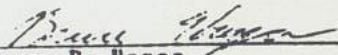UNIVERSITY OF CALIFORNIA

Los Angeles

Extraction in Modern Hebrew Morphology
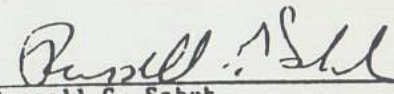
A thesis submitted in partial satisfaction of the
requirements for the degree Master of Arts
in Linguistics

by

Outi Bat-El

1986

The thesis of Outi Bat-El is approved.

Bruce P. Hayes

Bruce P. Hayes

Russell G. Schuh

Russell G. Schuh

Stephen R. Anderson

Stephen R. Anderson, Committee Chair

University of California, Los Angeles

1986

ii

0. Introduction

The purpose of this study is to present a type of word formation device developed in Modern Hebrew (MH). MH, spoken in the state of Israel for the last hundred years or so, is the descendant of Biblical Hebrew (BH), which has been revived after being dead for more than a thousand years. One of the major differences between BH and MH is that the latter has developed an additional word formation strategy which I will call Extraction.

In BH the lexicon consists of lists of two types of discontinuous morphemes; consonantal roots (usually of three consonants, $c_1-c_2-c_3$) and vocalic patterns $(-v_1-v_2-)$. The combination of two morphemes, one from each type, results in a lexical item whose meaning is, in most cases, composed of the basic meaning supplied by the root and the grammatical function provided by the vocalic pattern. The formal description of this process is presented in section 1.1.

For example, the combination of the root g-d-l, whose basic meaning is 'increase', and the vocalic pattern -i-e-, whose grammatical function is of a transitive verb, results in the form gidel 'to raise' (for simplicity, vowel length and gemination are ignored). This verb is the transitive counterpart of gadal 'to grow', whose vocalic pattern, -a-a-, is unmarked for grammatical function (citation forms are usually given in 3pr. m. sg. past tense). The same root can be combined with different vocalic patterns (some of which have affixed material) to form other related forms, such as higdil 'to magnify', godel 'size', gadol 'big', etc. A representation of a possible lexical entry is schematized in (1) below:

(1)
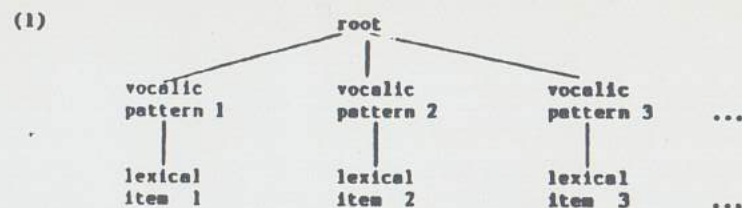
The derivation of forms, according to the above scheme, is global. Forms are derived via the combination of an abstract head root and various vocalic patterns. The term "global" is used to indicate that the morphological "source" for each derived word is not some other word, as would be the case in English, but the root node in a family tree of related words. That is, all words trace their morphological derivation directly from the primitive root, and not through some intermediate form.

This mechanism operates in BH in the verbal and the nominal system. The vocalic patterns of verbs (traditionally termed Binyanim, lit. 'constructions') carry semantic content such as transitivity, reciprocality, reflexivity, causativity, etc. The vocalic patterns of nouns (Miškalim, lit. 'weights') denote agenthood, instrumental, place, etc.

I will argue that in MH a mechanism of "local" derivation has been developed. The root combined with a vocalic pattern is not an abstract head root, but rather a root that has been "extracted" from a fully specified lexical item.

For example, the root d-g-m-n is extracted from the noun dugman 'modeler' (in which -an is a suffix) and combined with the vocalic

pattern -i-e- to form the verb digmen 'to model'. Following this
strategy, a representation of a lexical entry sould be such as the one
schematized in (2) below:

(2)   lexical item ———> root
                            |
                           vocalic pattern 1
                            |
                         lexical item 1 ——> root
                                            |
                                         vocalic pattern 2
                                         |
                                       lexical item 2   ...
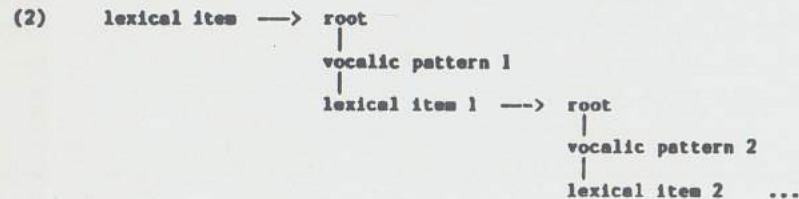
This sort of mechanism operates mainly within the verbal system.
The vocalic patterns of nouns (excluding verbal nouns) are not so
transparent in MH, semantically or morphologically, and therefore not
used much for deriving new words.

The claim for local derivation is supported by two arguments.
First, the consonantal part of affixed material shows up as part of the
root in a form derived via Extraction. From a form A, which contains the
root a-b-c and a suffix -f (i.e. a-b-c+f), one may derive a new word B,
whose root is a-b-c-f. In this case, the affixed material has been
extracted from A along with the basic root to participate as part of the
root in B. This situation is impossible in a global derivation, where
only the head root may participate in the process.

The second argument for local derivation is provided by the
phonology. When a phonological rule R operates on a form A, changing
a-b-c to a-x-c, the root which shows up in a newly derived word B, where
the environment of R is not met, is a-x-c and not a-b-c. Here again, the
fact that the output of the operation of R on A is maintained in B

suggests that B is derived directly from A, not from a head root a-b-c.

The formal apparatus of Extraction is given in 1.2., where it is
shown how roots are extracted from fully specified lexical items and
combined, in a manner described in 1.1., with vocalic patterns. The
discussion of Affixation in section 1.3. is followed by the two
arguments mentioned above, the morphological and phonological, which are
provided in section 1.4.

One of the main issues of section 1., the inclusion of affixes
within the extracted material, is carried over to section 2. An
interesting observation is made there, which points out that certain
type of affixes is never subject to Extraction. In section 2.1. I
distinguish between tense and template verb affixes, showing that only
template affixes are subject to Extraction. I try to capture a
generalization in section 2.3.; it seems that the affixes which are
subject to Extraction are those which are usually considered as
derivational affixes, and those which are ignored by Extraction are
mainly inflectional affixes.

1. Modern Hebrew Word Formation

There are two main types of Word Formation Rules (WFRs) attested in
MH: Association and Affixation. Association, which is peculiar to
nonconcatenative morphological structures known mainly from the study of
Semitic languages, combines consonantal roots and vocalic patterns to
build hierarchical structures in a manner discussed in section 1.1.
below. Affixation, the more conventional process, attaches affixes to
forms which may then undergo phonological adjustment. The vocalic

alternation, as that in godel 'size' and gadol 'big' will not concern us here. This alternation reflects the morphological system of BH, in which, as mentioned above, verbs as well as nouns have independent vocalic patterns. See Ravid (1978) for a comprehensive discussion of the non-verbal morphological patterns in MH, which distiguishes between 'old' and 'new' forms.

1.1. Association: Recent studies in morphology have devoted a great deal of attention to the formal apparatus of Semitic word formation, which is based on "discontinuous" morphemes. McCarthy (1979, 1981) extended the principles of the Autosegmental phonological theory developed in Goldsmith (1976) to treat the relation between consonants and vowels and segmental positions that forms the basis of Semitic word formation. Notions like multileveled representation, association, and spreading, which in the Autosegmental theory express formal relationships between segments and features, have been found to be equally useful in morphology in expressing the relationship between segmental positions within a word and individual vowels and consonants.

The formal apparatus developed in McCarthy's Nonconcatenative Morphological theory describes the combination of roots and vocalic patterns as a process of association of levels into hierarchical structures, such as that illustrated in (3) below:

(3) morpheme tier
     vocalic tier
     CV-skeleton
     consonantal tier
     morpheme tier

I view the structure in (3) above not as derived from a root by active processes of association, but as the basic, underived lexical representation of a form. Unlike McCarthy (1979, 1981) who assumes a lexicon of listed bound morphemes (the Morpheme-based view), I adopt here Aronoff's (1976) claim that the lexicon consists of fully specified words (the Word-based view). This preference is motivated in section 1.1.1. According to the Word-based view, WFRs do not actually combine morphemes but rather express a relationship between forms on the basis of their structural representation, such as that in (3) above.

For example, the relationship between taram 'to contribute' and hitrim 'to cause s.o. to contribute', or gadal 'to grow' and higdil 'to magnify' is expressed by a WFR as in (4) below:

(4)

It should be noted that in McCarthy (1981) the structure on the left of (4) is C V C V C, where the vowel is doubly-linked. McCarthy's motivation for doubly-linked vowel as an output of spreading, is to support the claim that the direction of spreading is universally left-

5   6

to-right. This also accounts for reduplicated forms like _madad_ 'to measure', in which left-to-right spreading occurs in the vocalic as well as in the consonantal tier. However, in the presence of forms like _simen_ 'to finance' in MH and _KaKKal_ 'to cook' in Amharic (Broselow 1985), which may reflect right-to-left spreading, the motivation for a universal direction of spreading is weakened, especially when reduplication can be analyzed as copying (Bat-El 1984). See also Steriade (1982) for an argument against McCarthy's doubly-linked consonants. In any event, this distinction will not be crucial here.

To return to our main concern, rules of the sort of (4) above, which express relationship between two existing forms, may also function derivationally in the case of new coining. In this case, the process would be roughly as in (5) below:

(5)
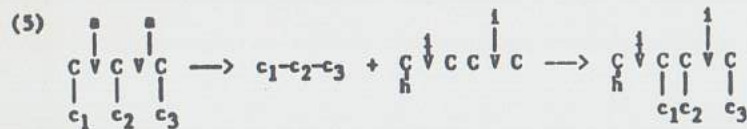
In the process illustrated above, the consonants are first peeled off the consonantal tier and then combined with the vocalic pattern in a hierarchical structure. A detailed discussion of the actual implementation of Association is given in 1.2.

Below are some examples of forms related by Association. For simplicity, the CV skeleton and the vocalic tier are often represented together on one tier. Affixes, which, as argued in McCarthy (1981), appear on separate tiers, are specified here as segmental material to express this difference. Thus, the representation of the structure on

the right of (4) would be, in my notation, hiCCiC, to which I will refer as "template". This is merely an abbreviatory device; a full representation would follow McCarthy's view that vowels cannot be represented on the same tier as the C-slots.

(6) a. xalav 'to milk' (Trns. verb: CaCaC + x-l-b)

   xaliva 'milking' (Verbal noun: CaCiCa + x-l-b)

   xalban 'milkman' (Agent noun: (C)CaCCan + x-l-b)

 b. histakel 'to observe' (Intrns. verb: hitCaC(C)eC + s-k-l)

   histaklut 'observation' (Verbal noun: hitCaC(C)ut + s-k-l)

   staklan 'observer' (Agent noun: (C)CaCCan + s-k-l)

 c. piteax 'to develop' (Trns. verb: CiC(C)eC + p-t-x)

   pituax 'developing' (Verbal noun: CiC(C)uC + p-t-x)

   hitpateax 'to develop o.s.' (Intrns. verb: hitCaC(C)eC + p-t-x)

   hitpatxut 'development' (Verbal noun: hitCaC(C)ut + p-t-x)

Some phonological processes obscure the outputs above: spirantization of /b/ in (6a.), and in other cases of /p/ and /k/, metathesis of /t/ and /s/ in (6b.), and insertion of /a/ before the final /x/ (historically /h/) in (6c.). The first two processes will be discussed in section 1.4.2.

The verb class templates are often linked to grammatical functions such as transitivity, causativity, and others. The status of the noun class templates (which include nouns and adjectives) differs from that of the verb class in several respects. First, a noun template is hardly ever linked to a grammatical function. There is nothing common to _regel_ 'leg', _'erec_ 'country', _nefeš_ 'soul', and _delet_ 'door', nor to _davar_

'thing', kanaf 'wing', zamar 'singer', and 'avaz 'goose' besides the fact that they are all nouns which share the same template (CeCeC and CaCaC, respectively). A noun template hardly ever exists as a quasi-independent entity like a verb template. Its existence is contingent upon its combination with the root, where the latter is a quasi-independent morpheme. The status of a noun template is similar to that of cran- in cranberry.

This observation is supported by the fact that borrowed nouns, as opposed to verbs, often do not conform to one of the existing noun templates. The original vocalic pattern is kept (adjusted to the segment inventory of Hebrew, as are the consonants), and in some cases native nominal affixes are added, as in telefon 'telephone', geografya 'geography', televizya 'television', and filosofi 'philosophical'.

In terms of structural representation, however, noun and verb templates are alike. In both cases there is a multileveled representation in which the vowels and consonants, which constitute separate tiers, are associated with V-slots and C-slots, respectively, on the CV-skeleton. The only difference is that noun templates appear as units only by virtue of the morphological representation, while verb templates are quasi-independent morphemes (see also McCarthy 1984).

1.1.1. Word-based Morphology: Before proceeding let me make clear why the Word-based (as opposed to the Morpheme-based) morphology is appropriate for MH. The classical Semitic languages (i.e. those which are not in colloquial use) exhibit a productive and regular morphological system. According to the morpheme-based view, their lexicon consists of bound morphemes, roots and templates. Each root and each template has an independent meaning. The morphology freely (with some exceptions) combines roots with templates to give a full word. The root supplies the basic semantic content and the template provides the grammatical function, such that the resultant of any combination of root and template is compositional in structure and meaning.

For example, the root g-d-l has a basic meaning of 'increase' and the template CiC(C)eC indicates transitivity. The combination of the two results in the verb gidel 'to raise' which is the transitive counterpart of the intransitive verb gadal 'to grow'. In the latter the template CaCaC indicates lack of transitivity. The same root can be associated with other templates, resulting in forms like higdil 'to enlarge' which includes the causative meaning of hiCCiC, and hitgadel 'to aggrandize o.s.' which includes the reflexive meaning of hitCaC(C)eC.

MH, however, while undoubtedly still a Semitic language, deviates to a large extent from this sort of ideal morphological system. The same is true for many dialects of Arabic, as noted in Smeaton (1973) for the Arabic of Al Hasa spoken in Saudi Arabia. Along with the large number of compositional forms there are a great many noncompositional ones, as well as accidental gaps. Only a few roots can be found associated with every template, and even for these roots, the result in many cases is often semantically noncompositional.

For example, there is no regular semantic relation between MH ganav (CaCaC, unmarked) 'to steal', higniv (hiCCiC, causative of CaCaC) 'to smuggle', and hitganev (hitCaC(C)eC, reflexive/reciprocal) 'to sneak'.

The three forms share the same root and thus a basic meaning, but the grammatical function of the templates, as noted in parentheses, is not reflected in the forms. There is also a gap in the paradigm of this root due to the lack of the verb *ginev. A somewhat more opaque semantic relation is reflected in the pairs patax (CaCaC, unmarked) 'to open' - piteax (CiC(C)eC, transitive) 'to develop', and zarak (CaCaC, unmarked) 'to throw' - hizrik (hiCCiC, causative of CaCaC) 'to inject'. In both pairs the templates are used as meaningless morphemes, i.e., their structure is used without their grammatical function.

It is not the case that the verb templates completely lost their grammatical function. Children (Berman 1980), as well as adults (Bolozky 1978), may still associate certain templates with transitivity, causativity etc. But since many forms do not reflect the grammatical function of the templates we may say that the latter has been "relaxed". This is due to various factors. The originally geminated template, CiC(C)eC, became the unmarked one, and therefore lost its transitivity. Unlike the other templates (except hitCaC(C)eC) it has more than three available C-slots, thus used for deriving verbs, transitive as well as intransitive, from nouns which have more than three consonants. Therefore, in the derivation of tifked 'to function' from tafkid 'job', CiC(C)eC is used even though the verb is intransitive. And since this template became the unmarked one, it is used for deriving triconsonantal intransitive verbs as well, like kitex 'to ∧ '. There complain is also a tendency to preserve the original consonant clusters. In the derivation of hišpric 'to squirt' from špric 'squirt', hiCCiC is used since its first and second C-slots are adjacent, although the verb is

not causative (see Bolozky 1978 for comprehensive discussion). Thus, it is clear that word formation in MH cannot be accounted for only by the implementation of rules which combine independently meaningful morphemes.

Recent work in MH morphology (Berman 1978, Ravid 1978, and Horvath 1981) has suggested that the nature of MH WFRs is similar to that of concatenative languages, as proposed in Aronoff (1976). These rules do not specify the combination of morphemes, as assumed by McCarthy (1979, 1981), Williams (1981), and Selkirk (1984), but rather express relations between existing words. This claim obviously eliminates the status of the root and the templates as morphemes listed in the lexicon, but not as quasi-independent units.

This proposal seems to be adequate for MH, since there is no other way to account for the vast amount of accidental gaps and noncompositional forms, except by proposing a lexicon of interrelated fully specified words. The possibility of filtering out the nonexisting words, and marking as exceptions the noncompositional ones, is undesirable since we will end up with a morphological system flooded with exceptions and filters.

I conclude then that WFRs, as that in (4) above, express a relationship between two forms on the basis of their multileveled morphological representation. Following Aronoff (1976), WFRs have access to structural, syntactic, and semantic information of their base and output. All WFRs may operate as lexical redundancy rules as well as produce new forms. Section 1.2. considers the function of the Association type of WFRs in producing new words.

1.2. Extraction: A very common way to form new words in MH is by using the Association type of WFR in derivational mode. As I argued in Bat-El (1985), the consonantal tier of the noun may peeled off from a fully specified noun, then associated with a given verb template, as in (7) below. In principle it is also possible to derive a noun from a verb or another noun, but since noun templates in MH are usually not independent units, this direction of the process is rather rare.

(7) a. Input: CoCaC koxav 'star'
                  | | |
                  k x v

   Extraction: k-x-v

   Association: k-x-v + CiCeC --> CiCeC
                                  | | |
                                  k x v   kixev 'to star'

   b. Input: CeCeCoC telefon 'phone'
                 | | | |
                 t l f n

   Extraction: t-l-f-n

   Association: t-l-f-n + CiCCeC --> CiCCeC
                                     | | | |
                                     t lf n   tilfen 'to phone'

   c. Input: CaCoC varod 'pink'
                 | | |
                 v r d

   Extraction: v-r-d

   Association: v-r-d + hiCCiC --> hiCCiC
                                   | | |
                                   vr d   hivrid 'to become pink'

The process of word formation described above consists of two stages. First Extraction provides the root, then Association combines the extracted root with a given template. Notice that Extraction and Association are the same process applied in opposite directions. While Association combines a root and a template, Extraction separates them.

This phenomenon demonstrates that morphemes may lack semantic content. The residues of Extraction, i.e., the noun templates, are meaningless (they count as morphemes, of course, only if one assumes that a word must be exhaustively parsable into morphemes). It is also clear from the above that the meaning of the root is based on the fully specified form(s) which contain it. The meaning of the adjective varod 'pink', for instance, is carried over by the root from the input adjective to the newly derived verb.

1.3. Affixation: Before proceeding with the discussion of Extraction, let us discuss the nature of Affixation. Affixation is another strategy of word formation attested in MH. Affixes may carry various grammatical and semantic features, such as lexical class, gender, number, agenthood, locativity, etc. The unaffixed counterpart of an affixed form can be a lexical item (e.g. lax 'humid' - lax-ut 'humidity'), or a nonexistent form (e.g. *tarb - tarb-ut 'culture'). Affixation is often followed by vocalic adjustment which will not concern us here.

1.3.1. Nominal Affixes: In (8) below I introduce the most common affixes. In cases where only a V-slot appears, the vocalic specification is introduced by various phonological rules:

provide counterevidence to a claim made in recent literature concerning the "headness" property of suffixes.

The following are the gender-number markers of the nominal class:

(10) Feminine: singular: -et, -it, and -a(t)   plural: -ot

      Masculine: ∅   -im

The f. sg. suffix _-et_ appears as _-at_ when preceded by the historical pharyngeals /h/ and /9/ (correspond to MH /x/ and /'/ respectively), as in the second form in (11) below. _-a(t)_ appears as _-a_ when /a/ bears the main stress, but as _-at_ elsewhere. Some examples are given below:

(11) zamar   zameret   'singer m./f.'

     rokeax   rokaxat   'pharmacist m./f.'

     'ezrax   'ezraxit   'citizen m./f.'

     sus   susa   'horse m./f.'

The grammatical gender of nouns is relevant for agreement purposes; adjectives agree in gender-number with their head nouns, and verbs with their subjects. The grammatical gender of animate nouns is always expressed by the gender-number suffixes, but that of inanimate nouns is not so straightforward. Most nouns ending in one of the feminine suffixes (including the abstract noun suffix _-ut_) are grammatically feminine. Inanimate nouns with no overt gender marker are grammatically either feminine or masculine, i.e., there is no correlation between form or meaning and gender. For instance, _kir_ 'wall m.' but _'ir_ 'city f.'; _degel_ 'flag m.' but _'even_ 'stone f.'; _rexov_ 'street m.' but _derex_ 'way f.'; _'even_ 'stone f.' but _sela_ 'rock m.' (underlyingly _sela'_). The

grammatical gender surfaces in the adjective which modifies the noun, e.g. _kir gadol_ 'big (m.) wall' but _'ir gdola_ 'big (f.) city', or when the noun is the subject of the verb, e.g. _a-sela ni8bar_ 'the rock was broken (m.)' but _a-'even ni8bera_ 'the stone was broken (f.)'.

Feminine suffixes may function as regular derivational suffixes, as can be seen from the examples below where the feminine suffixes are used for forming new words:

(12) -it: xa8mal 'electricity'   xa8malit 'trolley car'

          'e8kol 'cluster'   'e8kolit 'grapefruit'

          maxsan 'warehouse'   maxsanit 'magazine'

     -et: 8ayat 'sailor, rower'   8ayetet 'fleet'

          magav 'wiper'   magevet 'towel'

          8amen 'fat'   8amenet 'cream'

     -a : katav 'reporter'   katava 'article'

          se'ar 'hair (mass noun)' se'ara 'hair sg.'

          dag 'fish'   daga 'fish (mass noun)'

          8ir 'song'   8ira 'poetry'

          yam 'sea'   yama 'lake'

          'amud 'page, post'   'amuda 'column'

The forms in (12) above demonstrate the dual function of the feminine suffix; it not only adds the feature [+feminine] to masculine nouns, but also causes semantic idiosyncrasy. Thus the meaning of X+f. is not always the feminine of X, but may be Y, where Y is a feminine noun and X and Y are semantically related, yet they are not distinct in gender only.

Other occurrences of the feminine suffixes are in nouns which have no unsuffixed counterparts, as simla 'dress f.' (*siml), tavnit 'pattern' (*tavn), and maskoret 'wage' (*maskor). There are also related nouns each bearing different feminine suffixes. For example, mila 'word' – milit 'particle (linguistics)', mexona 'machine' – mexonit 'car', txuna 'property' – txunit 'feature (linguistics)', toxna 'program (computers)' – toxnit 'plan', and beica 'egg' – beicit 'ovum'. In most of these cases the feminine suffixes have been used for deriving new words.

As for the plural markers, their gender does not always agree with the grammatical gender of the noun, nor with the overt gender suffix, as exemplified in (13) below (recall that -im is m. pl. and -ot is f. pl.):

(13) sg. kir 'wall m.'   pl. kirot   *kirim
         'ir 'city f.'   'arim   *'arot
         'even 'stone f.'   'avanim   *'avanot
         sela' 'rock m.'   sla'im
         xalon 'window m.'   xalonot   *xalonim
         'iton 'newspaper m.'   'itonim
         šana 'year f.'   šanim   *šanot
         mana 'portion f.'   manot

Notice that the feminine plural suffix can be attached to a masculine noun as much as a masculine plural suffix can be attached to a feminine noun (also when the feminine noun has an overt feminine suffix, as in the last two forms in (13)). Thus it is not the case that one suffix is attached by a particular rule while the other is the elsewhere

case. It is possible, however, that plural forms, in which the gender of the plural marker does not agree with the grammatical gender of the noun, are formed at an early stage. Thus, when the regular plural marking rule applies, it is blocked in the forms already assigned [+plural], similar to what is suggested in Kiparsky (1982) for the irregular plurals in English.

It must be stressed that there are no cases similar to those in (12) above where the meaning of X+pl. is Y, where Y is plural and X and Y are related, but they are not distinct in number only. Plural suffixes do not have a dual function as do the feminine ones; unlike the feminine singular suffixes, they are never used for deriving new words.

Again, the grammatical gender of the noun surfaces in cases of agreement, without reference to the gender of the suffix, as illustrated by the examples below:

(14) 'even gdol-a   ——   'avan-im gdol-ot
     stone big   stone-s big

     xalon gadol   ——   xalon-ot gvoh-im
     window big   window-s big

The feminine suffix on the adjective of the singular form of 'even shows that 'even is grammatically feminine. Despite the masculine plural marker, the adjective of the plural form receives a feminine plural suffix to conform to the grammatical gender rather than to the overt gender. The same is true for xalon; despite its feminine plural marker on the noun, the adjective is marked with the masculine plural marker to conform to the grammatical gender.

The discrepancy between the grammatical gender of a noun and the gender of the plural suffix attached to it is an apparent counterexample to the claim made in Williams (1981), Lieber (1980), and Selkirk (1984) that the suffix is the head of the word. Contrary to Lieber's second percolation convention, which says that "all features of an affix morpheme, including category features, percolate to the first branching node dominating that morpheme" (Lieber 1980:85-6), the gender of the plural suffix in MH does not percolate to the first branching node. Thus, although the gender of the plural suffix -ot is feminine, the form kirot 'walls' (kir 'wall m. sg.') is masculine, as can be seen from the phrase kirot gdolim 'big (m.) walls' where the adjective agrees in gender and number with its head noun. There is no doubt that -im is associated with masculine and -ot with feminine, since the same suffixes are used, without exception, for adjectives and participles.

What I am concerned with here, for the purpose of the generalization to be made in section 2, is whether gender-number suffixes are inflectional or derivational. The feminine singular suffixes participate in forming new words, and thus must be derivational. However, it is also possible, as suggested in Newman (1979) for Hausa, that the same suffixes participate as derivational (forming new words) as well as inflectional (agreement) suffixes. As for the plural suffixes, it was mentioned above that they never participate in forming new words; thus they are not derivational. Still, the irregularity of the plural marking of nouns discussed above suggests that the plural marking of nouns is lexical, since it bears the property of irregularity which characterizes lexical processes. The proposal that

plural marking is lexical is supported by the following observation regarding the plural marking of nouns ending in -on.

The suffix -on appears on nouns related to other nouns as well as on nouns related to verbs, as exemplified in (15) below:

(15) a. N ——→ N+on

ša'a	'hour'	šaon	'watch'
še'ela	'question'	še'elon	'questionnaire'
'et	'time'	'iton	'newspaper'
šana	'year'	šnaton	'cohort'
mila	'word'	milon	'dictionary'
te	'tea'	tiyon	'tea bag'
mo'ed	'time'	mo'adon	'club'
pa'ot	'baby'	pe'oton	'kindergarten'

b. V ——— N+on

niceax	'to win'	nicaxon	'victory'
raca	'to wish'	racon	'will'
ra'a	'to see'	ra'ayon	'interview'
šataf	'to rinse'	šitafon	'flood'
pada	'to redeem'	pidyon	'redemption'
dama	'to resemble'	dimyon	'resemblance'
xaza	'to prophesy'	xazon	'prophecy'
xišev	'to calculate'	xešbon	'calculation'

All nouns ending in -on are grammatically masculine. Their plural suffix is -im in some forms and -ot in others. In these cases, however, the plural marking is predictable since it makes reference to the inner

structure of the word; if the _-on_ noun is related to a verb the plural marker is _-ot_, while if it is related to a noun the plural marker is _-im_. Thus, Snatonim and milonim, from Sana 'year' and milon 'dictionary', respectively, but pidyonot and reconot from pada 'to redeem' and raca 'to wish', respectively. Some exceptions can be explained by analogy. For example, bite'on 'organ (newspaper)' is derived form the verb bite 'to pronounce, to express', but the plural suffix of the noun is _-im_ rather than _-ot_. This is a case of analogy with the other terms for all sorts of newspapers, all derived from nouns: yerax 'month', yarxon 'monthly magazine', yarxonim; Savu'a 'week', Savu'on 'weekly magazine' Svu'onim; 'et 'time', 'iton 'newspaper', 'itonim; and 'ale 'leaf', 'alon 'bulletin', 'alonim. Forms ending in _-on_ which do not have an unsuffixed counterpart can be assigned either _-ot_ or _-im_ as in xilazon (*xilaz) - xelzonot 'snail(s)' but sabon (*sab) - sabonim 'soap(s)'.

If plural marking in MH is not a lexical process, but rather syntactic, one would have the undesirable situation of a syntactic process which has access to word internal structure, contrary to the Lexicalist Hypothesis. Assuming that Bracketing Erasure within the lexicon does not hold, the phenomenon discussed above is not so strange if plural marking is regarded as a lexical process. We may conclude then that feminine marking is derivational (when forming new words), but inflectional (in case of agreement). Plural marking is an inflectional process (since not used for deriving new words) which operates in the lexicon.

I have introduced in the above section some nominal affixes, including gender-number suffixes. The affixes are relevant for section 1.4.1. below, which demonstrate how the consonantal material of affixes may be subject to Extraction. The question of whether gender-number suffixes are inflectional or derivational is relevant to section 2, where a correlation is made between inflectional suffixes and suffixes ingnored by Extraction vs. the correlation between derivational suffixes and suffixes subject to Extraction.

1.4. Evidence for Extraction: This section provides morphological and phonological evidence for local derivation. In 1.4.1. I present the morphological evidence; it is shown that the consonantal material of affixes may participate in Extraction as if it is part of the root. In 1.4.2. I give the phonological evidence; it is shown that the output of a phonological rule shows up in the form derived by Extraction.

1.4.1. Morphological Evidence: Consider the morphological process illustrated below:

(16) a. Affixation: dugma 'example' + _-an_ —> dugman 'modeler'

    Input: CuCCaC
                   | | | |
                   d gm n

    Extraction: d-g-m-n

    Association: d-g-m-n + CiCCeC —> CiCCeC
                                  | | | |
                                d gm n digmen 'to model'

    b. Affixation: xiSev 'to calculate' + _-on_ —> xeSbon 'calculation'

Input: CeCCoC
              │ ││ │
              x ᵊb n

Extraction: x-ᵊ-b-n

Association: x-ᵊ-b-n + CiCCeC ──> CiCCeC
                                   │ ││ │
                                   x ᵊb n   xiᵊbben 'to caculate'

c. Affixation: 'ivri 'Hebrew m.sg' + -it ──> 'ivrit 'Hebrew f.sg.'
   Input: CiCCiC
                │ ││ │
                vr t

Extraction: '-v-r-t

Association: '-v-r-t + CiCCeC ──> CiCCeC
                                  │ ││ │
                                  vr t   'ivret 'to hibraize'

d. Affixation: tV- + kicer 'to shorten' ──> takcir 'summary'
   Input: CaCCiC
                │ ││ │
                t kc r

Extraction: t-k-c-r

Association: t-k-c-r + CiCCeC ──> CiCCeC
                                  │ ││ │
                                  t kc r   tikcer 'to summarize'

e. Affixation: ᵊV- + xum 'brown' ──> ᵊaxum 'brownish'
   Input: CaCuC
                │ │ │
                ᵊ x m

Extraction: ᵊ-x-m

Association: ᵊ-x-m + hiCCiC ──> hiCCiC
                                │ │ │
                                ᵊx m   hiᵊxim 'to become
                                                brownish'

f. Affixation: mV- + xaza 'to observe' ──> maxaze 'play'
   Input: CaCaCe
                 │ │ │
                 m x z

Extraction: m-x-z

Association: m-x-z + hiCCiC ──> hiCCiC
                                │ │ │
                                mx z   himxiz 'to dramatize'

The process demonstrated above provides direct evidence for local
derivation; forms are not derived from an abstract head root but
directly from another form. In (16d.) it is not clear whether the prefix
is attached to a noun from which a verb is derived (as described), or to
a verb from which a verbal noun is derived. In either case, the prefix
is extracted for the purpose of later derivation.

In some cases, as mentioned in Ornan (1975), it might be argued
that Extraction is only a by-product of historical reanalysis; that is,
the reinterpretation of originally polymorphemic forms as monomorphemic.
For instance, the noun xamcan 'oxygen' is historically related to xamuc
'sour'. The -an suffix in xamcan is not transparent since this suffix is
usually an agent suffix, while 'oxygen' is not an agent noun. In
addition, the semantic relation between 'sour' and 'oxygen' is rather
obscure. Therefore, it is possible that the creation of the new root
x-m-c-n, which appears in ximcen 'to oxidize' is more or less a
historical accident.

The same might be true for the verb mikem 'to place' which is
derived, via Extraction, from the noun makom 'place'. The initial /m/ in
makom is originally a prefix attached to the verb kam 'to stand'. mV- is
a noun prefix attached to place and instrumental nouns (cf. miᵊada

'restaurant' (_aa'ad_ 'to eat'), _aalon_ 'hotel' (_lan_ 'to sleep'), _maarek_ 'comb' (_sirek_ 'to comb'), and _macpen_ 'compass' (_cafon_ 'north')).

However, the status of /m/ in _makom_ 'place' as a prefix became opaque for two reasons. First, it occupies the same C-slot as the initial root consonant in _šalom_ (_š-l-m_) 'peace', _xalom_ (_x-l-m_) 'dream', and _yarok_ (_y-r-k_) 'green'. Second, the semantic relation between 'to stand' and 'place' is not readily apparent. Moreover, _mV-_ is not a very productive suffix in MH. Thus it is possible that in some forms the morpheme boundaries have been obscured. This explains why speakers may consider the prefix as part of the original root.

However, most cases of Extraction cannot be explained away in this fashion. In forms like _dugman_ 'modeler' (from _dugma_ 'example' + _-an_ agent suffix), _-an_ is a transparent agent suffix, therefore its /n/ is less likely to be misinterpreted as part of the root (although the semantic relation between 'example' and 'modeler' seems, to some speakers of English, obscure as well). Thus, it seems that Extraction is done deliberately for the purpose of new coining.

Since the number of possible verb structures is limited to five templates, addition of consonants to the root is another strategy for expanding the lexicon. The two sorts of WFRs, Affixation and Association, are used as productive rules for new coining. In many cases it is clear that Extraction is done deliberately by translators or scientists, who seek specific terms. In order to maintain the semantic relationship between the existing general term and the more specific one, the use of an affix as a root consonant is obviously preferred over inventing a completely unrelated root.

The translation of Chomsky's _Language and Mind_, for example, uses the verb _tivnet_ 'to structure'. This verb is derived by extracting the consonants _t-v-n-t_ from the noun _tavnit_ 'pattern' and associating them with the template CiC(C)eC. Notice that both the initial and the final /t/s are affixes. The initial /t/ is the noun prefix which appeared in the forms _takcir - tikcer_ in (16d.) above. The final /t/ is the feminine suffix introduced in section 1.3.2., and which also appeared in the forms _'ivrit - 'ivret_ in (16c.) above. The original root _b-n-y_ appears in the verb _bana_ 'to build' (which underwent Glide Deletion).

Exactly the same process yields the computer term _tixnet_ 'to program' from the noun _toxnit_ 'plan'. Here again the /t/s are affixes. The verb _tixnet_ is more specific than the verb _tixnen_ 'to plan'. The latter has been also invented by the process of Extraction (prior to the invention of the verb _tixnet_), in this case without the feminine suffix, but by reduplication of the final root consonant. The fact that the noun _toxnit_ 'plan' provides a base for two derived verbs, out of which only one uses the suffix, suggests that the inclusion of suffixes within the extracted material is done deliberately. The same phenomenon is demonstrated by the derivation of both _pizem_ (_p-z-m_) 'to hum a tune' and _pizmen_ (_p-z-m-n_) 'to write a tune' from the noun _pizmon_ 'tune', in which _-on_ is a suffix. The need to distinguish between the two verbs, yet to maintain their relationship, requires using the suffix in one case and ignoring it in the other.

Extraction of affixed material is also used as a device for avoiding homophones. Schachter-Hahem (1982) uses the verb _'ivrer_ instead of _'ivret_ for 'to hebraize'. This is a legitimate way of forming a new

word, as exemplified in the verb <u>tixnen</u> 'to plan' above (vs. <u>tixnet</u> 'to program'). However, since the form <u>'ivrer</u> appears (although with different spelling) in the meaning of 'to ventilate' (from <u>'avir</u> 'air', also by Extraction), the form <u>'ivret</u> has been preferred by most speakers.

1.4.2. **Phonological Evidence:** Additional evidence for the locality of morphological derivation is given by the example in (19) where Extraction follows a productive phonological rule, Metathesis. As illustrated in (17) below, the dental stop of the template hitCaC(C)eC metathesizes with the stem initial sibilant:

(17) Association: s-k-m + hitCaC(C)eC —> hitCaCeC
$$\begin{array}{c}\text{hitCaCeC}\\ |\ |\ |\\ \text{s k m}\end{array}\quad\text{/hit-sakem/}$$

Metathesis: /hit-sakem/ —> <u>histakem</u> 'to be summed up'

Metathesis in Hebrew is morphologically conditioned; monomorphemic sequences of a dental stop and a sibilant do not metathesize, as can be seen from <u>tsisa</u> 'fermentology' and <u>hitsis</u> 'to ferment' (<u>t-s</u> + hiCCiC and Reduplication).

It is important to note that Metathesis is fully productive. New words (or made-up words) with a root initial sibilant always undergo Metathesis when associated with hitCaC(C)eC. For example, the noun <u>zanav</u> 'tail' has been verbalized, yielding <u>hizdanev</u> 'to plod along' by the following process:

(18) Input:
$$\begin{array}{c}\text{CaCaC}\\ |\ |\ |\\ \text{z n v}\end{array}\quad\text{<u>zanav</u> 'tail'}$$

Extraction: z-n-v

Association: z-n-v + hitCaC(C)eC —>
$$\begin{array}{c}\text{hitCaCeC}\\ |\ |\ |\\ \text{z n v}\end{array}\quad\text{/hit-zanev/}$$

Voicing Assimilation: /hit-zanev/ —> /hid-zanev/

Metathesis: /hid-zanev/ —> <u>hizdanev</u> 'to plod along'

Regressive voicing assimilation of obstruents is a productive rule in MH phonology, as can be seen from the forms /tavšil/ —> [tafšil] 'dish' and /dikduk/ —> [digduk] 'grammar'. But while the one responsible for the assimilation in <u>hizdanev</u> is lexical, since it precedes Metathesis, the assimilation in the words above is post-lexical, since it operates also accross word boundaries.

Let us now observe what happens when Extraction operates on a form which has undergone Metathesis. The root <u>s-k-l</u> associates with hitCaCeC, yielding the verb <u>histakel</u> 'to observe' as illustrated in (19a.) below:

(19) a. Association: s-k-l + hitCaC(C)eC —>
$$\begin{array}{c}\text{hitCaCeC}\\ |\ |\ |\\ \text{s k l}\end{array}\quad\text{/hit-sakel/}$$

Metathesis: /hit-sakel/ —> <u>histakel</u> 'to observe'

From <u>histakel</u>, an agent noun is derived by extracting the consonants from the verb and then associating them with the agent noun template (C)aCCan, as demonstrated in (19b.) below. Notice that the /h/ is not extracted; this fact will be discussed in section 2:

b. Input:
$$\begin{array}{c}\text{CiCCaCeC}\\ |\ |\ |\ |\\ \text{h st k l}\end{array}\quad\text{<u>histakel</u> 'to observe'}$$

Extraction: (h-)s-t-k-l

Association: s-t-k-l + CCaCCan --> CCaCCan

st kl   staklan 'observer'

Notice that it is not the root s-k-l which has been associated with the agent noun template, since that would result in *saklan. Nor it is the case that Metathesis does not feed Extraction, since in the absence of the particular template prefix hit- the environment of Metathesis is not met. Therefore, it must be the case that staklan is derived directly from histakel.

Forms which do not undergo metathesis cannot provide evidence for the extraction of the /t/ of hitCaC(C)eC. For example, the noun taxposet 'costume' is directly related to the verb hitxapes 'to put on a costume'. It is clear from the semantic relation that it is not related to xipes 'to look for' which has the same root, x-p-s, but lacks a verb prefix. It seems that the initial /t/ in taxposet is not the one extracted from hitxapes, but from the noun prefix tV-, which appears also in taxboset 'bandage' (*hitxabeš). Forms with a root initial sibilant, like ticroxet (c-r-x) 'consumption', do not provide counterevidence since in addition to the verb hictarex 'to be in need of' there is an unprefixed verb carex 'to consume' which may provide the input for ticroxet.

Another example of a phonological output which surfaces in a form derived by Extraction is exhibited by the form in (7a.), in which the root k-x-v has been extracted from koxav 'star' for the purpose of deriving kixev 'to star'. The input noun koxav has been originally formed from the root k-b via Reduplication and Spirantization, as illustrated in (20):

(20) Association: k-b + CoCaC --> CoCaC

k b

Reduplication: Copying: CoCaC   Association: CoCaC

kb k b   kb k b /kokab/

Spirantization: /kokab/ --> koxav 'star'

For a comprehensive discussion of Reduplication in MH, see Bat-El (1984). As for Spirantization, its environment is not straightforward in MH. In BH Spirantization is applied to postvocalic unemphatic stops (see Prince 1975), as in /makar/ --> maxar 'to sell' (vowel length is ignored). Geminates did not undergo Spirantization, cf. /šibber/ --> šibber 'to break into pieces'. In MH geminates have been simplified, resulting in numerous exceptions to Spirantization; for example /šiber/ does not become *šiver. Doron (1981) suggests that in MH Spirantization is morphologically governed. Templates are associated with a continuant tier, which affects only the archiphoneme /P,B,K/, as illustrated below:

(21) continuant tier: - + +   - - +

CaCaC   CiCeC

š B r --> šavar   š B r --> šiber

With this background, we can turn to the interaction of Spirantization and Extraction. If the verb 'to star' was derived directly from the root K-B we would get *kikev since the first two C-slots in the template CiCeC are associated with [-continuant]. The fact that the actual form is kixev supports my argument for local derivation: kixev is derived directly from koxav, which has already undergone Spirantization. Since /x/ is not an archiphoneme, the continuant tier

does not affect it. The same is true for <u>hitxaver</u> 'to become friends' which is derived, via Extraction, from <u>xaver</u> 'friend'. Notice that the root of <u>xaver</u> 'friend' is <u>x-B-r</u>. This root shows up in <u>hitxaber</u> 'to be joined with', which has the same template, hitCaC(C)eC, as <u>hitxaver</u>. But, while <u>hitxaber</u> is derived by association of the original root <u>x-B-r</u> with this template, and thus conforms to the [-continuant] feature associated with the second C-slot, <u>hitxaver</u> is derived by extracting the consonants from the noun <u>xaver</u> in which the second root consonant, /b/, has already undergone Spirantization.

There are, however, forms which exhibit a global derivation such as those in (22). In these forms, the root medial glide is deleted in the formation of the noun but shows up again in the derived verb:

(22) kis 'pocket'   kiyes 'to pickpocket'

     sid 'plaster'   siyed 'to plaster'

     'ir 'city'   'iyer 'to urbanize'

     šuk 'market'   šivek 'to market'

     zug 'pair, mate'   ziveg 'to mate'

Glide Deletion is a phonological process of BH. Roughly speaking, root glide is deleted when it is neither   initial nor geminated. In certain cases, deletion of the glide is accompanied by changes in the vocalic pattern. In the verb templates CiCCeC and hitCaCCeC, which are the geminated templates in BH, the medial glides are maintained. Since there are no monomorphemic geminates in MH one should not expect any medial glides. There are, however, many lexical items in MH which were carried over from BH, in which the medial glide in the geminated

templates is kept. The forms in (22) above, which are new coinings in MH, are derived in analogy with those form preserved from BH. They are not derived by Extraction, otherwise we would get *<u>kises</u> from <u>kis</u>, *<u>sided</u> from <u>sid</u>, etc., as it is the case in the verb <u>kided</u> 'to codify' from the noun <u>kod</u> 'code'. They are rather derived by abstracting the head roots <u>k-y-s</u>, <u>s-y-d</u>, etc. and associating them with the template CiC(C)eC. Following the morphological system of BH, the glide is kept in the originally geminated templates.

This suggests that the global kind of derivation attested in BH is sometimes used for deriving new words in MH. However, I believe that such derivations are due primarily to the prescriptive influence of the Hebrew Language Academy which, as phrased by William Chomsky, "is vigilantly on guard against the intrusion of any solecisms or barbarisms that might impair the purity of the language" (Chomsky, W. (1957:1)). And even if such forms are introduced by naive speakers, it is not surprising since a large portion of the BH lexicon is maintained in MH, and since BH lexical items are derived by global derivation, this process has some degree of reality for native speakers.

Notice also that the noun <u>duax</u> 'report', which is an acronym of <u>din ve-xešbon</u> 'law and calculation', has provided a base for Extraction. This results in <u>diveax</u> 'to report' where the original /v/ (of the conjunction prefix <u>ve-</u>) resurfaces in the verb. This is a peculiar case of Extraction combined with global derivation. The alternation of a round vowel and /v/ as in the examples in (22) above allows the abstraction of the extracted consonants of the acronym to the root <u>d-w-x</u>. In this way the alternation between <u>duax</u> and <u>diveax</u> has been

33

34

regularized to match that between zug and ziveg.

In sum, Extraction provides evidence for local derivation. It is used, deliberately or not, for expanding the lexicon, since it provides new roots when operating after morphological and phonological processes. I have also shown that affixes may also be subject to Extraction, but this is not the case for all affixes, as we have seen in (19) where the /h/ of histakel has not been extracted.

2. Restrictions on Extraction

The inclusion of affixes within the extracted material is not obligatory. While in the derivation of the verb 'ivret 'to hibraize' from 'ivrit ('-v-r) 'Hebrew f.sg.' the feminine suffix (the final /t/) of the latter has been extracted, in the derivation of the verb misger 'to frame' from the noun misgeret (s-g-r) 'frame' the prefixed /m/ is extracted, but not the feminine /t/. Moreover, there are cases in which two verbs are derived from the same base noun, but only one of them includes the affix. For example, the noun pizmon 'tune' is the base of two verbs derived by Extraction, pizem (p-z-m) 'to hum a tune' where the /n/ of the suffix -on is not included, and pizmen (p-z-m-n) 'to write a tune' where /n/ has been extracted. The same is true for the derivation of tixnen (t-x-n) 'to plan' and tixnet (t-x-n-t) 'to program' from the noun toxnit 'plan'.

It is interesting to observe that while Extraction is optional for certain affixes, it is obligatorily blocked for others. For instance, the /h/ in example (19) (histakel – staklan) failed to be extracted along with the root and affixed consonants. In order to account for this phenomenon I will first distinguish, (in section 2.1.) between tense verb affixes and what I will call template verb affixes. Later, in section 2.2., I will draw a more general distinction between affixes which may optionally be extracted and those which can never be extracted.

2.1. Tense vs. Template Affixes: Consider the inflectional paradigm in (23). Verbs are inflected for person, gender, number and tense (for

(23)

		Past	Present	Future
CaCaC: 'to finish'	2nd m. sg.	gamar-ta	gomer	ti-gmor
	3rd m. sg.	gamar		yi-gmor
	1st pl.	gamar-nu	gomr-im	ni-gmor
CiC(C)eC: 'to raise'	2nd m. sg.	gidal-ta	me-gadel	te-gadel
	3rd m. sg.	gidel		ye-gadel
	1st pl.	gidal-nu	me-gadl-im	ne-gadel
niCCaC: 'to be finished'	2nd m. sg.	ni-gmar-ta	ni-gmar	ti-gamer
	3rd m. sg.	ni-gmar		yi-gamer
	1st pl.	ni-gmar-nu	ni-gmar-im	ni-gamer
hiCCiC: 'to enlarge'	2nd m. sg.	hi-gdal-ta	ma-gdil	ta-gdil
	3rd m. sg.	hi-gdil		ye-gdil
	1st pl.	hi-gdal-nu	ma-gdil-im	na-gdil
hitCaC(C)eC: 'to volunteer'	2nd m. sg.	hit-nadav-ta	mit-nadev	tit-nadev
	3rd m. sg.	hit-nadev		yit-nadev
	1st pl.	hit-nadav-nu	mit-nadv-im	nit-nadev

The future forms are inflected for person, gender, and number; the same prefixes appear in all templates. The present tense is inflected only for gender and number; its prefix mV- appears only in CiC(C)eC, hiCCiC, and hitCaC(C)eC. The plural suffix -im (and -ot for feminine) is the familiar one from the noun class. The past tense prefixes are the following: ni- in niCCaC, hi- in hiCCiC, and hit- in hitCaCaC. Notice, however, which one of the past tense prefixes (or which part of the prefix) is maintained across the paradigm. hi- is substituted by the

appropriate tense prefixes in the present and future. ni- shows up in the present tense; in the future tense the /n/ is assimilated with the following consonant, thus /yi+ngamer/ ——> /yiggamer/. Since there are no long consonants in MH /gg/ ——> [g], thus the result is yigamer (BH yiggamer). /n/ assimilation is not peculiar to the prefix ni-. Root initial /n/ is also assimilated with the following consonant in some forms, as in nafal (n-p-l) 'fell' - yipol 'will fall' (<—— /yippol/ <—— /yinpol/). This rule, as a residue of BH phonology, does not apply to new words, such as navax (n-b-x) 'to bark' - yinbax 'will bark', where the /n/ surfaces in the future form. As for the prefix hit-, one part of it, hi-, is replaced by the appropriate tense prefixes, while the other part, -t-, is retained throughout the paradigm.

On the basis of the above distribution of affixes I distinguish between template affixes, which occur across the paradigm, and tense affixes, which show up only in the appropriate tense. ni- is a template prefix, while hi- and the future and present prefixes are tense prefixes. hit- is a mixed prefix: hi- is a tense prefix, since it is replaced by other tense prefixes, while -t- is a template affix, since it is kept in all tenses. The following are the verb class affixes:

(24) a. Tense prefixes

	Past	Present	Future
CaCaC:	—	—	yV- (agreement)
niCCaC:	—	—	"
CiC(C)eC:	—	mV-	"
hiCCiC:	hi-	"	"
hitCaC(C)eC:	"	"	"

b. Template affixes:

ni- in niCCaC and -t- in hitCaC(C)eC

In addition there are person-gender-number suffixes like -ta in gamarta 'you (2nd m.sg.) finished' and higdal-ta 'you (2nd m.sg.) enlarged'.

What is crucial for my purpose is that Extraction is sensitive to the distinction drawn above. While template affixes can be subject to Extraction, tense prefixes and person-gender-number affixes are always ignored by this process.

Returning to the problem addressed at the top of this section, with respect to the form in (19), the answer is now straightforward. The /t/, but not the /h/, was extracted in histakel - staklan because /h/ is the consonant of the tense prefix while /t/ is that of the template prefix.

This predicts that ni-, the other template prefix, should be also subject to Extraction; this is verified in (25) below:

(25) Association: y-c-v + niCCaC —> niCCaC
                                          | | |
                                         yc v   /ni-ycav/

Glide Deletion: /ni-ycav/ —> nicav 'to be standing'

Extraction: n-c-v

Association: n-c-v + CeCiC —> CeCiC
                                   | | |
                                  n c v neciv 'commissioner'

From (25) we see that, like the /t/ of hitCaCeC, the /n/ of niCCaC can be subject to extraction, since both are template prefixes.

While forms with extracted template affixes can be found, there is no evidence for extracted tense prefixes; that is, the following

process cannot be identified by any existing form:

(26) a. Input: CeCiC herim 'raised (3rd m.sg.)' (hi-)
                    | | |
                    h r m

Extraction: h-r-m

Association: h-r-m + CaCCan —> CaCCan
                                | | |
                               h r m   *harman

b. Input: CaCiC merim 'raises (3rd m.sg.)' (mV-)
               | | |
               m r m

Extraction: m-r-m

Association: m-r-m + CaCCan —> CaCCan
                                | | |
                               m rm   *marman

A number of apparent counterexamples disappear if properly analyzed. In particular, consider forms like mitvakxan 'one who tends to argue' (from mitvakeax 'argues') and mistaklan 'observer' (from mistakel 'observes') in which the present tense prefix mV- occurs in the agent nouns. These nouns (usually identified with children's language) are not formed by extracting the consonants and then associating them with the agent noun template, but by a regular affixation of -an to the present tense form (as will be discussed in 2.1.1. below, the present tense forms can also function as nouns and adjectives). As noted in Clark and Berman (1984), -an appears as part of the agent noun template, but also as a regular agent suffix attached to a noun, as in dugman 'modeler' (from dugma 'example') and 'ekdoxan 'pistoleer' (from 'exdax 'pistol'). Therefore mitvakxan and mistaklan, which are formed by Affixation and not by Extraction, do not provide a case of extracted tense prefix.

My argument that tense prefixes are ignored by Extraction is mainly supported by the absence of data which would verify the contrary. However, there is one peculiar form that provides positive evidence for my proposal. That is, there is one form derived by Extraction in which the present tense prefix m- could in principle have been extracted, but was not. The compound macav ruax 'mood' (lit. 'situation of the spirit') appears as the adjective mecuvrax 'to be in a bad mood'. This adjective has the present passive template of CiC(C)eC, i.e. meCuC(C)aC (cf. meturgam 'translated' – tirgem 'to translate'). The form mecuvrax has been derived from macav ruax by the following process:

(27) Input: CaCaCCuaC macav ruax 'mood'
                | | || |
                m c vr x

Extraction: m-c-v-r-x

Association: m-c-v-r-x + meCuC(C)aC ─→ meCuCCaC
                                        | | | |
                            (m) c vr x mecuvrax 'to be in
                                            a bad mood'

One would expect to find two /m/s in the output, the prefix /m/ and the extracted /m/, but there is only one /m/. It might be the case that the root initial /m/ has not been associated due to the lack of sufficient C-slots. It is the /m/ that fails to be associated rather than any other consonant, since it is identical to the prefix. This happens also in blendings where the final consonant of the first word is identical to the initial one in the second word, as in maxazemer 'musical show' from maxaze 'play' + zemer 'song', and kaduregel 'football' from kadur 'ball' + regel 'foot'. It is also possible that the root initial /m/ has been realized as the present tense prefix and

the original tense prefix has been ignored. At any rate, what is crucial for my argument is that in the derivation of the verb hictavreax 'to get into a bad mood', from the adjective mecuvrax, the (realized) present tense prefix m- does not surface, as can be seen from (28) below:

(28) Input: CeCuCCaC mecuvrax 'to be in a bad mood'
                   | |·|| |
                   m c vr x

Extraction: (m)c-v-r-x

Association: c-v-r-x + hitCaC(C)eC ─→ hitCaCCeC
                                        | | | |
                                        c vr x /hit-cavrex/

Metathesis: /hit-cavrex/ ─→ /hictavrex/

/a/ Insertion: /hictavrex/ ─→ hictavreax 'to get into a bad mood'

Notice that the /m/ of the participle prefix has not been extracted, otherwise we would have derived *hitmacvreax. One cannot argue that /m/ is extracted and then deleted due to a constraint of an impermissible consonant cluster, since there are forms (derived from loan words) like hit'anglez 'to become English' and tilgref 'to telegraph' which show that a sequence of three consonants is permissible in MH.

It should be noted that this is another case of violation of the Bracketing Erasure convention; the internal structure of derived forms is transparent to Extraction, in that the prefix m- can be identified and subsequently ignored.

Following the discussion above, it seems that the distinction between tense and template affixes, which has been drawn from the inflectional paradigm, is relevant for Extraction. Tense affixes are

never subject to Extraction while template affixes may be extracted.

2.1.1. The Participle: The participle forms (active and passive) may function as verbs in the present tense as well as nouns and adjectives. Some examples are given in (29) below:

(29) a.

	Verb (Present Active)	Noun
none	'to count (m.sg. of CaCaC)'	'meter m.'
boleŝet	'to detect (f.sg. of CaCaC)'	'secret police f.'
colelet	'to dive (f.sg. of CaCaC)'	'submarine f.'
mexaŝev	'to calculate (m.sg. of CiC(C)eC)'	'calculator m.'
me'areax	'to host (m.sg. of CiC(C)eC)'	'host m.'
mazkir	'to remind (m.sg. of hiCCiC)'	'secretary m.'
manhig	'to lead (m.sg. of hiCCiC)'	'leader m.'

b.

	Verb (Present Passive)	Adj / Noun
nagua	'to be touched (m.sg. of CaCaC)'	'infected'
mucav	'to be placed (m.sg. of hiCCiC)'	'palisade'
mucag	'to be exhibited (m.sg. of hiCCiC)'	'exhibited object'
musaf	'to be added (m.sg. of hiCCiC)'	'supplement'
mecupe	'to be covered (m. sg. of CiC(C)eC)'	'type of chocolate-covered candy bar'

In the forms above it seems that the participle form is first derived by a regular process of verb inflection and then gets its idiosyncratic meaning as an adjective or a noun (not all participles have a nominal counterpart). But there are also forms, as in (30) below, where adjectives and nouns bearing a participle template do not have a participle verb counterpart. These forms are derived by extracting the consonants out of nouns and associating them with the participle template:

(30)

Base Noun		Adj / Noun		Verb	
melax	'salt'	memulax	'witty'	himliax	'to salt'
'emca	'middle'	memuca	'average'	---	
'anan	'cloud'	me'unan	'cloudy'	---	
cela	'side'	mecula	'polygon'	---	
caleket	'scare'	meculak	'scared'	---	
'aniva	'tie'	me'unav	'wearing a tie'	'anav	'to put on a tie'

The adjectives and nouns above are formed independently of any existing verbs. They are all formed on the present passive template of CiC(C)eC, i.e. meCuC(C)aC, but they do not have corresponding verbs in that template. Some of the forms above have related verbs, but not in the template CiC(C)eC, as we can see in the rightmost column.

The fact that the participle template may function as a noun template (where noun affixes may be subject to Extraction) does not obscure the status of the prefix mV- as a tense prefix; this /m/ is never subject to Extraction, nor is it when it appears on a noun with no related verb.

Additional support to the argument that the participle prefix is a tense prefix can be drawn from language acquisition. As has been observed by Berman (1983), children adopt the mV- prefix as a unique marker of the present tense and attach it also to templates which do not have this prefix in the present tense (e.g. niCCaC). Also the /h/ of the tense prefix of the template hiCCiC appears on the verbal noun of this

template, haCCaCa, (e.g. higdil 'to enlarge' - hagdala 'enlargement').
Here again, the /h/ is not extracted although it appears on nouns.

Thus, we may conclude that although morphologically and, in certain
cases syntactically, participles behave like nouns or adjectives, for
the purpose of Extraction their structure is that of verbs and their
prefix is considered a tense prefix, and therefore cannot be extracted.

2.2. Some Generalizations: Given that the distinction between tense
affixes and template affixes is crucial in explaining their different
behavior under Extraction, it becomes important to provide independent
support for the distinction between the two. I present this in section
2.2.1. Section 2.2.2. discusses specific analyses.

2.2.1. Inflection vs. Derivation: The present section attempts to
draw a generalization on the basis of the observations made so far. I am
looking for common properties shared by affixes subject to Extraction,
and other properties shared by affixes which are ignored by Extraction.
So let us first list the two sorts of affixes under discussion:

(34) a. Affixes subject to extraction

-on:	ra'ayon	'interview'	ri'ayen	'to interview'
-an:	dugman	'modeler'	digmen	'to model'
-it:	'ivrit	'Hebrew f.'	'ivret	'to Hebraize'
-ut:	tarbut	'culture'	tirbet	'to cultivate'
mV-:	maxaze	'play'	himxiz	'to dramatize'
tV-:	takcir	'summary'	tikcer	'to summarize'
šV-:	šixzur	'reconstruction'	šixzer	'to reconstruct'

ni-: nicav 'to stand' neciv 'commissioner'

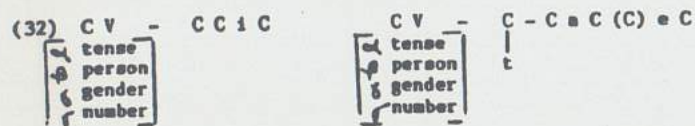-t-: histakel 'to observe' staklan 'observer'

b. Affixes ignored by Extraction

-im: m. pl. marker

-ot: f. pl. marker

hi-: 3rd pr. m.sg. past tense prefix of hiCCiC and hitCaC(C)eC

mV-: present tense prefix of CiC(C)eC, hiCCiC, and hitCaC(C)eC

'V-: 1st pr. sg. future tense prefix

nV-: 1st pr. pl. future tense prefix

tV-: 2nd pr. m. and 3rd pr. f. sg. future tense prefix

yV-: 3rd pr. m. sg. and pl. future tense prefix

all person-gender-number affixes

All of the affixes in (31a.) participate in deriving new lexical
items which often bear idiosyncratic meaning with respect to their
source. This is also true for the template affixes ni- and -t- due to
the relaxation of the grammatical function of the templates. Thus, the
meaning of hitgareš 'to get divorced' cannot be directly derived from
the meaning of gireš 'to expel' plus the reflexive meaning of
hitCaC(C)eC. The same is true for nixnas 'to enter' - kines 'to gather'.

In (31b.) none of the affixes is used for deriving new words. All
of these affixes are fully productive in the sense that the forms are
always compositional. One may argue that the tense prefix hi- in (31a.)
functions in deriving new words as much as the template affixes do, but
this is found to be wrong due to the interchangability of hi- with the
other tense prefixes. I thus suggest that the representation of
templates includes feature specification for the tense affixes, as

illustrated below for the templates hiCCiC and hitCaC(C)eC:

$$(32) \quad \begin{matrix} C & V & - & C & C & i & C \\ \end{matrix}$$

$$\begin{bmatrix} \alpha & \text{tense} \\ \beta & \text{person} \\ \delta & \text{gender} \\ \gamma & \text{number} \end{bmatrix}$$

$$\begin{matrix} C & V & - & C & - & C & a & C & (C) & e & C \\ & & & & & & & & & & | \\ & & & & & & & & & & t \end{matrix}$$

$$\begin{bmatrix} \alpha & \text{tense} \\ \beta & \text{person} \\ \delta & \text{gender} \\ \gamma & \text{number} \end{bmatrix}$$

The features are spelled out by postlexical rules on the basis of the syntactic environment. Tense gets its feature specification from INFL node, while person, gender, and number get their feature value from the subject. The unmarked features are past tense 3rd pr. m. sg.

The distinction between the two sorts of affixes drawn above is roughly what appears in the literature as the distinction between inflection and derivation. Since none of the accounts for the distinction between inflection and derivation is flawless, it is difficult to find a clear cut set of properties which distinguish the two sorts of affixes.

Anderson (1982) claims that inflection is what is relevant to or produced by the syntax. Indeed, all affixes which are ignored by Extraction are relevant to (plural), or produced by (tense affixes), the syntax. However, the feminine suffixes, which are not ignored by Extraction, are as relevant for the syntax as the plural suffixes are. We cannot say that the feminine suffixes are inflectional since they are widely used for deriving new words. However, as suggested above, these suffixes are both inflectional (output of agreement) and derivational (used for deriving words), and only the derivational ones are subject to Extraction. The fact that the feminine suffix is extracted from 'vrit 'Hebrew f.sg.' (which is originally an adjective, thus the suffix is

inflectional) can be explained by the common use of this adjective as a noun. It seems that suffixes may bear gender features in addition to their derivational function. Recall that in the discussion of -on, which is a pure derivational suffix, it was mentioned that all nouns ending in this suffix are grammatically masculine, even if they are derived from feminine nouns (cf. šana 'year' - šnaton 'cohort' where the feminine suffix even surfaces in the derived form). Also -ut, the abstract noun suffix, bears a feminine feature. I thus conclude that all affixes ignored by Extraction are inflectional, as under Anderson's claim.

Borer (1985) suggested that inflectional processes are those which obey the Projection Principle. The notion of the Projection Principle is still rather vague; in general, it includes the preservation of subcategorization and semantic features of the forms and of their subcategorized elements. All tense prefixes obey the Projection Principle. As for the plural markers, one may argue quite convincingly that the addition of plurality to a noun causes a change in meaning. Therefore it is not clear if the plural markers fall within the inflectional affixes group under Borer's criterion. What is clear, however, is that all the affixes which are subject to Extraction violate the Projection Principle.

Matthews (1974) proposed productivity as the criterion for the distinction between inflection and derivation. Ignoring the complex notion of productivity, and the inaccuracy of this criterion in the presence of derivational suffixes like the English -able and -ness (see Anderson 1982 for arguments against this criterion), all affixes ignored by Extraction are fully productive in that the output of their

attachment is compositional.

Following the discussion above we may conclude that Extraction is sensitive to some sort of distinction between inflection and derivation; while derivational affixes are subject to Extraction, inflectional affixes are always ignored by this process. This observation is contrary to the view held by various morphologists (cf. Lieber 1980) that there is no formal distinction between inflection and derivation. At this stage of research, however, it is not clear which sort of formal apparatus would enable Extraction to refer to this distinction. The following section argues that a level ordering account would not provide the solution, and suggests another possibility.

2.3. An Analysis: In this section I will consider a formal account for the sensitivity of Extraction in regard to the distinction between inflectional and derivational affixes. In section 2.3.1. I will show that the Lexical Phonology framework cannot handle this matter, and in section 2.3.2. I will provide a possible account.

2.3.1. The Failure of a Level Ordering Account: Within the framework of Lexical Phonology (Kiparsky 1982, Mohanan 1982, and others), the most plausible account of the facts presented here would posit that Extraction operates in a level which follows all levels of derivational processes, and precedes those of inflectional processes.

The most straightforward way to account for this would be level ordering. All tense prefixes would be attached at the last level of the morphology, while the derivational affixes would be attached at an

earlier level. If we place Extraction at the level of derivational processes, tense affixes would not be subject to Extraction, since they would not be available at the stage at which Extraction operates. This proposal can be summarized as follows:

(33)   Level n: -on -an, mV-, -t-, etc., Extraction
         Level n+m: Tense prefixes

One should consider the level ordering above as a relative ordering suggested only for the purpose of my argument. The fact that Extraction applies to level n affixes optionally suggests that they are placed at the same level as Extraction, but this is not that relevant here.

A major problem with this analysis arises with respect to the participles. Participles, as shown in (34) below, are also subject to an and -ut affixation:

(34) colel 'to dive'   colelan 'diver'
     macxik 'to cause to laugh, funny'   macxikan 'funny person'
     manhig 'to lead, leader'   manhigut 'leadership'
     mexuyav 'to be obliged'   mexuyavut 'obligation'

In order for participles to undergo -an and -ut affixation they must be available at level n. But the output of level n is subject to Extraction; thus we would expect that the participle prefix mV- could be extracted. But this is not the case.

2.3.2. A Possible Analysis: I would like to suggest a possible account for the fact that derivational affixes are optionally extracted, while inflectional affixes are obligatorily not extracted. This account

is based on the interaction of Tier Conflation and features specification.

Tier Conflation, the process of bracket erasure in nonconcatenative structures, folds all segmental tiers into one linear structure such that any information about the internal structure of the form, i.e., the various morphemes it consists of, is erased (see detailed discussion in McCarthy forthcoming). It was proposed in McCarthy (1981) that before the application of Tier Conflation, all morphemes are represented on separate tiers. Assuming that tiers are conflated at the end of the lexicon, Extraction, which is a lexical process, precedes Tier Conflation. Thus, at the stage where Extraction takes place the information about the distinct morphemes within a form is still available. Indeed, Extraction distinguishes between the vocalic tier and the consonantal tier, operating only on the latter. This explains why derivational affixes are optionally extracted; the transparent boundaries allow Extraction to either ignore or include the affixed material. But the problem of the distinction between inflectional and derivational affixes still remains, since one would not like to assume that affixes are specified with an ad hoc diacritic like [+inflectional].

Two basic assumptions are required to solve this problem: (a) only fully specified consonants are subject to Extraction; (b) inflectional affixes, as suggested in 2.2.1. above, are bundles of features which are spelled out by postlexical phonological rules (similar to what has been suggested in Anderson 1982). Assuming the above, it is now clear why inflectional affixes are not extracted. At the stage in which Extraction

applies, inflectional affixes are not fully specified segments thus not subject to Extraction.

In order to account for the fact that the participle /m/ and the past tense /h/ are not subject to Extraction even when they appear in nouns, I must assume that in these cases as well, the inflectional affixes are not yet specified at the stage where Extraction takes place. Since there is no syntactic environment to provide their features values (i.e., nouns are not followed by INFL node) inflectional affixes which appear in nouns get their feature specification by default. If there are unspecified morphemes after the spell out rules, they should be either m- or h-. The way to distinguish between the two would be on the basis of phonological information.

3. Summary

To conclude, I will repeat the main arguments of this thesis. I have proposed that a process of Extraction is a word formation device of MH. Extraction is used for lexical expansion, since it can provide new roots by extracting the consonants out of a fully specified base form. The existence of Extraction supports the Word-based view of word formation processes. The morphological representation of the base form consists of a vocalic tier and a consonantal tier, both associated with a CV-skeleton. This multileveled representation allows Extraction to peel off the consonantal tier from the CV-skeleton. This process is the opposite of Association, the common word formation device of nonconcatenative languages, which combines the consonantal tier with the CV-skeleton.

Extraction has been supported by phonological and morphological arguments. It has been shown that the output of a phonological rule, operating on the consonants of the base form, is maintained in the form derived by Extraction, and that the consonantal material of affixes attached to the base form can be extracted so that it appears as part of the root in the form derived by Extraction.

The latter argument has been of major interest for the issue of the distinction between inflection and derivation. The crucial fact is that while some affixes may be optionally extracted, others are obligatorily ignored by Extraction. I argued that there is a correlation between affixes subject to Extraction and derivational properties, and between affixes ignored by Extraction and inflectional properties. This is counterevidence to the claim that there is no formal distinction between inflection and derivation.

According to the tentative proposal made here, what enables Extraction to distinguish between inflectional and derivational affixes is that inflectional affixes are not actual segments, but only bundles of features which are spelled out by postlexical rules. Assuming that only fully specified segments can be extracted, and that Extraction precedes the spell out rules, there is no way inflectional affixes can be extracted. My analysis implies that the inflectional suffixes which appear in nouns are also spelled out by default rules. The fact that derivational affixes are optionally extracted has been accounted for by the application of Extraction before Tier Conflation. Extraction can identify the affixes, and thus may optionally include them within the extracted root.

REFERENCE

Anderson, Stephen R. (1982) "Where's Morphology", Linguistic Inquiry 13:4.

Aronoff, Mark (1976) Word Formation in Generative Grammar, The MIT Press, Cambridge.

Bat-El, Outi (1984) "Reduplication in Modern Hebrew", a paper presented at LSA Annual Meeting, Baltimore.

---- (1985) "Locality in Morphological Derivation", a paper presented at WCCFL, Los Angeles.

Berman, Ruth A. (1978) Modern Hebrew Structure, University Publishing Projects, Tel-Aviv.

---- (1980) "Verb-pattern Alternation: The Interface of Morphology, Syntax, and Semantics in Hebrew Child Language", Journal of Child Language 9:1.

---- (1983) "Establishing a Schema: Children's Construal of Verb-tense Marking", Language Sciences 4:3.

Bolozky, Shmuel (1978) "Word Formation Strategies in Hebrew Verb System: Denominative Verbs", Afroasiatic Linguistics 5:3.

Borer, Hagit (1985) "The Projection Principle and Rules of Morphology", ms., UC Irvine.

Broselow, Ellen (1985) "Amharic, Automatic spreading, and the Obligatory Contour Principle", ms., SUNY Stony Brook.

Chomsky, Noam and Morris Halle (1968) The Sound Pattern of English. Harper & Row, Publishers, New York.

Chomsky, William (1957) Hebrew the Eternal Language, The Jewish Publication Society of America, Philadelphia.

Clark, Eve V. and Ruth A. Berman (1984) "Structure and Use in the Acquisition of Word Formation", Language 60:3.

Doron, Edit (1981) "Spirantization Melodies in Hebrew," ms., The University of Texas, Austin.

Goldsmith, John (1976) Autosegmental Phonology, Indiana University Linguistics Club, Bloomington.

Horvath, Julia (1981) "On the Status of Vowel Patterns in Modern Hebrew: Morphological Rules and Lexical Representations", in T. Thomas-Finders (ed.) Introduction to the Extended Word-and-Paradigm Theory, UCLA Occasional Papers #4: Working Papers in Morphology.

Kiparsky, Paul (1982) "From Cyclic Phonology to Lexical Phonology", in van der Hulst, Harry and Norval Smith (eds.) The Structure of Phonological Representations (part I), Foris Publications, Dordrecht.

Lieber, Rochelle (1980) On the Organization of the Lexicon, Ph.D dissertation, MIT, Cambridge.

Matthews, P. H. (1974) Morphology, Cambridge University Press, Cambridge.

McCarthy, John J. (1979) Formal Problems in Semitic Phonology and Morphology, Ph.D dissertation, MIT, Cambridge.

—— (1981) "A Prosodic Theory of Nonconcatenative Morphology", Linguistic Inquiry 12:3.

—— (1984) "Morphological Structure(s)", ms. University of Texas, Austin.

—— (forthcoming) "OCP Effects: Gemination and Antigemination", to appear in LI.

Mohanan, Karuvannur P. (1982) Lexical Phonology, Ph.D. dissertation, MIT, Cambridge.

Newman, Paul (1979) "Explaining Hausa Feminines", Studies in African Linguistics 10:2.

Ornan, Uzzi (1975) "al yecirat shorashim xadashim veal kama milim mexudashot" [On the creation of new roots and on some renovated words]", Leshonenu Laam 27:9.

Prince, Alan P. (1975) The Phonology and Morphology of Tiberian Hebrew. Ph.D dissertation, MIT, Cambridge.

Ravid, Dorit (1978) Word-Formation Processes in Modern Hebrew Nouns and Adjectives, M.A. thesis, Tel-Aviv University, Tel-Aviv.

Schachter-Haham, Mayer (1968) Compound of Hebrew in Thousand Stem Words Kiryath Sepher LTD., Jerusalem.

Selkirk, Elisabeth O. (1983) The Syntax of Word, The MIT Press, Cambridge.

Smeaton, Hunter B. (1973) Lexical Expansion due to Technical Cahnge, Indiana University, Bloomington.

Schwarzwald, Ora R. (1984) "Analogy and Regularization in Morphophonemic Canges: The Case of the Weak Verbs in Post-Biblical and Colloquial Modern Hebrew", Afroasiatic Linguistics 9:2.

Steriade, Donca (1982) Greek Prosodies and the Nature of Syllabification. Ph.D dissertation, MIT, Cambridge.

Williams, Edwin (1981) "On the Notions 'Lexically Related' and 'Head of a Word'," Linguistic Inquiry 12:2.