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Root-and-Pattern Morphology Without Roots or Patterns

Adam Ussishkin
University of California, Santa Cruz

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0. Introduction

The Prosodic Morphology research program (McCarthy & Prince 1986, *et seq.*) has at its core the tenet that templates are defined as authentic units of prosody. This position greatly restricts the theory of templates because it limits potential templates to those that conform to independently motivated phonological and prosodic structures. Within Optimality Theory (OT; Prince & Smolensky 1993), templates were originally specified through constraints that defined them in terms of the prosodic units they encompassed. For example, much work on reduplication concerns the shape of the reduplicant (in OT, this begins with McCarthy & Prince 1995, and continues in many other authors' research).

More recently, however, we have witnessed the emergence of an even more restrictive theory: one which does without constraints that explicitly define templatic shape. This move comes in reaction to a serious problem caused by such constraints: their existence predicts a broader typology than actually exists in natural language. The dilemma, dubbed the "Kager-Hamilton" problem, has been pointed out in most depth by Spaelti (1997) and McCarthy & Prince (1999). The crux of the Kager-Hamilton problem is that given the existence of templatic constraints, we predict languages where the templatic requirement on a reduplicant may be forced (or "back-copied") on the base of reduplication. However, there is no such language in which this takes place.

Given this fact it is fruitful to question the validity of templatic constraints. According to McCarthy & Prince (1999), it is exactly these constraints that the theory must be rid of in order to avoid the Kager-Hamilton problem. In this approach, so-called templatic effects are actually an instance of the Emergence of the Unmarked (McCarthy & Prince 1994), resulting from the following ranking schema:

(1) Input-Output-Faith » C » Base-Reduplicant-Faith

where C is some phonological markedness constraint. C is active just in the cases of reduplication, because C dominates the constraint demanding total identity between base

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and reduplicant, a relation between different parts of a particular morphologically-specified output form.

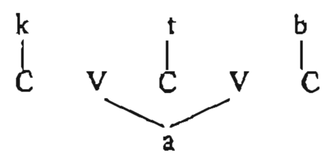
The upshot of this approach is that one or many markedness constraints may explain the so-called templatic effects observed in reduplicants. What makes this theory so appealing is that it resorts to markedness constraints for which there is already an abundance of empirical evidence and whose effects are attested elsewhere, so no template-specific machinery is necessary. In this paper, I extend these principles to a different but related domain: templatic effects in Semitic. I henceforth label this phenomenon as *fixed prosody*, to emphasize that my analysis makes no use of templatic constraints in explaining the constant prosodic shape of words.

The remainder of the paper is structured as follows. In §1, I provide background on nonconcatenative morphology and prosodic morphology, focusing in particular on the verbal system of Modern Hebrew, which displays characteristic "root-and-pattern" behavior. §2 provides an analysis of this system, and argues for an approach based on morphologically-segregated faithfulness constraints to explain the phenomenon of Melodic Overwriting. In this section, I show that the constraints responsible for the fixed prosodic effects observed in Modern Hebrew are not templatic in nature, but rather, that they are independently motivated constraints on prosodic and metrical structure. In §3 I discuss a potential alternative approach, which I reject due to its inability to correctly predict attested patterns. §4 concludes the paper, and §5 provides an appendix on Modern Hebrew stress, showing that the same constraints responsible for fixed prosody in the verbal system are also active in the metrical structure of the language.

1. Empirical Background and Focus

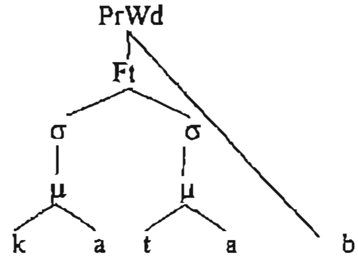
Since the ground-breaking work on Semitic morphology and phonology of McCarthy (1979, 1981), languages of the Semitic branch of the Afro-Asiatic language family have served as a classic example of templatic effects. In his original work on these languages, McCarthy (1979, 1981) extended the representations provided by Autosegmental Phonology (Goldsmith 1976) to describe the patterning of morphemes in languages like Arabic. Three types of morpheme compose a word under this view: the vocalic melody, the consonantal root, and the CV template. To briefly illustrate an oft-used example, the representation of the word *katab* 'he wrote' appears as follows:

(2) (a) the consonantal root
(b) the template
(c) the vocalic melody



Further developments in template theory arose in the work of McCarthy & Prince (1986), known as Prosodic Morphology. The basic principle underlying this approach is that templates are defined in terms of authentic prosodic units. So, rather than defining the Arabic verbal template for *katab* as CVCVC, it is defined as an iambic foot, which is independently known to occur in the language. This prosodic structure is illustrated below:

(3)



The superiority of this approach over the other is that templates are no longer viewed as extra-theoretical structures that the language happens to make use of, rather, their existence is driven by the fact that their prosodic make-up is independently necessary. In this view, templatic effects are linked to prosodic and metrical structure whose existence is independently borne out.

Within the framework of OT, the overwhelming majority of work concerning templatic effects centers on reduplicative phenomena. Much less work, if any, however, has been done in the domain of languages in which the majority of the words, as opposed to simply those in the reduplicative domain, exhibit templatic effects. It is the templatic effects or what I term here *fixed prosody* in these languages which I turn to in this paper. The primary empirical focus of this study is the verbal system of Modern Hebrew, which is characterized by templatic effects typical of nonconcatenative morphology. In the following section I present a description of these effects in Modern Hebrew.

The Modern Hebrew verbal system contains seven classes or *binyanim*.[1] The basic proposal here is that the one binyan serves as the base of affixation for the others[2], and that the prosodic constraints govern this relation. I claim that the basic binyan is the *paʕal* binyan. If the paʕal form indeed serves as the base of affixation in an output-output correspondence relation (Benua 1995, 1997) for deriving the other binyanim, what can we say about the lexical status of the paʕal form itself? Interestingly, the paʕal form has been claimed to be the unmarked, basic pattern by Horvath (1981:231), who maintains that the other binyanim can be semantically and/or syntactically characterized, as seen in the following table (adapted from Horvath 1981:231).

[1] It turns out that two of these binyanim (puʕal and hufʕal) are dependent on other binyanim (piʕel and hifʕil, respectively), so there are really only five patterns that need to be accounted for (see Horvath 1981, Bat-El 1989).

[2] An important paper that makes a similar (pre-OT) proposal is McCarthy's (1993) work on Arabic and Akkadian. That account, however, still relies on the consonantal root as a morpheme used to derive Binyan I (=paʕal), and therefore crucially differs from the account presented here. Other work arguing for high-ranking prosodic constraints in Modern Hebrew include Bat-El (1994), Inkelas (1990), Sharvit (1994) and Ussishkin (1999, to appear).

(4)

Binyan name[3]	*Function*	*Example*	*Gloss*
paʕal	• unmarked, basic pattern	gadal katav	'he grew' 'he wrote'
nifʕal	• passive of paʕal • ingressive (change of state) from paʕal • Intransitive form of a transitive hifʕil form	(none) nixtav	 'it was written'
piʕel	• A typically transitive basic pattern • Intensified form of paʕal	gidel (none)	'he raised
puʕal	• passive of piʕel	gudal (none)	'he was raised'
hitpaʕel	• middle voice reflex of transitives in piʕel • reflexive • reciprocal • repetitive action	(none) hitkatev	 'he corresponded'
hifʕil	• causative of paʕal • transitive reflex of nifʕal	higdil hixtiv	'he enlarged' 'he dictated'
hufʕal	• passive of hifʕil	hugdal huxtav	'he was enlarged' 'it was dictated'

Given this classification, we have two patterns which are candidates for lexical entries (or bases of affixation): the paʕal and the piʕel binyanim, both of which may be "basic patterns", according to Horvath's classification. Interestingly, in favor of at least the paʕal being lexically listed, it is the only binyan that may surface as monosyllabic. This is seen in data such as the following:

(5)

Monosyllabic paʕal	*Gloss*
kam	'he got up'
rac	'he ran'
sam	'he put'
ba	'he came'
gar	'he lived'
xas	'he pitied'

I take such forms as evidence that verbs in the paʕal binyan are lexically specified, and therefore subject to Input-Output faithfulness constraints. However, since paʕal forms serve as the base of affixation in forming other binyanim, these other binyanim are subject not to IO-faithfulness, but rather to Output-Output-faithfulness (Benua 1995, 1997). The emergent generalization, to be fleshed out in greater detail below, is that such affixation exhibits typical Emergence of the Unmarked (TETU) effects.

[3] The system of binyan names stems from the practice of associating (in traditional parlance) the consonantal root *p, ʕ, l* (to which the meaning 'to act' is attributed) with the appropriate vocalic melody and template.

2. Fixed Prosodic Effects: The analysis

In this section I provide an analysis of the Hebrew verbal system. The analysis involves two central theoretical claims: (i) that there are no specifically templatic constraints at work and (ii) that there is no need to refer to the consonantal root. I now turn to the fixed prosody, a term I introduce to describe the templatic effects so prevalent in the verbal system of Hebrew and "nonconcatenative" languages in general.

2.1. *Bisyllabicity as a fixed prosodic effect*

The table in (4) above shows that in general, verbs in Modern Hebrew are bisyllabic. In fact, this is true for every binyan except monosyllabic paʕal forms and the hitpaʕel, which contains three syllables due to the presence of the prefix *hit-*. If this prefix is considered to be outside the true verbal stem, then the generalization holds for this binyan as well. This observation will figure crucially in the analysis that follows.

This account is driven by several assumptions regarding Modern Hebrew prosodic morphology. The first of these is that there is no consonantal root. Rather than being derived from a consonantal root, words are derived from other words. This approach has shown to be quite productive in the analysis of denominal verb formation in the language (Bat-El 1994, Ussishkin 1999, to appear), where referring only to the consonantal root as opposed to an actual output obscures crucial information which turns out to be required for determining the pattern particular verbs will conform to. The analysis of denominal verb formation, and the analysis of relations between binyanim to be presented here, rely on the concept of Melodic Overwriting (Steriade 1988, McCarthy & Prince 1990), whereby an affixal melody, rather than simply concatenating with a base of affixation, actually overwrites a portion of the phonological material in the base. This approach, I claim, is especially appropriate to an analysis of Semitic morphology, where in related forms the vowels may be the only material that differs. Note that this does not imply the existence of the consonantal root *qua* morpheme; under this view the consonants happen to be consistent from one related form to another only because they are the residue remaining after Melodic Overwriting. This is illustrated in the following verbal paradigm, which contains related verbs in different binyanim.

(6)	*Binyan*	*Hebrew verb*	*Gloss*
	paʕal	gadal	'he grew' (intransitive)
	piʕel	gidel	'he raised'
	puʕal	gudal	'he was raised'
	hifʕil	higdil	'he enlarged'
	hufʕal	hugdal	'he was enlarged'

An important question relating to the above discussion concerning templatic effects is how to enforce the bisyllabic limit on verbal stems in Hebrew. This is accomplished through the interaction of prosodic constraints, which I claim are those constraints responsible for the metrical structure of Hebrew. These are:

(7) PARSE-σ (cf. Halle & Vergnaud 1987, Hayes 1987, Liberman & Prince 1977, Mester 1994, Prince 1980.)
Every syllable must be parsed by a foot.

(8) FTBIN (e.g., McCarthy & Prince 1986, 1993, Prince 1980)
Every foot consists of two syllables.[4]

(9) ALIGN-L (STEM; FT)
The left edge of every stem is aligned to the left edge of a foot.

(10 ALL-FT-L
The left of edge of every foot is aligned to the left edge of the prosodic word.

(11) OO-MAX-V (cf. McCarthy & Prince 1995)
Every vowel in the base must have a correspondent in the output.

(12) *Prosodic Hierarchy*

These constraints, when combined with the prosodic hierarchy (Selkirk 1980a,b), enforce bisyllabicity on all stems (Ito & Mester 1992). Crucially, PARSE-σ must crucially dominate OO-MAX-V, and so must FTBIN. This is shown in the following tableaux, which demonstrate how the piʕel verb *gidel* 'to raise' is derived from the paʕal form *gadal* 'to grow (intrans.)' by simply combining the affixal material /i e/ with the full output form *gadal*. (Foot boundaries are indicated by '[' and ']'.)

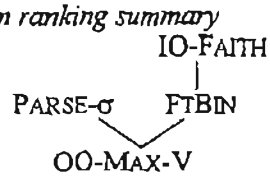
(13) *gidel* from *gadal*

(i) gadal+i e	PARSE-σ	OO-MAX-V
a. gi[dela]	*!	*
b. ga[dile]	*!	*
☞ c. [gidel]		**

(ii) gadal+i e	FTBIN	OO-MAX-V
a. [gi][dela]	*!	*
b. [gadile]	*!	*
☞ c. [gidel]		**

We have evidence for the following ranking schema, based on these tableaux:

(14) *Interim ranking summary*



IO-FAITH is crucially ranked above FTBIN to account for the fact that monosyllabic paʕal forms, who are lexically specified as such, do not conform to the fixed prosody. They are immune from the constraints enforcing fixed prosody precisely because they are governed by IO-faithfulness relations. However, all other binyanim are governed by

[4] Modern Hebrew appears to be quantity-insensitive (e.g., Bat-El 1989, 1994, Graf 1999) so a moraic analysis of FTBIN is inappropriate.

OO-faithfulness relations, and are thus subject to the constraints enforcing fixed prosody, since such constraints are ranked above OO-faithfulness, as seen in (12).

2.2. *Which vowels remain – a Head Dominance account*

A serious question is still before us, however. What determines *which* vowels are deleted in these cases? If we incorporate all three constraints into one tableau, we find that there are other potential winning candidates at this point:

(15) *gidel* from *gadal*

gadal+i e	FtBin	Parse-σ	OO-Max-V
☞ ? a. [gadal]	✓	✓	**
☞ ? b. [gadel]	✓	✓	**
☞ ? c. [gidal]	✓	✓	**
☞ ? d. [gidel]	✓	✓	**

There are (at least) two possible solutions to this problem. One appears in Ussishkin (to appear a), where I argue that Max-V must be separated into two constraints:

(16) Max-V-A(ffix)
Every affixal vowel in the input has a correspondent in the output.

(17) Max-V-S(tem)
Every stem vowel has a correspondent in the output.

In order for *gidel* to be correctly selected as the optimal candidate, we must adopt the ranking seen in the following tableau:

(18) *gidel* from *gadal*

gadal+i e	Max-V-A	Max-V-S
a. [gadal]	i!e	
b. [gadel]	i!	a
c. [gidal]	e!	a
☞ d. [gidel]		aa

If the constraint Max-V-A is undominated and crucially dominates Max-V-S, the problem disappears. However, based on observations about faithfulness and markedness in different morphological domains, McCarthy & Prince (1995:364) propose a universally fixed ranking between two different types of faithfulness constraints. This "Stem-Affix Faithfulness Metaconstraint" (henceforth SAFM) was originally introduced in McCarthy & Prince (1994), and is presented in (19):

(19) Stem-Affix Faithfulness Metaconstraint (SAFM)[5]
StemFaith » AffixFaith

Clearly the SAFM is contradicted by the ranking in tableau (16) above. Rather than abandon the SAFM *in toto*, however, I propose that the SAFM is simply too strong to be universally fulfilled. In the case at hand, in addition to the case of denominal verbs as I argue in Ussishkin (1999), there are other principles at play. Specifically, I claim that this issue can be resolved with the theory of Head Dominance as proposed by Revithiadou

[5] I have termed this the Stem-Affix Faithfulness Metaconstraint rather than use McCarthy & Prince's original Root-Affix Faithfulness Metaconstraint in order to avoid confusion between roots in general and consonantal roots.

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(1999). Head Dominance provides an interface between prosody and morphology, and states that faithfulness to heads outranks faithfulness in general, as formalized by the following ranking:

(20) Head Dominance (HD; adapted from Revithiadou 1999:5)
HEADFAITH » OO-FAITH

HEADFAITH, formalized by Revithiadou (1999), requires faithfulness to material dominated by a head:

(21) HEADFAITH
A segment sponsored by a head in S_1 has a correspondent in S_2; likewise, a segment sponsored by a head in S_2 has a correspondent in S_1. In addition, featural specifications between corresponding segments in a head are identical in S_1 and S_2.

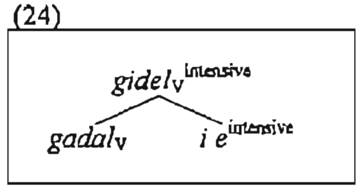
(22) OO-FAITH
A segment in the base has a correspondent in a related output form derived from it; likewise a segment in the derived form has a correspondent in the derivational base. In addition, featural specifications between corresponding segments are identical in the two forms.

Returning to the case of the Hebrew binyanim, we no longer need to stipulate a questionable ranking between the constraints MAX-V-S and MAX-V-A. This is because the HD ranking configuration in (20) will determine which vowels must surface in *gidel*: the affixal vowels must surface, because they constitute a morphological head as a derivational affix.[6] The following tableau illustrates this result, with the accompanying schematic representation capturing the compositionality of such a form:

(23) *gidel* from *gadal*

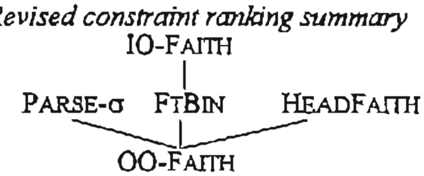
	gadal+i e	HEADFAITH	OO-FAITH
	a. [gadal]	i!e	ie
	b. [gadel]	i!	ia
	c. [gidal]	e!	ae
☞	d. [gidel]		aa

(24)



The following Hasse diagram summarizes the constraint ranking in effect.

(25) *Revised constraint ranking summary*



The strategy of HD may be extended to all other binyanim. This is illustrated in the following tableaux.

[6] See di Sciullo & Williams (1987), Scalise (1986), and Zwicky (1985).

(26) *higdil* 'to enlarge' from *gadal* 'to grow'

	gadal+hi i[7]	HEADFAITH	PARSE-σ	OO-FAITH
	a. hi[gadal]	i!	*	i
	b. hi[gadil]		*!	a
	c. hi[gidal]		*!	a
☞	d. [higdil]			aa

This case involves the hifʕil binyan, which is the first case we have seen so far in which a prefix is affixed to the base form. This prefix consists of CV-, and the rest of the affix is simply vocalic. Interestingly, such cases force a CVC.CVC output in order to satisfy PARSE-σ. In other words, the [g] and [d] are adjacent to each other in this case, as opposed to *gadal* or *gidel*. A similar situation arises in the nifʕal binyan:

(27) *nignav* 'to be stolen' from *ganav* 'to steal'

	ganav+ni a	HEADFAITH	PARSE-σ	OO-FAITH
	a. ni[ganav]	a!	*	a
☞	b. [nignav]			aa

These cases, involving vowel-final prefixes, also provide evidence for further rankings among the relevant constraints. Notice that so far, in the non-prefixed forms, ALIGN-L is satisfied in every optimal output. However, given that in the cases involving vowel-final prefixes the left edge of the stem is never foot-initial, ALIGN-L must be dominated by FTBIN. This is illustrated for the form *higdil* below, where the stem boundaries are indicated by '{' and '}':

(28) *higdil* 'to enlarge' from *gadal* 'to grow'

	gadal+hi i	FTBIN	ALIGN-L	PARSE-σ
	a. hi[{gdil}]	*!		*
☞	b. [hi{gdil}]		*	

(29)

FTBIN
|
ALIGN-L

A different situation occurs, however, in the hitpaʕel binyan. This is illustrated in the following tableau.

(30) *hitraxec* 'to wash oneself' from *raxac* 'to wash'

	raxac + hit a e	FTBIN	HEADFAITH	PARSE-σ	FAITH
	a. hit[raxac]		e!	*	e
	b. [raxec]		hit!		hit
	c. [hitraxec]	*!			aa
☞	d. hit[raxec]			*	aa

Here, the optimal form consists of three syllables, rather than two. The main consequence of interest here is that one of these syllables is not footed. As seen in (30), forms in the hitpaʕel form such as *hitraxec* require us to modify our ranking; the constraint PARSE-σ is actually violable.[8] Further ranking arguments are also clear once we consider the hitpaʕel binyan. So far, we have seen no reason for violating the constraint ALL-FT-L, which

[7] This affix requires further investigation. First of all, it violates Keer's (1999) conception of the Obligatory Contour Principle (OCP) because it contains an input with two identical adjacent elements that do not necessarily fuse into one; and secondly, some EDGEMOST constraint (e.g., McCarthy & Prince 1993) is required here to assure that *hi-* will be a prefix (this is true for all the following cases involving prefixes).

[8] The unfooted status of *hit-* is not definitively clear. Native speaker informants do not have uniform judgments, for instance, regarding whether *hit-* may bear secondary stress. At the sentence level, at least, it appears that the prefix does not receive stress.

requires all feet to be word-initial. However, this constraint is violated by the hitpaʕel forms, in order to satisfy the constraint ALIGN-L. The interaction between these two constraints can be seen below:

(31) *hitraxec* 'to wash oneself' from *raxac* 'to wash'

	raxac + hit a e	ALIGN-L	ALL-FT-L
	a. [hitraxec]	*!	
☞	b. hit[raxec]		*

(32)

ALIGN-L
|
ALL-FT-L

This situation arising from the effects of fixed prosody gives rise a very interesting ranking schema, and one which is very reminiscent of a TETU ranking (McCarthy & Prince 1994). TETU describes cases in which certain phonological constraints are dominated by general faithfulness constraints, and so are inactive, except within specific morphological domains where faithfulness is subordinate to the phonological constraints. This is a novel instance of TETU, however, in that it is observed not in some special, morphologically-restricted domain, such as reduplication, but rather in a very large domain of a language. Consider the following fragment from the ranking for the Hebrew verbal system. As seen here, this is a clear case of TETU:

(33) *Ranking summary*

HEADFAITH IO-FAITH
| |
PARSE-σ FTBIN
OO-FAITH

} TETU: IO-FAITH
|
Phono-Constraint
|
OO-FAITH

3. An alternative account

An alternative proposal that might at first glance seem appropriate in this empirical domain would be to adopt a constraint such as REALIZEMORPHEME (Samek-Lodovici 1993, Rose 1996, 1997, 1998, Walker 1998, Kurisu to appear). This constraint (abbreviated RM) plays a similar role to HEADFAITH, though the respective consequences of the two constraints diverge exactly in the cases at hand. For this reason I reject the RM analysis.

RM has been used in various analyses to assure that morphological material in the input corresponds to phonological material in the output. Formally, RM is defined as follows:

(34) REALIZEMORPHEME
Every morpheme in the input has some phonological realization in the output.

It is clear how RM can be profitably employed in OT, but the force of this constraint actually turns out to be weaker than that of the HD analysis argued for above. Indeed, I claim that is in inadequate. Crucial to our purposes here is the fact that according to the definition of RM, some *minimal* realization of a morpheme will satisfy the constraint just as well as a *maximal* realization of that morpheme. Previous analysts who have used RM to drive their analyses have typically done so in cases where the input and output differ minimally; that is, cases such as morphological gemination (Samek-Lodovici 1993), morphological reduplication (Rose 1996, 1997, 1998), and subtractive morphology (Kurisu to appear).

However, for the Semitic cases at hand, a RM analysis will not achieve the right results. This is exactly because of its permissive nature: *any* part of an input-specified morpheme that surfaces in the output is sufficient to satisfy RM. However, this predicts that in Hebrew, a vocalic affix specified in the input could surface with only one vowel present. Even if RM is high-ranking, the wrong candidate(s) will be chosen as optimal. The following tableau illustrates the situation, assuming that the same prosodic constraints in effect above are in effect here:

(35) failed attempt to derive *gidel* from *gadal* using REALIZE MORPHEME

gadal+i e	RM	FAITH
a. [gadal]	*!	ie
☞ ? b. [gadel]	✓	ia
☞ ? c. [gidal]	✓	ae
☞ ? d. [gidel]	✓	aa

In this case, it is not clear which candidate is optimal, and there are no constraints that could distinguish between the three potentially optimal candidates in this case without appealing to a mechanism like HEADFAITH. In other words, RM does not provide a way to force both affixal vowels to surface.

It is important at this point to note the parallel with earlier, serialist accounts of similar phenomena, termed Melodic Overwriting by Steriade (1988) in analyses of reduplicative morphology. Bat-El (1994) adopts this approach in her serial analysis of denominal verbs in Modern Hebrew, and Ussishkin (to appear) extends this idea to an OT account of similar data. Within OT, Melodic Overwriting is easily achieved by a phonology-morphology interface like the Head Dominance approach, where morphemes in the input have required correspondents in the output.

Another consequence of this approach is the elimination of the consonantal root as a morpheme. In the analysis advocated here, the consonantal root is simply the residue remaining after Melodic Overwriting has occurred. However, as seen in the tableaux above, the consonantal root is never referred to. This is because it has no morphemic status in this analysis. This is an expected consequence of the combination of Melodic Overwriting with high-ranking constraints on prosodic shape. In addition, this accords with conclusions reached in Bat-El (1994) and Ussishkin (to appear) with respect to the formation of denominal verbs in Hebrew.

4. Conclusion

In this paper, I have investigated the verbal system of Modern Hebrew in an approach to root-and-pattern morphology without making any analytical to either the consonantal root or template-specific constraints. Based on general theoretical considerations of Optimality Theory and prosodic morphology, I have shown that Modern Hebrew can be seen as a case in which TETU effects are observed in the language as a whole and are not restricted to a particular morphological domain. Previous work has clearly established the ubiquity of TETU effects in the area of reduplicative morphology, but this is the first account of fixed prosodic effects analyzed as an instance of TETU.

I have also argued that within OT, Melodic Overwriting can be achieved through a phonology-morphology interface such as Head Dominance, where morphological heads are subject to special faithfulness constraints. Another consequence of this approach is the elimination of the consonantal root as a morpheme. In the analysis advocated here, the apparent consonantal root is simply the residue remaining after Melodic Overwriting. This is an expected result of the combination of Melodic Overwriting with fixed prosody, and accords with conclusions reached in Bat-El (1994) and Ussishkin (to appear) with respect to the formation of denominal verbs in Modern Hebrew.

Future research is necessary to determine if this approach may be extended to all Semitic languages and to all systems involving fixed prosodic effects. To the extent that this approach is viable in such systems, the Semitic languages begin to look less exotic with respect to their morphology, further undermining the special status of "nonconcatenative" systems in general.

5. Appendix: Stress in the Modern Hebrew verb

In this appendix, I sketch an analysis of stress in the Modern Hebrew verbal system. To begin, consider the following paradigm, which illustrates stress in a piʕel form 'to speak' in the past, present, and future tenses:

(36)

Past tense		*Present tense*		*Future tense*	
dibárti	1.masc.sg.	medabér	masc.sg.	ʔedabér	1.sg.
dibárta	2.masc.sg.	medabéret	fem.sg.	tedabér	2.masc.sg.
dibárt	2.fem.sg.	medabrím	masc.pl.	tedabrí	2.fem.sg.
dibér	3.masc.sg.	medabrót	fem.pl.	yedabér	3.masc.sg.
dibrá	3.fem.sg.			tedabér	3.fem.sg.
dibárnu	1.pl.			nedabér	1.pl.
dibártem	2.masc.pl.			tedabrú	2.pl.
dibárten	2.fem.pl.			yedabrú	3.pl.
dibrú	3.pl.				

As the paradigm illustrates, stress tends to the right edge of the word. This motivates a constraint demanding the stress fall at the right edge of the prosodic word:

(37) E(ND)R(ULE)R(IGHT)
Stress falls at the right edge of the prosodic word.

This constraint, however, is not always satisfied. This is seen in forms above such as *dibárnu*, *dibártem*, *dibárten*, and *medabéret*. I set aside cases such as *medabéret* for now, under the assumption that they involve a more complex analysis than space permits here. Returning to the generalizations regarding stress, the constraint ERR must be outranked by some other constraint that allows non-final stress in cases involving a consonant-initial suffix. I claim that this constraint is one of those seen above: namely, the alignment constraint forcing the left edge of every stem to be aligned to the left edge of every foot:

(38) ALIGN-L

Cases like *dibárnu* provide evidence for the ranking illustrated by the following tableau:

(39) *dibárnu*

dibar+nu	ALIGN-L	ERR
a. [{dibar}]nu		σσ!
b. {di[bar}nú]	*!	
☞ c. [{dibár}]nu		σ

Interestingly, cases involving a vowel-initial suffix (e.g., *dibrá*, *dibrú*) involve deletion of a stem vowel. This shows that the effects of fixed prosody are active not only in deriving one binyan from another, but also in inflectional morphology. I claim that these effects are to be computed in the same way as seen above: the high-ranking prosodic constraints enforce a bisyllabic fixed prosody. The following tableau illustrates the analysis for the third person feminine form *dibrá*, which derives from *dibér*, explaining not only the bisyllabicity but also stress placement:

(40) *dibrá* - deletion of a stem vowel!

	diber+a	ALIGN-L	ERR	PARSE-σ	OO-FAITH
	a. [{dibe]r}a		σ!	*	
	b. [{dibé]r}a		σ!	*	
	c. {di[bér}a]	*!	σ	*	
	d. {di[ber}á]	*!		*	
	e. [{díbr}a]		σ!		*
☞	f. [{dibr}á]				*

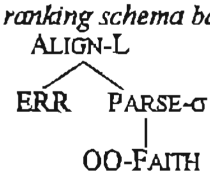
Note that including all of these constraints in the analysis of *dibárnu* still produces the correct result: stress is on the penultimate syllable.

(41) *dibárnu* - now with all constraints

	dibar+nu	ALIGN-L	ERR	PARSE-σ	OO-FAITH
	a. [{díbar}]nu		σσ!	*	
	b. {di[bár}nu]	*!	σ	*	
	c. {di[bar}nú]	*!		*	
☞	d. [{dibár}]nu		σ	*	

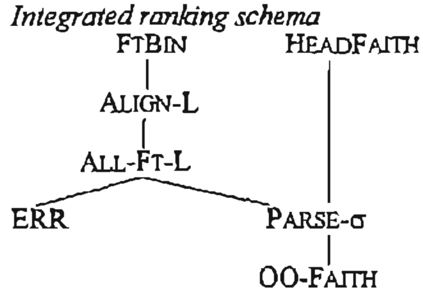
In summary, we have established the following ranking schema based on stress in the Modern Hebrew verb:

(42) *Emergent ranking schema based on metrical structure*



Together with the rankings established above in the analysis of fixed prosodic shape across binyamin, the following integrated schema results:

(43) *Integrated ranking schema*



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Department of Linguistics
Stevenson College
UC Santa Cruz
Santa Cruz, CA 95064

ussishki@ling.ucsc.edu