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EXTRAIT



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ON THE APPARENT AMBIGUITY OF THE SCHWA SYMBOL IN TIBERIAN HEBREW

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This paper provides a theoretical account for the ambiguity of the schwa symbol in the Tiberian script of the Old Testament. It is argued that the two surface representations of the schwa symbol, a vowel in a light syllable and a consonant at the end of a syllable, share an identical phonological representation, *a moraic consonant*. The surface representation of the moraic consonant is contingent upon the structure of the preceding syllable and some universal and language specific constraints on syllable structure. This argument is supported by several phonological phenomena attested in Tiberian Hebrew: Vowel Weakening (reduction and deletion), Degemination, and some aspects of the phonology of the Conjunctive *waw*. The analysis is given within the framework of the Moraic Theory.

0. Introduction

The schwa symbol in the Tiberian vocalization system of the Old Testament, marked by two vertical dots under the consonant, is ambiguous. In some cases, where it is referred to as schwa mobile (hereafter schwaM), it indicates the presence of a vowel. In other cases, where it is referred to as schwa quiescence (hereafter schwaQ), it indicates the absence of a vowel.

The schwa symbol, along with the other vowel symbols, was added to the consonantal script during the sixth and seventh centuries A.D., after Hebrew had ceased to exist as a spoken language. This was in order to preserve the pronunciation which was otherwise ambiguous in the presence of consonant symbols only. Nevertheless, it will appear from the discussion on schwa in this paper that the addition of these symbols was not entirely a phonetic documentation, but rather relied on phonological factors as well. I will argue that although schwaM and schwaQ are phonetically distinct they have an identical phonological representation.

According to the traditional interpretation of the schwa symbol, schwaM and schwaQ are in complementary distribution. The schwa symbol is interpreted as schwaM when it appears under the first consonant of the syllable, i.e. onset (word initial, after schwaQ, and under a geminate), and as schwaQ when it appears under the last consonant of the syllable, i.e. coda (word final, before another schwa symbol). The interpretation of the schwa symbol when flanked by other vowel symbols is, however, controversial (see, for example, Allony 1943a vs. Burshtein 1943). I assume the view presented in Dotan (1967) and Allony (1943a, 1943b), based on 10th century manuscripts of Hebrew grammar. A schwa symbol in the middle of the

word (which is not under a geminate or after another schwa symbol) is usually schwaQ. There are two cases where the schwa symbol is interpreted as schwaM in this position: (i) when the consonant marked with a schwa is followed by an identical consonant within the same morpheme, as in *ciiláloo* 'his shadow' Job 40:22 (see McCarthy 1986); and (ii) when the preceding syllable is accompanied by a major *gafyaa* symbol, a small perpendicular stroke under the consonant. It is not yet understood why the *gafyaa* appears where it appears, but it is probably uncontroversial that its phonetic realization is a slight pause after the vowel, which has the effect of leaving the syllable open (see Dotan 1971 and Yeivin 1981). Therefore a form with a *gafyaa* in the first syllable is read *zaakarúu* 'they remembered' Judg 8:34, while a form without a *gafyaa* is read *zaakríu* 'they remembered' Amos.1:9.¹ I will not consider here these two instances of schwaM.

The phonological source of schwaM and schwaQ is often identical. A vowel in a pretonic position can surface as schwaM, as in *šillem+im* ---→ *šillámim* 'dumbs' Isa 56:10, and as schwaQ (i.e. zero), as in *zaakar+uu* ---→ *zaakríu* 'they remembered' Amos.1:9. Similarly, a vowel in an antepretonic position can surface as schwaM, as in *daabar+im* ---→ *dabaarím* 'words' Exod 4:10, and as schwaQ, as in *háraabot+am* ---→ *hábootám* 'their swords' Ezek 28:7.

Another circumstance where schwaM and schwaQ reflect an affinity is when they actually alternate. SchwaM in the first syllable of the word surfaces as schwaQ (i.e. disappears) when one of the prepositions *b-* 'in', *l-* 'to', or *k-* 'like' is added. For example, *k+məqom* ---→ *kimqom* 'like place of' Jer 19:13, *l+gəbuulám* ---→ *ligbuulám* 'to their (country)' Jer 31:17.

These observations and others suggest that schwaM and schwaQ, although different phonetically, are one phonological entity, and it is thus not at all accidental that the two are designated in the Tiberian script by the same symbol. The questions to be addressed then are the following: (i) what is the phonological representation of the schwa symbol?; and (ii) what principles are responsible for the appearance of the two surface realizations of this single phonological entity?

I will argue that the phonological representation of the schwa symbol is a *moraic consonant*. The fact that on the surface in some cases the moraic consonant appears as a light syllable, where the vowel is marked as reduced (schwaM), and in others just as a consonant at the end of the syllable (schwaQ), is due to the language constraints on syllable structure. When the constraints allow the moraic consonant to join the coda of the preceding syllable, the schwa symbol stands for schwaQ, indicating the absence of a vowel after this consonant. If, however, the moraic consonant cannot join the preceding syllable, it is linked to its own syllable node. In this case

¹ The data in this paper are taken from Dotan (1974), a bible edition based on the Leningrad manuscripts. Gloss is based on Even-Shoshan (1990). The transcription ignores spirantization and lengthening of stressed vowels, as they are not directly relevant to the present discussion. Forms in construct state 'Noun of' do not bear primary stress.

the schwa symbol stands for schwaM, indicating the presence of a vowel after the consonant. The vowelless syllable is filled by a vowel whose quality is determined by a neighboring segment (in case of gutturals), or by default.

The claim that the phonological representation of the schwa symbol is a moraic consonant is supported by several distributional restrictions and phonological processes attested in Tiberian Hebrew. These phonological phenomena are shown to be natural consequence of such a representation, assuming the Moraic Theory of syllable structure and the Maximality Principle.

The paper is organized as follows. Section 1 discusses in brief the syllable structure in Tiberian Hebrew within the framework of Moraic Theory (1.1.), and proposes that the phonological representation of the schwa symbol is a moraic consonant, and that of the light syllable is a moraic consonant linked to a syllable node (1.2.). Section 2 provides an analysis of three phonological phenomena in Tiberian Hebrew involving schwa: Vowel Weakening (2.1.), Degemination (2.2.), and some aspects of the phonology of the Conjunctive *waw* (2.3.). These phenomena demonstrate that the affinity between schwaM and schwaQ stems from their identical phonological representation as a moraic consonant.

1. The Syllable and the Schwa Symbol

On the surface, there are three types of syllables in Tiberian Hebrew: light (CV), heavy (CVV, CVC), and super-heavy (CVVC, CVCC). The super-heavy syllables are restricted to word final position, though CVVC can also appear word internally, but only when derived. The distribution of the heavy syllables is not restricted, and thus heavy syllables are considered to be the unmarked syllables in Tiberian Hebrew.

Of these syllable types, the most relevant to the present study is the light syllable. The vowel in a light syllable is marked in the script as reduced, either with a schwa symbol (schwaM), as in *kə.síl* 'fool ms.sg.' Ps 49:11, *mam.lə.kot* 'kingdoms of' Jer 24:9, and *ʔim.mə.kén* 'your fm. mother' Ezek 16:45, or with a compound schwa symbol (termed *haatéf*) as in *ʔě.mét* 'truth, right' Gen 24:48, *hă.ber.tə.káa* 'your ms. consort (wife)' Mal 2:14, and *poo.šö.líi* 'my work' Ps 95:9. Only non-high vowels, *e*, *o*, and *a*, can appear in a light syllable.

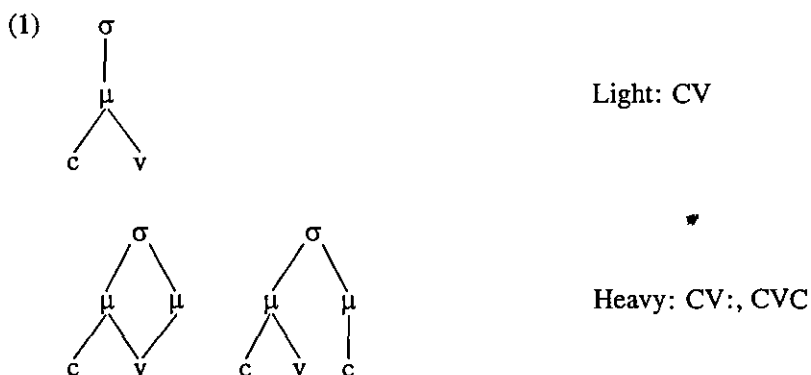
Studies such as Morag (1962) and Rappaport (1984) follow the view that the vowel symbols indicate quantity, and therefore distinguish between long, short, and ultrashort or reduced vowels, implying a three-way distinction in length. Yeivin (1981), Khan (1987), and in particular Bendavid (1957-8), argue that the vowel symbols indicate quality only, and quantity is derived from the syllable structure and the accentual system (*təšaamím*). Following this latter view the symbols of the reduced vowels (schwaM and compound schwa) denote a light syllable in a weak position of a foot, and not a reduced or ultra-short vowel. Thus, the first low vowel in *hă.ber.tə.káa* is not shorter than the one in *mam.lə.kot*; the different symbols,

hātaf paatah vs. *paatah* respectively, indicate that the former is in a light weak syllable and the latter is in a heavy one.²

Although the light syllable CV is universally the least marked, its distribution in Tiberian Hebrew is quite restricted: a light syllable is never stressed. In addition, a light syllable cannot appear at the end of a word, nor can it appear immediately after another light syllable.³ These distributional restrictions suggest that the light syllable is phonologically different from the other syllables. I will argue in section 1.2. below that this peculiar behavior of the light syllable stems from two factors: (i) its representation as a vowelless syllable, and (ii) the Maximality Principle, which serves to minimize the number of vowelless syllables by requiring a maximal syllable size.

1.1. Constraints on Syllable Structure

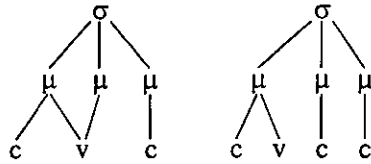
The view of the syllable structure in Tiberian Hebrew is given here within the framework of the Moraic Theory developed in Hyman (1984), McCarthy and Prince (1986), Hayes (1989) and elsewhere. A syllable (indicated by σ) consists of weight units, called moras (indicated by μ): a light syllable has one mora, a heavy syllable two, and a super-heavy three. The onset does not contribute to the syllable weight, and therefore it does not have its own mora. The following are the structures of the syllables permitted in Tiberian Hebrew, viewed here as constraints on syllable structure:⁴



² I assume that a heavy syllable forms a trochaic moraic foot (strong-weak), and so does a sequence of two light syllables. An unfooted light syllable is considered weak. See Churchyard (1990) for a discussion on foot structure in Tiberian Hebrew. For clarity, I follow the Tiberian script in transcribing vowels in a light syllable as reduced (\bar{a} or \bar{V}), and refer to them as reduced. It should be clear, however, that these vowels are considered here as phonologically full vowels.

³ See Gesenius (1910) for instances of stressed light syllables and a sequence of two light syllables within the view that the vowel symbols indicate quantity; see also Khan (1987) for a different view.

⁴ There are two theoretical issues that I do not attempt to discuss here: (i) whether a super-heavy syllable has two or three moras, and (ii) whether the onset is linked directly to the syllable node, as in Hayes (1989) and McCarthy and Prince (1986), or to the mora of the following vowel, as in Hyman (1984), Bat-El (1988), and Itô (1989). I adopt here the latter view.



Super-heavy: CV:C, CVCC

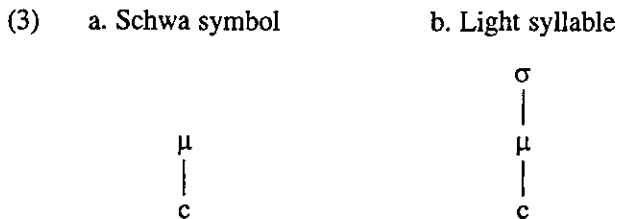
The multi-tier representation in (1) above, developed in recent studies in non-linear phonology (see, for example, Clements and Keyser 1983), introduces every phonological element, either prosodic (syllable or mora) or segmental (features; see section 2.3.) on a separate tier. Long segments are represented as one segment on the segmental tier linked to two positions in a prosodic tiers, as the long vowel in the CVV syllable in (1) above (see Hayes 1986).

The onset in Tiberian Hebrew syllables obeys Itô's (1989) Onset Principle, a principle which reflects the universal preference for syllables with onsets.⁵ The Tiberian Hebrew onset is, however, much more restricted. Not only is an onset obligatory in Tiberian Hebrew, it must consist of one consonant only. These restrictions can be captured by the following principle.⁶

(2) Tiberian Hebrew Onset Principle: [_σ CV

1.2. The Representation of the Schwa Symbol and the CV Syllable

The phonological representations of the schwa symbol and the light syllable proposed in this paper are given in (3) below.

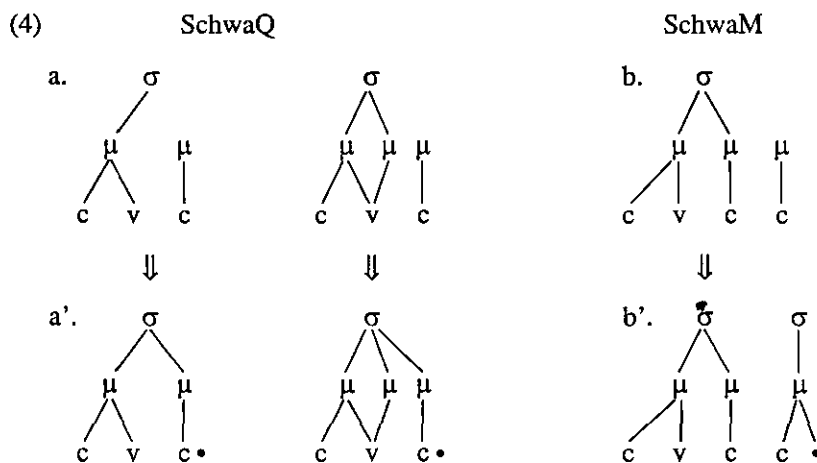


The schwa symbol is a moraic consonant, and the light syllable is a moraic consonant linked to its own syllable node. Notice that the light syllable is vowelless, and as will be shown below this is the reason for its peculiar behavior.

⁵ Exceptions to the Onset Principle appear when the Conjunctive *waw* precedes a labial consonant or a *Cə* syllable; in these cases the syllable begins with *u*. See Bat-El (1994).

⁶ Itô's Onset Principle is stated negatively, * [_σ V, indicating that a syllable without an onset is ill-formed. It is also parameterized with the values 'absolute' and 'relative' to distinguish between languages which never allow an onsetless syllable and others that permit it in some circumstances. The limitation for only one consonant in the onset in Tiberian Hebrew requires a positive statement of the principle, which makes the parameter redundant.

Due to constraints on syllable structure (section 1.1. above), these representations do not remain as such: a mora must be dominated by a syllable node (3a), and a consonant must not occupy the peak position of a syllable (3b). On the surface, the moraic consonant may occupy the onset position of a light syllable (schwaM) or the coda position of a heavy syllable (schwaQ), depending on the structure of the preceding syllable. When the syllable preceding the moraic consonant ends in a vowel (4a), CV or CVV (where the vowel is not marked with *gafyaa*), the moraic consonant joins it as its coda, forming a CVC or CVVC syllable respectively (4a'). In this case the schwa symbol stands for schwaQ. When the syllable preceding the moraic consonant ends in a consonant (4b), the moraic consonant cannot join this syllable if it is in medial position (as a CVCC is restricted to word final position), and therefore it is forced to link to its own syllable node (4b'). The resulting light vowelless syllable obtains its vowel either by spreading of the neighboring vowel (in the environment of gutturals), or by default. To obtain a clear structural representation I indicate schwaQ with • after the consonant and schwaM with • linked to an association line. It should be emphasized, however, that these marks do not refer to phonological entities. • in the case of schwaQ indicates a syllable boundary, while • in the case of schwaM marks an empty nucleus which is filled by a vowel in the phonetic representation.⁷



The principles responsible for (4a and b) to surface as (4a' and b') respectively, in addition to the constraints of syllable structure, are Prosodic Licensing and the Maximality Principle (Itô 1989). Prosodic Licensing requires every phonological element to be dominated by a higher element in the hierarchy, thus prohibiting the undominated mora in (4a and b). The Maximality Principle forces units (in our case syllables) of maximal size, respecting other universal and language specific

⁷ The issue regarding the vowel quality in a light syllable is beyond the scope of this paper. See Har-Zahav (1951: v.2 141-144), Chomsky (1971), and others.

constraints, such as constraints on syllable structure. Therefore in (4a') the undominated mora does not stand in a syllable of its own but rather joins the preceding syllable forming a possible syllable. In (4b'), however, affiliation of the undominated mora to the preceding syllable would yield an impermissible syllable (in word medial position), and this mora is therefore dominated by its own syllable.⁸

The representations of the schwa symbol and the light syllable in (3) and the principles presented above also account for the distributional restrictions mentioned in section 1. A light syllable cannot appear at the end of the word because a trimoraic (super-heavy) syllable is permitted in this position, and therefore, as forced by the Maximality Principle, the moraic consonant (which is the source of the light syllable) must join the preceding syllable. That is, at the end of a word, $[\mu\mu]_{\sigma}$ μ is syllabified as $[\mu\mu\mu]_{\sigma}$ and not as $[\mu\mu]_{\sigma}$ $[\mu]_{\sigma}$.

Similarly, two adjacent light syllables are prohibited because, assuming that light syllables originate from moraic consonants, the Maximality Principle forces them to join into one heavy syllable, when possible.⁹ That is, given two adjacent moraic consonants, CC, it is possible to syllabify them into two syllables, CV.CV, or into one syllable CVC (all V's are epenthetic; a dot indicates a syllable boundary). In a language that allows CVC syllables, the first option violates the Maximality Principle and is therefore ruled out.

The last distributional restriction mentioned in section 1 is that a light syllable cannot be stressed. In this respect Tiberian Hebrew is not different from French (Anderson 1982, Charette 1991) or Indonesian (Cohn 1989), where a schwa is never stressed (though in French a schwa is stressed in monosyllabic forms). Anderson (1982) attributes this behavior of the French schwa to its representation as an empty nucleus, claiming that a stressed syllable must dominate a segmental nucleus. Given the vowelless representation of the light syllable in (3b), the fact that a light syllable cannot be stressed is due its empty nucleus, which makes the syllable not eligible to be a stress-bearing unit.

2. Case Studies

It was proposed in the previous section that the phonological representation of the schwa symbol is a moraic consonant. This moraic consonant may surface as the coda of a heavy syllable (schwaQ), or as the onset of a vowelless light syllable (schwaM or compound schwa).

⁸ Itô's Maximality Principle is adopted from Prince (1985). A similar approach is taken in Selkirk's (1981) study on Cairene Arabic, where vowelless (degenerate) syllables are introduced. Selkirk proposes a general principle which requires a minimization of the number of empty vowel (dummy) positions. Since minimizing the empty vowel positions entails minimizing the number of syllables, this principle is actually compatible with the Maximality Principle, which requires maximizing the size of the syllable; given a string of segments, the larger each syllable is, the smaller the total number of syllables.

⁹ This is not always possible, as there are other constraints in the language which may conflict. If, for example, the second moraic consonant is a guttural, the two moraic consonants form two distinct light syllables, and not one heavy syllable, as the language does not permit gutturals in coda position.

The rest of the paper analyzes several phenomena from Tiberian Hebrew phonology which can best be accounted for under the proposal made above. Vowel Weakening (2.1.) reflects the affinity between schwa_M and schwa_Q, Degemination (2.2.) demonstrates the relation between schwa_M and a following geminate on the one hand and schwa_Q and a following simple consonant on the other, and the phonology of the Conjunctive *waw* (2.3.) provides further support for the representations of the schwa symbol and the light syllable proposed in (3).

2.1. Vowel Weakening

Vowels in Tiberian Hebrew are often reduced or deleted. The exact position in which a vowel is subject to reduction or deletion has been discussed in studies such as Prince (1975), McCarthy (1979), Hayes (1981), Rappaport (1984), Halle and Vergnaud (1987), and Churchyard (1990), and it will not concern us here. What is at issue here is the effect of reduction or deletion on the syllable representation.

The environment of vowel reduction and vowel deletion is identical, and as will be shown below it is one and the same process, termed here Vowel Weakening. The distinction between reduction and deletion is parallel to the distinction between schwa_M and schwa_Q respectively.

When the syllable whose vowel is subject to Vowel Weakening is at the beginning of a word or preceded by a closed syllable, the rule functions as reduction, and the result is a light syllable (whose vowel is marked as reduced).

(5) Reduction: V ---→ [ə/ǃ] (schwa_M or compound schwa)

daabár	'word' Gen 44:18	dābaarím	'words' Exod 4:10
yaabéš	'dry ms.sg.' Ezek 17:24	yābeešót	'dry fm.pl.' Ezek 37:2
nibbáʔ	'he prophesied' Jer 20:1	nibbāʔúu	'they prophesied' Jer 2:8
yooʔéc	'advisor' 1Chr 26:14	yooʔācím	'advisors' Prov 15:22
ħaacér	'court' Ezra 40:28	ħāceerót	'courts' Ezek 46:22

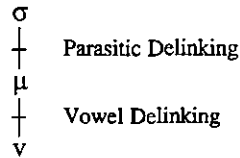
If, however, the syllable of the vowel subject to Vowel Weakening is preceded by an open syllable, the result is null, that is, the rule functions as deletion.

(6) Deletion: V ---→ Ø (schwa_Q)

ħāraabóot	'swords' Isa 21:15	ħarbootám	'their swords' Ezek 28:7
cədaaqáa	'righteousness' Gen 15:6	cidqaatíi	'my righteousness' Gen 30:33
šaaláh	'he sent' Gen 42:4	šaalháa	'she sent' Gen 38:25

The process of reduction is viewed here not as a feature changing rule (i.e. not as a rule that turns a vowel to schwa by changing its features to [-back, -high, -low]), but rather as a delinking of the vowel from the mora (indicated by '-' on the association line connecting the vowel to the mora). Following Hayes's Parasitic Delinking, I assume that "delinking of a vowel segment implies loss of syllable structure" (Hayes 1989:268). Thus, Vowel Weakening involves delinking of the vowel (Vowel Delinking) and of the syllable (Parasitic Delinking), as formulated below:

(7) Vowel Weakening

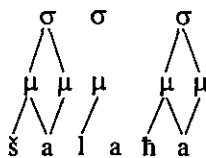
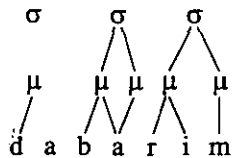
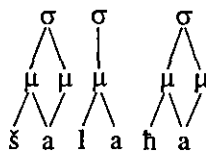
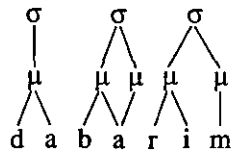


It is assumed that a segment which is not dominated by a prosodic element and a syllable that is not dominating a prosodic element are eventually deleted. Notice that Parasitic Delinking does not delink the syllable node from every vowelless syllable but only from a syllable whose vowel is delinked. Therefore Parasitic Delinking should be formulated as parasitic on Vowel Delinking, as in (7) above, and not as an independent process*

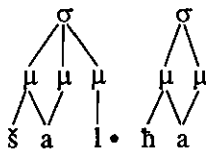
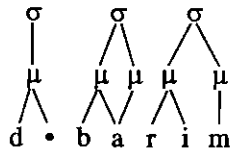
What remains after Vowel Weakening (assuming that the delinked phonological elements, the syllable and the vowel in this case, are not realized phonetically) is a *moraic consonant*. This is exactly the stage which the schwa symbol in the Tiberian script refers to. The surface representation of the moraic consonant, and the distinction between schwaM and schwaQ, are predictable from the structure of the preceding syllable, and therefore not indicated in the script. The moraic consonant surfaces as the coda of a preceding open syllable (schwaQ), and as the onset of a light syllable when the preceding syllable is closed or when in a word initial syllable (schwaM).¹⁰

(8) SchwaM

SchwaQ



Vowel Weakening



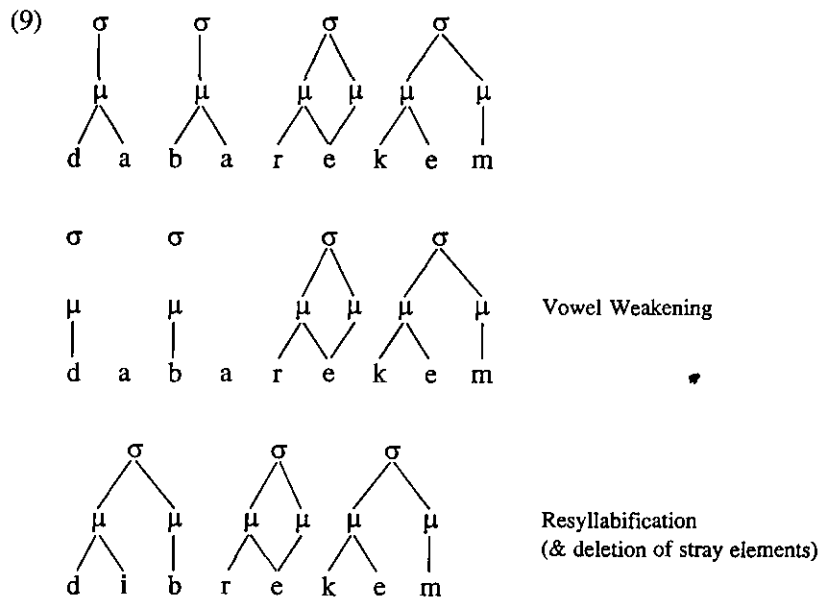
Resyllabification
(& deletion of stray elements)

¹⁰ Long vowels result from Pretonic Lengthening. I assume that Vowel Weakening affects vowels when they are still short.

The resulting schwaQ reflects the power of the Maximality Principle, while the schwaM indicates the priority of the constraints on syllable structure (in this case, no complex onset) over the Maximality Principle. Obviously, Prosodic Licensing ensures that every phonological element (except the top one) is dominated, and those which are left stray are deleted (or not realized phonetically).

Vowel Weakening may affect two vowels within the same word. In the underlying form *da.ba.ree.kém*, for example, the vowels in the first and the second syllables are affected by the rule. The output in this case is not **d̥a.b̥a.ree.kém*, as one would expect if Vowel Weakening was a feature changing rule, but rather *dib.ree.kém* 'your words' Gen 42:16. Recall from section 1.2. that a sequence of two light syllables, as in **d̥a.b̥a.ree.kém*, is impermissible.

The output *dib.ree.kém* is expected within the present approach, as Vowel Weakening yields in this case two moraic consonants. Syllabification then forms one closed syllable, in accordance with the Maximality Principle. The vowel position is filled by *i*, the default vowel in a closed syllable. Here again, *i* (in bold) should be understood as a phonetic realization of an empty nucleus.



In sum, this section has argued that vowel reduction and vowel deletion are the same process, Vowel Weakening, thus supporting the representation of schwaM and schwaQ as the same phonological entity. The output of Vowel Weakening is governed by the Maximality Principle and constraints on syllable structure, and therefore has two possible surface outputs, schwaM (reduction) and schwaQ (deletion).

2.2. Degemination

This section is concerned with the relation between a geminate and a schwa. It provides a straightforward explanation for the facts that (i) a schwa after a geminate must be schwaM, and (ii) a geminate is never preceded by a schwa, neither schwaM nor schwaQ.

In many instances Vowel Weakening is accompanied by degemination of the preceding geminate (and the simplified consonant is then marked with schwaQ).

- | | | | | |
|------|-----------|--------------------------|-----------|----------------------------|
| (10) | yiqqáh | 'he will take' Exod 33:7 | yiqhúu | 'they will take' Gen 14:24 |
| | kisséʔ | 'throne' Ezek 10:1 | kisʔóo | 'his throne' Jer 1:15 |
| | zikkarón | 'remembrance' Eccl 1:11 | zikron | 'remembrance of' Eccl 1:11 |
| | bammaqqél | 'with the rod' Num 22:27 | bammaqlót | 'with the rods' Gen 30:41 |

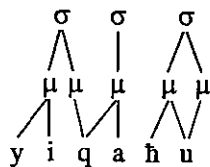
In forms where degemination does not occur, a schwa surfaces (schwaM).

- | | | | | |
|------|--------|------------------|----------|----------------------|
| (11) | cawwár | 'neck' Isa 8:8 | cawwərey | 'necks of' Judg 8:21 |
| | ʔillém | 'dumb' Exod 4:11 | ʔilləmím | 'dumbs' Isa 56:10 |

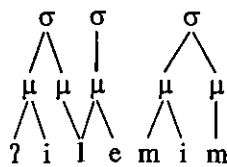
Within the present approach the relation between a geminate and schwaM (11) on the one hand, and a simple consonant and schwaQ (10) on the other hand is not accidental. This is exactly what is expected assuming the syllable structure of Tiberian Hebrew and the Maximality Principle.

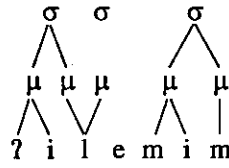
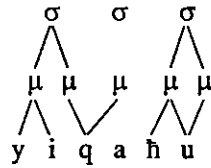
Recall from section 1.1. that a long segment, in this case a geminate, is linked to two prosodic elements (see the first line in (12) below). When a vowel following a geminate is affected by Vowel Weakening, whereby the vowel and syllable are delinked, the undominated mora shares a consonant with the preceding mora. Recall that Prosodic Licensing does not allow an undominated mora in the surface representation. Deletion of this mora would not affect the segmental content (though it would affect the prosodic content) as the consonant it dominates is also dominated by the preceding mora (cf. (8) above, where the deletion of the mora would trigger the deletion of the consonant it dominates, as the stray consonant would not surface). The presence of the two options, (10) and (11), reflects the competition between the Maximality Principle, which pushes towards deletion of the mora, and thus forming syllables of maximal size (10), and the requirement to preserve all underlying moras (11).

(12) SchwaQ

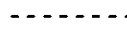
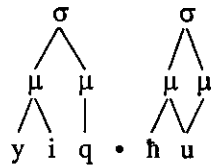


SchwaM

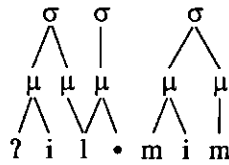
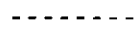




Vowel Weakening



Mora Deletion
(& deletion of stray elements)



Resyllabification
(& deletion of stray elements)

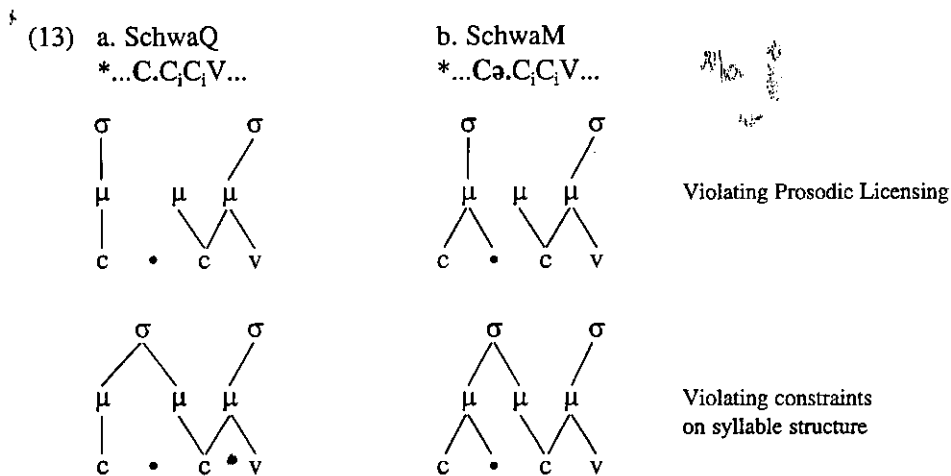
As demonstrated in (12), the presence of a geminate entails the presence of a light syllable (schwaM), and the presence of a simple consonant entails the absence of a light syllable (schwaQ). Thus, the absence of a vowel (schwaQ) in this case is contingent upon Mora Deletion and not an independent unrelated phenomenon. Similarly, when Mora Deletion fails to apply, the geminate persists and so does the light syllable (schwaM).

The claim that the phonological representation of both schwas is a moraic consonant also explains in a straightforward way the distributional restrictions that a consonant marked with a schwa symbol cannot be followed by a geminate, i.e. the sequence C'C_iC_i, where C' is marked with a schwa symbol, is impossible.

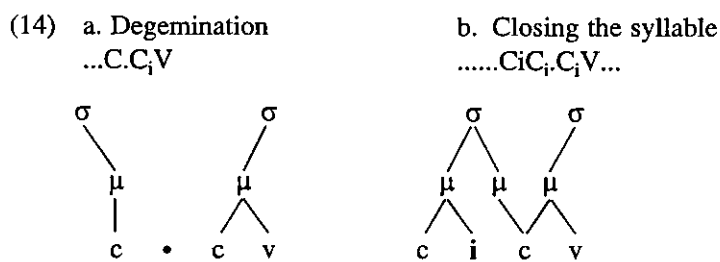
If the schwa symbol on C' indicates schwaQ, i.e. a coda (13a), the first half of the geminate cannot be syllabified. It cannot join the preceding CVC syllable since a complex coda is possible only in word final position. Nor can it join the following syllable because (i) the moraic view of syllable structure forces geminates to be heterosyllabic,¹¹ and (ii) the Tiberian Hebrew Onset Principle (2) allows only one segment in an onset.

If the schwa symbol indicates schwaM, i.e. a light syllable (13b), then the first half of the geminate cannot join the preceding syllable since it would close it, and schwaM appears only in light syllables. The option of leaving the mora undominated by a syllable is not available as it violates Prosodic Licensing, which requires every phonological element to be dominated by a higher unit. The two impermissible structures for each case are given in (13):

¹¹ This also accounts for degemination in word final position, as in *šam* 'people' Esth 1:5; cf. the plural form *šammim* Esth 1:11, where the geminate is retained.



Parallel to the two types of impermissible structure, there are two ways to amend such representations if they happen to arise. One way is to simplify the geminate by deleting the unsyllabified mora (Mora Deletion), and the schwa symbol is then interpreted as schwaQ (14a). The other way is to preserve the mora by linking it to the preceding syllable, and by this to eliminate the schwa symbol, as the epenthetic vowel in a closed syllable is *i*. In neither case do we get the impermissible sequence of a schwa symbol followed by a geminate. In (14a) the schwa symbol is retained and the geminate disappears, while in (14b) the geminate is retained and the schwa symbol disappears.



The case in (13a-14a) can be observed in (*haa*)*ʔāgamīm* '(the) marshes' Exod 8:1 and *ʔagmehēm* 'their marshes' Exod 7:19. In the latter form Vowel Weakening (i.e. deletion of the *a* following the *g*) is accompanied by degemination of the *m*, thus resulting in *ʔagmehēm* rather than **ʔagmehēm* or **ʔagmehēm*. The case in (13b-14b) can be observed in forms from binyan *nifal*. The underlying form of *yikkaateb* 'it will be written' Esth 2:23 is *y+n+kaateb*, which then becomes *yikkaateb* by complete assimilation. In this case the geminate is preserved and *i*, rather than schwa, is inserted to fill the empty nuclear position of the heavy syllable (cf. *yākannes* 'he will gather' Ps 147:2 in binyan *piʔel*, from underlying *y+kannes* without a geminate).

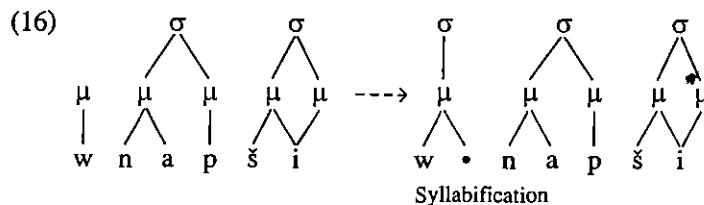
In sum, this section has demonstrated the structural relations between geminates and schwa. First it showed the mutual relations between a geminate and schwaM on the one hand and a simple consonant and schwaQ on the other. Second, it showed that it is impossible to have a schwa, either schwaM or schwaQ, before a geminate. These structural relations follow directly from the principles presented in this paper (the Prosodic Licensing, the Maximality Principle, and the constraints on syllable structure), and the representations of the schwa and the light syllable proposed in (3).

2.3. The Conjunctive *waw*

The Conjunctive *waw* 'and' is cliticized to the rightmost element of a conjunction clause, as in *ħannúun wəraahúum* 'merciful and gracious' Jonah 4:3. The Conjunctive *waw* usually surfaces as *wə*, as shown below:

(15)	napší Ps 22:21	wənapší Ps 6:4	'(and) my soul'
	laaqhúu Gen 43:15	wəlaaqhúu Zech 14:21	'(and) they took'
	ħóošek Exod 10:21	wəħóošek Gen 1:2	'(and) darkness'
	yaʔāqób Gen 25:26	wəyaʔāqób Exod 3:16	'(and) Jacob'
	koohén Gen 14:18	wəkoohén Lam 2:6	'(and) a priest'

The representation of the Conjunctive *waw* in (15) as a light syllable with schwa suggests that its underlying representation is a moraic *w*. When the moraic consonant is linked to a syllable node we get a light vowelless syllable, as the *w* functions as an onset in accordance with the Onset Principle (2). This is another instance where a light syllable, i.e. a consonant marked with schwaM, is derived from a moraic consonant.



There are no cases where the Conjunctive *waw* surfaces as a consonant in coda position (schwaQ), to show a vowel (schwaM) - null (schwaQ) alternation, since it always appears at the edge of the word. The Conjunctive *waw* can, however, precede another clitic, and in this case the expected alternation can be observed. The phonological behavior of the prepositions *k-* 'like', *b-* 'in' and *l-* 'to' is in many respects similar to that of the Conjunctive *waw*; like the Conjunctive *waw*, they usually surface as *Cə* (schwaM), as in *lədaawíd* 'to David' 1Kings 11:36. When the Conjunctive *waw* is added to a cliticized base the resulting form is not **wələdaawíd*, but rather *uldaawíd* 'and to David' 1Kings 2:33. This is exactly the same phenomenon

observed in section 2.1., where Vowel Weakening derives *dib.ree.kém* from *da.ba.ree.kém*, rather than **də.bə.ree.kém*.

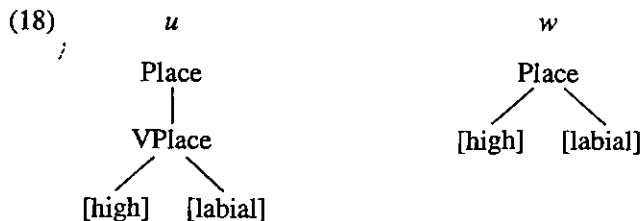
This appears to be the behavior of the Conjunctive *waw* whenever it is added to a base that begins with a light syllable with schwa, as exemplified below:

- | | | | |
|------|---------------------|---------------------|------------------|
| (17) | šənaatí Gen 31:40 | ušnaatí Jer 31:25 | '(and) my sleep' |
| | gəbúl Jer 5:22 | ugbúl Num 34:6 | '(and) boundary' |
| | nəpaašót Exod 13:18 | unpaašót Ezek 13:18 | '(and) souls' |
| | dəbaarím Exod 4:10 | udbaarím Gen 11:1 | '(and) words' |

As in the case of Vowel Weakening (section 2.1.), instead of two adjacent light syllables we get one closed syllable, as enforced by the Maximality Principle. The peculiarity of the forms with the Conjunctive *waw* in (17) is that (i) the Onset Principle is violated, and (ii) the vowel in the closed syllable formed from two light ones is *u* rather than *i*. That is, instead of **wišnaatí*, we get *ušnaatí*. I will discuss here the second point only, as this is the most relevant to the present study. A discussion of the Onset Principle violation is given in Bat-El (1994) within the framework of Optimality Theory (Prince and Smolensky 1993), where minimal violation of constraints is permitted.

An empty nucleus in Tiberian Hebrew is filled by a default vowel (*ə* in a light syllable and *i* in a closed syllable) only when there is no neighboring vowel available, otherwise, the features of an available vowel spread to the empty nuclear position. For example, when the Conjunctive *waw* is followed by a guttural in a light syllable, the vowel following the guttural spreads to the empty nuclear position of the Conjunctive *waw*, as in *wəšemet* 'and truth' 2Kings 20:19 and *wošōli* 'and sickness' Eccl 6:2.¹² Similarly, when the Conjunctive *waw* is followed by *y* in a light syllable, the features of *y*, which are identical to that of *i*, spread to the empty nuclear position of the Conjunctive *waw*, as in *yəméy* Gen 3:14 - *wiiméy* '(and) days of' Deut 11:21 and *yəhuudáa* Exod 31:2 - *wiihuudáa* Gen 35:23 '(and) Judah'.¹³

The source of the *u* in (17) is the Conjunctive *waw* itself. On the surface, the difference between *w* and *u* is in syllabic position (only *u* can function as a syllable nucleus) and in the feature geometry, as illustrated below:



¹² Notice that in such cases there is a sequence of two light syllables and not one heavy, as in (17), because gutturals cannot occupy a coda position.

¹³ Vowel spreading must be foot internal, therefore it occurs in the above cases only when the base begins with a light syllable. I assume that a heavy syllable forms a foot and so do two adjacent light syllables.

Assuming the theory of Feature Geometry developed in Clements (1985, 1991) and elsewhere, features are hierarchically organized, where the vowel features are grouped together under the node V(owel)Place, while consonant features are grouped together under the node Place. The segmental change from *w* to *u* thus involves the demotion of the features from Place to VPlace, without any change in the features themselves.

In sum, since the Conjunctive *waw* is a moraic consonant, when it precedes a light syllable one heavy syllable is formed, in accordance with the Maximality Principle. The nucleus of this heavy syllable is not filled by *i* (the default vowel in heavy syllables), as there are neighboring vocalic features available, those of the Conjunctive *waw*.

3. Conclusion

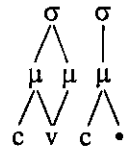
Two well-known facts about the schwa in Biblical Hebrew have been elucidated in this paper: (i) the schwa symbol in Tiberian script is ambiguous, as it stands for two surface representations, a coda in a closed syllable (schwaQ), and an onset in a light syllable (schwaM); (ii) the phonology of the language reflects affinity between schwaQ and schwaM.

I have argued that the ambiguity of the schwa symbol is just apparent: the schwa symbol indicates a single phonological entity – a moraic consonant. The two surface representations of the moraic consonant are due to constraints on syllable structure and the Maximality Principle. The argument was supported by various phonological phenomena attested in Tiberian Hebrew which demonstrate that the rise of schwaM or schwaQ from a moraic consonant is determined by these principles. These principles rule out the ill-formed representations in the left column in (19) in favor of the well-formed representations recapitulated in the right column in (19):

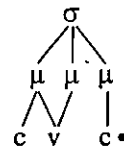
(19) Ill-formed representations

Well-formed representations

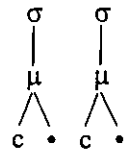
a. Maximality Principle



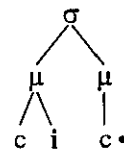
open syllable + schwaM
*šaa.lə.háa



closed syllable + schwaQ
šaal.háa

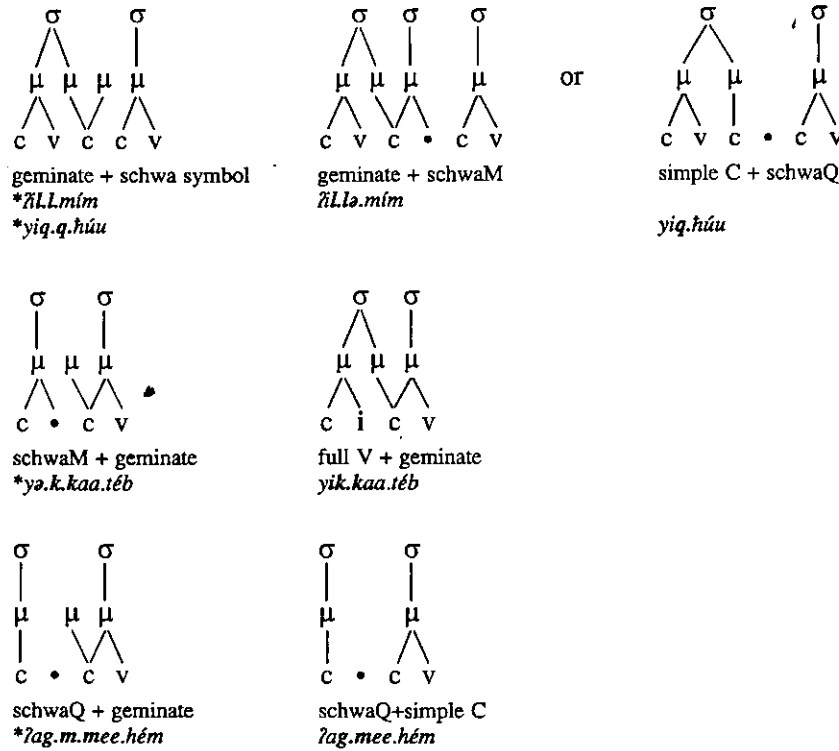


a sequence of two schwaM
*də.bə.ree.kém
*wə.gə.búl



heavy syllable
dib.ree.kém
ug.búl

b. Constraints on syllable structure and Prosodic Licensing



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