *-im* suffix could be identified in possessive forms such as *dgal-éynu* 'our flags' and *digl-eyhém* 'their flags', where the *y* in the suffixes is unique to the plural forms (cf. *digl-énu* 'our flag', *digl-ám* 'their flag'). However, native speakers of Hebrew often delete the *y* and are quite likely to assume different possessive suffixes for singular and plural (see appendix). Such distinction is based on less similar suffixes, like that of the 1st person singular, which is *-i* with singular nouns and *-ay* with plural nouns (cf. *karn-í* 'my horn' vs. *karn-áy* 'my horns') and also the 3rd person singular, which is *-o* with singular nouns and *-av* with plural nouns (cf. *karn-ó* 'his horn' vs. *karn-áv* 'his

horns'). Although the relation between the suffixes can be traced historically, it is not accessible in the current stage of the language.

The *-aim* paradigm is different, since the suffix *-aim* is actually a dual suffix, which also functions as plural, mostly, but not exclusively with body parts (e.g. *birk-áim* 'knees', *ʃin-áim* 'teeth'). When a noun only takes the *-aim* suffix, this suffix serves as a plural. However, when it takes both *-aim* and *-im*/*-ot*, the *-aim* serves as a dual and the *-im*/*-ot* as a plural (e.g. *yam-ím* 'days', *yom-áim* 'two days'). Homophonous singular forms, where one refers to a body part, are distinguished in the plural; for example *régel* 'holiday, leg' takes the plural suffix in *regal-ím* 'holidays' and the dual in *ragl-áim* 'legs', and *kéren* 'treasure, horn', takes the plural suffix in *kran-ót* 'treasures' and the dual in *karn-áim* 'horns'. That is, the plural and dual suffixes serve in drawing semantic contrast (Schwarzwald 2002).

The peculiarity of the *-aim* suffix is manifested in the paradigmatic relation in (3), which minimally differs from that of *-im*/*-ot* in (2). The plural form in the *-aim* paradigm does not only have a base, but an input as well, and this input is the singular form.

(3) Paradigmatic relations: *-aim* paradigm



Evidence that the dual also has an input is drawn from feminine nouns that have both dual and plural forms, where the plural suffix is *-ot*. In such forms, the plural suffix *-ot* is often preserved in the dual (as in the possessive forms); e.g. *dor-ót* 'generations' – *dor-ot-áim* 'two generations' and *nekud-ót* 'dots' – *nekud-ot-áim* 'two dots'. In the case of segolates with both dual and plural, the prosodic structure of the plural is preserved; e.g. *dlat-ót* 'door' – *dlat-áim* 'two doors', *drax-ím* 'roads' – *drax-áim* 'two roads'. That is, the dual has an input, either the plural or the singular. When the noun has a plural form, the *-aim* form is often derived from the plural (*drax-ím* 'roads' – *drax-áim* 'two roads'), but when it does not have a plural form, it is derived from the singular (*kéren* 'horn' – *karn-áim* 'horns')

5. Analysis

The distinction between base and input (§4) is crucial for the analysis presented in this section. I propose a constraint-based analysis (§3), consisting of markedness and faithfulness constraints, where some of the faithfulness constraints refer to the base, and others to the input. Constraints referring to the base are marked as base-output (BO) constraints, and those referring to the input are marked as paradigm uniformity (PU) constraints. Thus, in forms without an input, like the plurals in the *-im* and *-ot* paradigms, the constraints referring to the input are inactive.

5.1. Possessive singular forms: All singular suffixed forms take the CVCC-stem, regardless of the type of the suffix (e.g. *digl-í* 'my flag', *dalt-énu* 'our door', *ragl-ám* 'their foot', *ragl-exá* 'your ms.sg. foot'). Following my proposal, a suffix is attached to the CVCVC base, but the properties of the output are also conditioned by an input, which, according to (2) and (3), is the surface form of the unsuffixed singular form. It must be emphasized that the surface form is specified for stress, which is a crucial property determining the shape of the suffixed form. Given the input CVCVC (where the first syllable is stressed), the surviving vowel in the CVCC-stem is the one corresponding to the vowel in the stressed syllable of the input.

The constraint responsible for the preservation of the input's stressed vowel is $^{PU}\text{MAX}V^{S\sigma}$ (4), which enforces uniformity between the input singular form and the output possessive forms with reference to the stressed syllable.

(4) VOWEL MAXIMALITY IN A STRESSED SYLLABLE (^{PU}MAXV$^{S\sigma}$)
A vowel in a stressed syllable in the input has a correspondent in the output

This constraint simply says: "do not delete an input's stressed vowel", but it is oblivious to its quality. Stressed syllables are perceptually strong and thus often resist deletion or reduction (Beckman 1997/2000 and references therein), as in the case with English stressed vowels, which resist reduction to schwa (e.g. *ˌfoʊnəˈlɒʤɪkəl* 'phonological').

There is also a constraint responsible for the preservation of the base vowels. This constraint is ^{BO}MAXV (5), which refers to the correspondence between the output and the CVCVC base, prohibiting deletion of a base vowel.

(5) VOWEL MAXIMALITY (^{BO}MAXV)
A vowel in the base has a correspondent in the output

Deletion of any of the two base vowels violates ^{BO}MAXV. However, a constraint violation is not arbitrary but rather enforced by a higher ranked constraint (§3). I do not dwell here on the nature of the constraint that forces deletion, and thus opt for a simple NO VOWEL constraint (*V), a markedness constraint that penalizes for every vowel in the surface form. In general, every unit in the representation violates a markedness constraint that prohibits it. The reason the unit survives in the output is attributed to some higher ranked constraint, which blocks its deletion.

The ranking of the three constraints is *V >> ^{PU}MAXV$^{S\sigma}$, ^{BO}MAXV, where the markedness constraint *V is crucially ranked above the two faithfulness constraints (there is no evidence for the ranking between the latter two). The high-ranked constraint *V enforces vowel deletion while ^{PU}MAXV$^{S\sigma}$ protects the vowel corresponding to the vowel in the stressed syllable of the input. The other vowel of the base is thus deleted, violating the low ranked ^{BO}MAXV. Of course, only one vowel can be deleted from the base, since deletion of two vowels would result in an impermissible cluster of three consonants (see §6).

As shown below, the suffixed form has three potential stems (listed in the second column): CVCVC- where no deletion applies (6i), CCVC- where deletion applies in the first syllable of the base/input (6ii), and CVCC-, where deletion applies in the second syllable (6iii).

(6)

digl-í 'my flag'		Input: *dégel*	*V	^{PU}MAXV$^{S\sigma}$	^{BO}MAXV
i.	degel-í →	degel-í	**!		
ii.	degel-í →	dgal-í	*	*!	*
iii. ☞	degel-í →	digl-í	*		*

Out of the three candidates in (6), cand-i (**degel-í*) has more violations (marked with *) of the dominating constraint *V than the other two candidates, and it is therefore ruled out (marked with !). In reference to the constraint *V, I ignore the suffix vowels since they are constant for all candidates and thus not distinctive. Out of the two remaining candidates, both violate ^{BO}MAXV, but only cand-ii (**dgal-í*) also violates ^{PU}MAXV$^{S\sigma}$. Thus, the candidate that wins the competition is cand-iii (*digl-í*), whose stem is CVCC- (the winning candidate is marked with ☞).

Given the high ranking of *V, the candidate that does not undergo deletion (cand-i in (6)) has no chance of winning in the suffixed forms. For simplicity reasons, I henceforth ignore the constraint *V and the candidate that has not undergone deletion; only the stems CVCC- and CCVC- will be considered. I also ignore the lowest ranked constraint ^{BO}MAXV, since it is equally violated by both candidates and thus never gets to have an effect on the selection of the optimal candidate.

5.2. Plural forms: As shown in (1), the stem of the plural forms is not uniform across the three paradigms; in the *-im* (1a) and the *-ot* (1b) paradigms, the plural stem is CCVC- (*dgal-ím*, *dlat-ót*), while in the *-aim* (1c) paradigm, it is CVCC- (*ragl-áim*).

I propose that vowel deletion is partially determined by metrical structure. A right-headed disyllabic (binary) foot, consisting of unstressed-stressed syllables, is assigned at the right edge of the base+suffix – *de*[*gel-ím*]$_F$. This is the strong foot in the word, as it dominates the stressed, thus strong syllable (the other feet, if any, are not relevant). The strong foot, like the strong syllable (§5.1) is perceptually dominant,

as evident in early child's speech (Ben-David 2001, Adam 2002). So here, again, as in the case of the stressed syllable, there is a faithfulness constraint responsible for protecting syllables in a strong foot.

(7) VOWEL MAXIMALITY IN A STRONG FOOT (^{BO}MAXV^{SF})
A vowel in a syllable dominated by the strong foot has a correspondent in the output

The constraint ^{BO}MAXV^{SF} is crucially ranked below ^{PU}MAXV$^{S\sigma}$, as evident by the selection of *digĺ*, where both constraints are active.

(8)

digl-í 'my flag' Input: *dégel*	^{PU}MAXV$^{S\sigma}$	^{BO}MAXV^{SF}
i. de[gel-í]$_F$ → dgal-í	*!	
ii. ☞ de[gel-í]$_F$ → digl-í		*

Since cand-i (**dgal-í*) violates the higher-ranked constraint ^{PU}MAXV$^{S\sigma}$, the remaining cand-ii (*digl-í*) is the optimal and thus surface form.

In the *-im*/*-ot* plural forms, ^{PU}MAXV$^{S\sigma}$ is not active, since there is no input, just a base (see (2) above). Therefore, ^{BO}MAXV^{SF} gets to select the cand-i (*dgal-ím*), where the vowel in the strong foot is preserved.

(9)

dgal-ím 'flags' Input: ——	^{PU}MAXV$^{S\sigma}$	^{BO}MAXV^{SF}
i. ☞ de[gel-ím]$_F$ → dgal-ím		
ii. de[gel-ím]$_F$ → digl-ím		*!

The comparison between (8) and (9) reveals that the presence vs. absence of an input determines the surface form of the suffixed stem.

The suffix *-aim* is different from the other two plural suffixes since it is actually a dual suffix. As proposed in §4, unlike the *-im*/*-ot* plural forms, which do not have an input, the *-aim* plural forms are related to the surface singular form. This distinction is crucial since the surface singular form bares stress and thus the constraint ^{PU}MAXV$^{S\sigma}$ is active, as in *digl-í* (8).

(10)

karn-áim 'horns' Input: *kéren*	^{PU}MAXV$^{S\sigma}$	^{BO}MAXV^{SF}
i. ke[ren-á]$_F$im → kran-áim	*!	
ii. ☞ ke[ren-á]$_F$im → karn-áim		*

When the input is the singular surface form, which is specified for stress, ^{PU}MAXV$^{S\sigma}$ protects the vowel corresponding to the stressed vowel in the input. Consequently, the stem where the other vowel is deleted (cand-ii) is selected.

5.3. Possessive plural forms: The possessive plural forms show diversity within and across paradigms. In the *-ot* (1b) and *-aim* (1c) paradigms, the stem of the possessive plural forms is consistently CVCC-. However, in the *-im* paradigm (1a), the stem is CCVC- when stress resides on the initial syllable of the suffix (e.g. *dgal-éynu* 'our flags') and CVCC- when it resides on the final syllable of the suffix (e.g. *digl-eyxém* 'your flags'). The position of stress in disyllabic suffixes is determined by the properties of the final syllable: if it has an onset and a coda (CVC), it is stressed (e.g. *-eyxém*); otherwise, the penultimate syllable is stressed (e.g. *-áix*, *-éynu*).

The position of stress in the suffixes is crucial for determining the structure of the stem. Recall from §5.2 that the stressed syllable must reside at the right edge of the strong foot, thus when the suffix is monosyllabic or disyllabic with initial stress, the binary foot consists of the final base syllable and the first (stressed) syllable of the suffix – CV[CVC-σ]$_F$σ as in (10) and CV[CVC-σ]$_F$ as in (9). However, when the suffix is disyllabic with final stress, the binary foot consists of the two syllables of the suffix – CVCVC-[σσ]$_F$, and consequently ^{BO}MAXV^{SF} is not active with reference to the base vowels. In the latter case, where both ^{PU}MAXV$^{S\sigma}$ and ^{BO}MAXV^{SF} are not active, the constraint *COMPLEX becomes relevant, reflecting the dispreference for syllables with a complex onset (or complex subsyllabic units in general).

(11) NO COMPLEX (*CX)
A complex syllable margin is prohibited

*CX, which prohibits CCV syllables, is ranked below ^{BO}MAXV^{SF}. Therefore, when ^{BO}MAXV^{SF} is active (12a), it gets to select the optimal candidate, by ruling out the candidate that violates it (cand-ii). When not active (12b), *CX selects the optimal

candidate, preferring *digl-eyxém* (cand-ii) over **dgal-eyxém* (cand-i), since in the latter there is a complex onset.

(12) Possessive forms in the *-im* paradigm

a.

dgal-éynu 'our flags' Input: *dgalím*	^{PU}MAXV$^{S\sigma}$ ^{BO}MAXV^{SF}	*CX
i. ☞ de[gel-éy]$_F$nu → dgal-éynu		*
ii. de[gel-éy]$_F$nu → digl-éynu	*!	

b.

digl-eyxém 'your flags' Input: *dgalím*	^{PU}MAXV$^{S\sigma}$ ^{BO}MAXV^{SF}	*CX
i. dege[l-eyxém]$_F$ → dgal-eyxém		*!
ii. ☞ dege[l-eyxém]$_F$ → digl-eyxém		

As indicated in (12), the input of the possessive plural forms is the plural form, where stress is on the suffix. Therefore, ^{IO}MAXV$^{S\sigma}$ does not protect any of the base vowels.

In the *-ot* paradigm, the base vowels are not within the foot regardless of the type of the suffix, since the plural suffix *-ot* is preserved in the possessive forms (§4). Consequently, as in (12b) above, the base vowels are not protected by ^{BO}MAXV^{SF} and the stem is selected by *CX, which is respected by CVCC- but not by CCVC-.

(13) Possessives in the *-ot* paradigm

a.

dalt-ot-éynu 'our doors' Input: *dlatót*	^{PU}MAXV$^{S\sigma}$ ^{BO}MAXV^{SF}	*CX
i. dele[t-ot-éy]$_F$nu → dlat-ot-éynu		*!
ii. ☞ dele[t-ot-éy]$_F$nu → dalt-ot-éynu		

b.

dalt-ot-eyxém 'your doors' Input: *dlatót*	^{PU}MAXV$^{S\sigma}$ ^{BO}MAXV^{SF}	*CX
i. delet-ot-[eyxém]$_F$ → dlat-ot-eyxém		*!
ii. ☞ delet-ot-[eyxém]$_F$ → dalt-ot-eyxém		

The problem arises with the *-aim* paradigm. Following the constraint hierarchy developed so far, stems with monosyllabic suffixes or disyllabic with penultimate stress are expected to take the CCVC- stem, as shown in (14).

(14) Wrong output in the *-aim* paradigm

karn-eyxém 'your horns' Input: *karnáim*	^{PU}MAXV$^{S\sigma}$ ^{BO}MAXV^{SF}	*CX
i. ☛ ke[ren-éy]$_F$nu → kran-éynu		*
ii. ke[ren-éy]$_F$nu → karn-éynu	*!	

This is the wrong output, as indicated by ☛. Notice the distinction in the stems of *karn-éynu* 'our horns' in the *-aim* paradigm and *dgal-éynu* 'our flags' in the *-im* paradigm. This distinction, once again, is attributed to the different structures of the input, *karn-áim* (CVCC-) and *dgal-ím* (CCVC-) respectively.

To account for this distinction, I propose a faithfulness relation with regard to the complex onset, which blocks a derived complex onset. This faithfulness relation is independently motivated by verbal paradigm of Hebrew. When a vowel initial suffix is added to *dibér* 'talked', the vowel in the stem final syllable is deleted resulting in *dibr-á* 'she talked'. Deletion is blocked in *tirgem-á* 'she translated', to avoid a complex onset (**tirgm-á*). It is not, however, the case that complex onsets are entirely absent from the verb paradigm. The verb *sindlér* 'cobbled' has a medial complex onset (*dl*), and so does its suffixed form *sindler-á* 'she cobbled'. That is, if the input does not have a complex onset, the output cannot have it as well, as in *tirgém – tirgem-á* (Bat-El 2008). The following paradigm uniformity (input-output) constraint expresses this relation:

(15) NO DERIVED COMPLEX ONSET (^{PU}*CX)
An output with complex onset does not correspond to an input with a simple onset in the same position

This faithfulness constraint aims at preserving the syllable structure of the input. Its brother, which requires preservation of a complex onset, is low-ranked, in particular below the markedness constraint *CX. Notice that ^{PU}*CX is a faithfulness constraint, which differs from the markedness constraint *CX, since the latter prohibits a complex onset regardless of the input.

The constraint ^{PU}*CX does not block candidates with a complex onset when the input also has a complex onset, as it is the case in the *-im* paradigms (16a). However,

in the *-aim* paradigm (16b) the input does not have a complex onset and therefore the candidate with the complex onset is blocked. Note that ^{PU}*CX must be ranked above ^{BO}MAXV^{SF}.

(16) a. *-im* paradigm

digl-eyxém 'your flags' Input: *dgalím*	^{PU}MAXV$^{S\sigma}$	^{PU}*CX	^{BO}MAXV^{SF}	*CX
i. ☞ de[gel-éy]$_F$nu → dgal-éynu				*
ii. de[gel-éy]$_F$nu → digl-éynu			*!	

b. *-aim* paradigm

karn-eyxém 'your horns' Input: *karnáim*	^{PU}MAXV$^{S\sigma}$	^{PU}*CX	^{BO}MAXV^{SF}	*CX
i. ke[ren-éy]$_F$nu → kran-éynu		*!		*
ii. ☞ ke[ren-éy]$_F$nu → karn-éynu			*	

As indicated in (16), the input of the possessive plural forms is the plural form. When the input has complex onset (16a), ^{PU}*CX is inactive, since it requires preservation of a simple rather than a complex onset. ^{PU}*CX is, however, active when the input has a simple onset (16b). That is, the distinction between the outputs in the *-im* and *-aim* paradigms is due to the different structure of the input. Notice also that in both cases, stress is on the input's suffix and therefore ^{PU}MAXV$^{s\sigma}$, which protects input stressed syllables from deletion, is inactive.

6. Concluding remarks

The prosodic alternations in the inflectional paradigms of Modern Hebrew segolates (CVCVC, CVCC- and CCVC-) are the outcome of a grammar consisting of the following fragment of constraint ranking:

(17) Constraint ranking

*V >> ^{PU}MAXV$^{S\sigma}$ >> *^{PU}CX >> ^{BO}MAXV^{SF} >> *CX >> ^{BO}MAXV

The high-ranked *V enforces deletion in suffixed forms, and the ranking of the other constraints determines which vowel is deleted.

In addition to the constraints in (17), there are two relevant constraints which dominate *V. One is responsible for the fact that only one vowel is deleted from the base and not two; deletion of two vowels would result in the impermissible sequence of three consonants (**dgl-í*). A sequence of an initial trisyllabic cluster consists of two complex onsets (C_1C_2 and C_2C_3 in $C_1C_2C_3$). Since languages may distinguish between CC and CCC onset, allowing the former but prohibiting the latter, two constraints are required: *CX which prohibits a CC onset and its conjoined form *CX^2, which prohibits a CCC onset (on constraint conjunction, see Ito and Mester 2003, and references therein).

The other relevant constraint that dominates *V is responsible for the preservation of the two base vowels in the singular form. This is the MINIMAL WORD (MINWRD) constraint (Prince 1980, Broselow 1982, McCarthy and Prince 1986), which requires word size to be minimally disyllabic. Thus, although the disyllabic *dégel* has more violations of *V than the monosyllabic **digl* or **dgal*, it preserves the two base vowels conforming to the MINWRD constraint. Indeed, as noted by an anonymous reviewer, Modern Hebrew has nouns that violate the MINWRD constraint (e.g. *ken* 'nest', *yam* 'sea'). These are, however, reminiscence of Tiberian Hebrew lexicon, where the mora, rather than the syllable, was the relevant unit for word minimality. That is, in Tiberian Hebrew, as in English, monosyllabic words with a long vowel obey the MINWRD constraint.

The site of deletion, as shown in §5, is determined by the constraints dominated by *V, where the higher the constraint in the hierarchy, the stronger its effect. For example, it is better to delete the first vowel in the base and create a complex onset than delete the second vowel, which resides in a strong foot (^{BO}MAXV^{SF} >> *CX). However, if the first vowel is stressed in the input, it is better to delete the second (^{PU}MAXV$^{S\sigma}$ >> ^{BO}MAXV^{SF}).

While all the forms in the paradigm are subject to the same constraint ranking and have the same CVCVC base, they are distinguished by their input. This distinction is most crucial since the faithfulness constraints ^{PU}MAXV$^{S\sigma}$, ^{PU}*CX and

^{PU}MAXV^{SF} refer to the input; if the inputs are different then the effect of these constraints may be different as well.

As a final remark, I would like to note that Modern Hebrew inherited its segolate paradigm from Tiberain Hebrew (excluding, of course, the distinction in vowel length). However, the present paper does not attend to historical issues, but rather to the grammar that accounts for native speakers' knowledge. As the paradigms of the two languages are similar, it is quite likely that the grammar proposed here for Modern Hebrew, in particular with the postulation of a CVCVC base, also holds for Tiberian Hebrew segolates. Indeed, the vocalic alternation may point towards the traditional CVCC base, where epenthesis and some type of vowel harmony /assimilation are required (Malone 1993, Coetzee 1999). However, the properties of the proposed vowel harmony do not conform to universal tendencies, in particular the directionality of the harmony (regressive) and its trigger (an epenthetic vowel); vowel harmony tends to be progressive and an epenthetic vowel is usually the target, not the trigger. Therefore, the analysis assuming a CVCC base does not reflect a grammatical system of a natural language, neither for Modern Hebrew nor for Tiberian Hebrew.

APPENDIX: Possessive and plural suffixes

Below is the inventory of the plural and possessive suffixes, classified according to the number of syllables and stress in (a) and according to the category in (b). For the possessive suffixes, the number of the noun (singular or plural) is indicated before the person-number-gender of the possessive (e.g. 'Sg. – 3rd ms. sg.' means 'his N-singular'). Note that when the suffix is consonant initial, an epenthetic *e* in inserted with CVCC- stems (cf. *dalt-**e**xém* 'your pl. door' vs. *sus-xém* 'your pl. horse').

a.

-ˈσ		-ˈσσ		-σˈσ	
-im	'Plural (ms.)'	-áim	'Plural (dual)'	-eyxém	'Pl. – 2nd pl.'
-ot	'Plural (fm.)'	-énu	'Sg. – 1st pl.'	-eyhém	'Pl. – 3rd pl.'
-i	'Sg. – 1st sg.'	-éxa	'Pl. – 2nd ms. sg.'		
-xa	'Sg. – 2nd ms. sg.'	-áix	'Pl. – 2nd fm. sg.'		
-ex	'Sg. – 2nd fm. sg.'	-éha	'Pl. – 3rd fm. sg.'		
-o	'Sg. – 3rd ms. sg.'	-éynu	'Pl. – 1st pl.'		
-a	'Sg. – 3rd fm. sg.'				
-xem	'Sg. – 2nd pl.'				
-am	'Sg. – 3rd pl.'				
-ay	'Pl. – 1st sg.'				
-av	'Pl. – 3rd. ms. sg.'				

b.

Possessive suffixes			
Category		Sg. Noun	Pl. Noun
Singular	1st	-i	-ay
	2nd fm.	-ex	-áix
	2nd ms.	-xa	-éxa
	3rd fm.	-a	-éha
	3rd ms.	-o	-av
Plural	1st	-énu	-éynu
	2nd	-xem	-eyxém
	3rd	-am	-eyhém

Plural suffixes	
-ot	'feminine'
-im	'masculine'
-áim	'dual'

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