

Root or No Root?

Word Formation in Hebrew

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0. Introduction

This paper is about word formation in Hebrew. Central to this issue is the debate over whether the consonantal root exists or not. For centuries, grammarians have thought of Hebrew word formation as a process in which a vocalic melody is added to a consonantal root to form a noun, a verb, an adjective, etc. The vowel patterns are consistent throughout the language and determine both the lexical category of a word, and its exact meaning. The consonantal root provides a somewhat underspecified meaning that can be realized in many different ways, while still retaining some essence of the meaning of the root. For example, the root $\sqrt{\text{חשב}}$ can be realized with the following meanings: ‘think’, ‘calculate’, ‘consider’, ‘be considerate’, ‘a computer’, ‘a thought’, ‘importance’, ‘arithmetic’, ‘calculus’. From these incarnations, it appears that the underspecified meaning of $\sqrt{\text{חשב}}$ has something to do with cognize.

Recently this notion of a consonantal root merging with a vocalic melody to form a word has been questioned. Based on evidence from denominal verbs and borrowed words, Bat-El (1994) and Ussishkin (1999, 2005) argue that the consonantal root does not exist. Rather, words are formed from words, or to be more specific, from the *pa'al* form of the verb, which Ussishkin argues is the most basic form. Under this approach, different vowel patterns are affixed onto the *pa'al* stem and overwrite the original vowels. The consonants are treated as phonological residue, or the part of the *pa'al* stem that is not overwritten.

On the other side of the debate is evidence from experimental work of psycholinguists that suggests that the consonantal root and the vocalic melody in the traditional sense are psychologically real and play an important part in word formation. For example, at the conclusion of several experiments that tested the effects of masked priming on reaction times, Deutsch and Frost (2003: 183) state:

“The empirical findings presented in the chapter indicate that (1) a previous presentation of a root facilitates word recognition of nominal and verbal forms, which are derived from that root and (2) a previous presentation of a word pattern facilitates word recognition of verbs, but not of nouns, which are derived from the same word pattern. The facilitation effects observed are independent of semantic factors. We conclude that roots and verbal-patterns serve as an organizing principle of the Hebrew lexicon, and govern the morphological decomposition process during lexical access.”

Arad (2003) proposes an integrative solution to this debate, that allows for some words to be derived from roots and others to be derived from words. She introduces a locality constraint that limits the interpretation of roots to the first functional head with which they are merged. Under her model, the root is unpronounceable until it is merged with a head bearing a category feature such as noun, verb, etc. The category feature determines which vocalic melody will be assigned to the root. This merge operation also assigns a semantic interpretation to the root. These root-derived words can have idiosyncratic interpretations as demonstrated by the variety of meanings possible for a single root as mentioned above. Syntactically, this merge of the root with a functional head is the end of a phase, and the form is subsequently sent off to the interface levels. This creates Arad’s locality constraint on interpretation of roots. After the phase is ended, the form can still be merged with another head bearing a different category feature, i.e. a nominalizer, etc., but the semantic interpretation is fixed, and the derivation is transparent. Arad argues that this explains the properties of denominal verbs and borrowed words, both of which are word-derived rather than root-derived. Word-derived words undergo a process of vocalic overwriting as described by Ussishkin (1999, 2005), since the forms already contain a vocalic

melody that was assigned by the first head with which the root merged. By using the locality constraint to distinguish between root-derived words and word-derived words, Arad essentially accounts for the different evidence presented by both sides of the debate over Hebrew word formation.

This paper will first consider several phenomena that seem to defy Arad's locality constraint, and argue that there are other heads that can assign interpretations. Specifically, idioms present a clear case of interpretation being assigned by something other than the first functional head with which the root is merged, following Marantz (1997: 208), who argues that "the syntactic head that projects agents defines a locality domain for special meaning." Secondly, Volpe's (2005) account of nominalizations of Japanese lexical causatives will be discussed, and how his analysis may help to explain certain Hebrew verbs that do not exhibit the semantic effect of the binyan that they are in. Finally, it will be argued that the unpredictability of the vowel in future and imperative *pa'al* verbs suggests that this vowel is part of the lexical entry and not assigned by a functional head. This means that instead of a consonantal root morpheme, there is actually a stem that contains a vowel, in the form CCVC (CVC for bi-consonantal roots), which undergoes vocalic overwriting every time it is merged with a functional head to form a word.

The paper is organized as follows: section 1 will outline some of Arad's arguments for her locality constraint on root interpretation. Section 2 will discuss how idioms and other special meaning phenomena fit into the picture. Section 3 will discuss Volpe's analysis of Japanese, and section 4 will argue for an underlying stem morpheme as opposed to a consonantal root. Section 5 will be the conclusion.

1. Root-Derived vs. Word-Derived Words

Arad (2003: 745-6) argues that there is an “important difference between root-derived and noun-derived Hebrew verbs.” Take for example the following example of words derived from the root $\sqrt{\text{sgr}}$ (Arad’s example 10):

- (1) $\sqrt{\text{sgr}}$
- | | | |
|------------------|-----------------|---------------------|
| a. CaCaC (v) | <i>sagar</i> | v, ‘close’ |
| b. hiCCiC (v) | <i>hisgir</i> | v, ‘extradite’ |
| c. hitCaCCeC (v) | <i>histager</i> | v, ‘cocoon oneself’ |
| d. CeCeC (n) | <i>seger</i> | n, ‘closure’ |
| e. CoCCayim (n) | <i>sograyim</i> | n, ‘parentheses’ |
| f. miCCeCet (n) | <i>misgeret</i> | n, ‘frame’ |

All of these words exhibit idiosyncratic interpretations that are derived from the underspecified meaning of the root. Arad argues that these words are formed when the root merges with a feature-bearing head, where it is combined with the appropriate affixes and vocalic melody, and is assigned an interpretation. She schematizes this process as follows (her example 12a):

- (2) Root-derived noun:

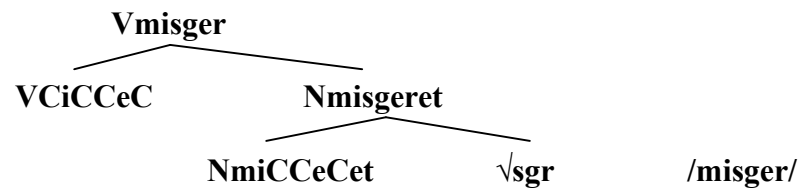


As can be seen in (2), the nominalizer prefix *mi-*, the stem-vowel *-e-*, and the feminine nominal ending *-et* are part of the N head. Once the root and pattern are merged under N, the phase is over and /misgeret/ is sent of to the interface levels.

In contrast to root-derived words, which can have idiosyncratic interpretations, Arad argues that there are also word-derived verbs that have distinct properties. She gives the example

of the verb *misger* ‘to frame’ which she argues is derived from the noun *misgeret* ‘frame (n.)’ and has the following structure (her example 12b):

(3) Noun-derived verb:



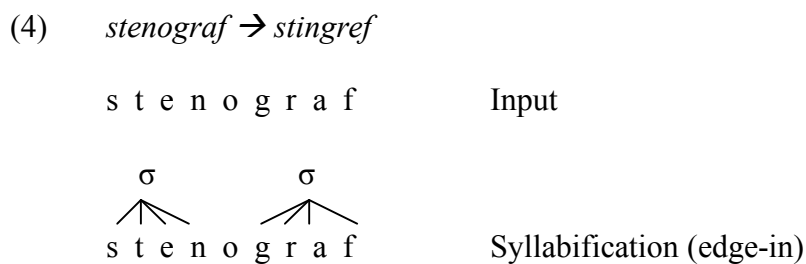
In this structure, the N *misgeret* merges with a V head with the vocalic melody *–i– –e–*, which overwrites the vowels of the N (even though they happen to be the same in this case). Arad argues that (3) is the structure for *misger* based on the fact that the interpretation ‘to frame’ is based on the noun *misgeret*, and cannot have any of the other idiosyncratic interpretations of \sqrt{sgr} manifested in (1a-e). She states (2003: 747):

“The root \sqrt{sgr} is assigned numerous interpretations in different environments, but when the basis for the derivation is not the root \sqrt{sgr} itself but a noun derived from it (*misgeret*), that noun seems to force its meaning on any element further derived from it. Although the verb *misger* contains the consonants of the root \sqrt{sgr} , it cannot have access to the underspecified core meaning of the root or to all the interpretations assigned to that root in different environments: something seems to interfere between the verb *misger* and the root \sqrt{sgr} . This interfering element, I argue, is the noun *misgeret*.”

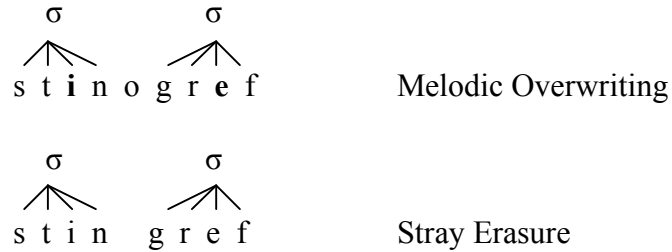
It is crucial to notice that the verbal pattern CiCCeC (*pi’el*) has slots for a four consonants. Arad argues that the presence of the *m-* in the verb shows that it is derived from the noun *misgeret*, and

not from the root \sqrt{sgr} . This seems to be correct, since if *misger* were derived from the root \sqrt{sgr} , it would surface as **siger*, as occurs with other *pi'el* verbs, for example *xizeq* ‘to strengthen’.¹

However, the word pair *misger/misgeret* seems to be a poor example to demonstrate denominal verb formation, since at first glance, one would be more likely to assume that *misgeret* is derived from *misger*, since there is an additional suffix *-et* present on the noun. One could argue that *misger* is, in fact, derived from a four-letter root \sqrt{msgr} , and is then merged with an N head, which attaches the nominalizer suffix *-et* to derive the noun *misgeret*. This explanation appears to account for the semantic dependency of the two words, just as well as Arad’s description. Arad (2003: 746 fn. 5) admits that what happens to *-et* is “yet to be explained”, and refers the reader to Bat-El (1994) for instances of final syllable truncation in borrowed words. Bat-El (1994) and Ussishkin (2005) both argue that the Hebrew verb is limited to two syllables (except in the case of the *hitpa'el* binyan, which has three), a property that Ussishkin (2005: 190) calls “fixed prosody”. Fixed prosody has the effect of causing truncations in a process Bat-El (1994: 582) calls “Stray Erasure”. Hebrew syllabification occurs edge-in as the following example derivation shows (Bat-El’s example 12):



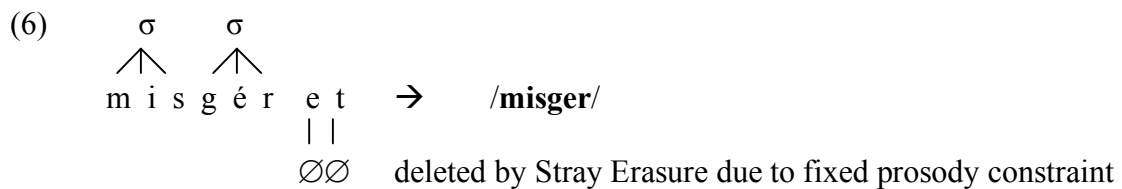
¹ Historically, the *pi'el* binyan had a gemination of the second consonant, as in Classical Hebrew *kittev* ‘he wrote out’. In Modern Hebrew, this gemination has been lost, although second consonants do not spirantize after vowels in the *pi'el* as they do in the other binyanim: i.e. in *qibel* ‘he received’ (*pi'el*) the /b/ does not change to /v/ as it normally does when following a vowel. Cf. *katav* ‘he wrote’ (*pa'al*).



In (4), fixed prosody allows two syllables, one of which aligns with the left edge, and the other with the right. This leaves the /o/ unsyllabified, and consequently it is truncated. Under this analysis, we would expect *misger* to be syllabified as **misgret*, because the second syllable should align with the right edge of *misgeret*, and therefore include the final /t/. The answer to this problem may lie in the fact that *misgérét* has penultimate stress instead of final stress as *stenográf*. Bat-El (1994: 585) mentions that other verbs that are derived from nouns that have penultimate stress truncate the final vowel (her example 13):

(5)	Base	Derived verb
	cenzúra ‘censorship’	cinzer ‘to censor’
	citáta ‘quotation’	citet ‘to quote’
	torpédo ‘torpedo’	tirped ‘to damage’
	simpáti ‘sympathetic’	simpet ‘to sympathize’

It thus appears that right syllable alignment actually aligns with the right edge of the stressed syllable rather than the right edge of the word. If this is the case, it would explain why the *-et* suffix is truncated in *misger*:



Perhaps a better argument to show that there are verbs derived from nouns rather than from roots in Hebrew is the phenomenon of cluster transfer in borrowed words as described by Bat-El (1994: 577-8 example 6-7).

(7)	Base	Derived verb
a.	xantariš ‘nonsense’	xintreš ‘to talk nonsense’
	telegraf ‘telegraph’	tilgref ‘to telegraph’
	sandlar ‘shoemaker’	sindler ‘to make shoes’
	sinxroni ‘synchronic’	sinxren ‘to synchronize’
b.	praklit ‘lawyer’	priklet ‘to practice law’
	traklin ‘salon, parlour’	triklen ‘to make something neat’
	šravrav ‘plumber’	šrivrev ‘to plumb’

The verbs in (7a) have a three consonant cluster in the pattern CiCCCeC, while the verbs in (7b) have the pattern CCiCCeC, even though all the verbs are in the *pi’el* binyan. If these verbs were derived from roots rather than the words in the left-hand column, it would be difficult to explain why the verbs in (7b) do not have the CiCCCeC pattern, since there is no sonority restriction on the clusters in **pirklet*, **tirklen*, or **širvrev*. The best explanation for why these two patterns exist seems to be that these are indeed denominal verbs that have the structure in (3).

2. The place of Idioms

In his argument against the lexicalist hypothesis, Marantz (1997) argues that there is more than one locality domain for special interpretation, which is difficult for a lexicalist to

explain. He argues that special meanings are defined syntactically: specifically, that the interpretation of idioms is constrained by the head that projects an agent. He states (1997: 208) “Nothing above this head may serve as the context for the special meaning of any root below this head, and vice versa.” This claim is founded by the following cross-linguistic empirical evidence (Marantz’s example 7):

- (8) a. No idioms with fixed agents
(root in agent position, context for special meaning within the VP)
- b. No eventive-passive idioms, but possible non-eventive stative idioms
- c. No idioms with causative morpheme and lower agentive verb, but possible idioms with causative and lower non-agentive verb

This second locality domain for special meaning seems to be justified in Hebrew as well, as the following idioms show:

- (9) a. *hotsi lo ‘et ha-mits*
take.out to.him Acc the-juice
‘be hard on someone and make their life bitter’
- b. *hidliq nora ‘aduma*
light (v) light (n) red
“ring warning bells, indicate an impending problem’
- c. *katav Noah b-ševa šgi’ot*
write Noah with-seven mistakes
‘make a lot of spelling mistakes’

These idioms seem to be subject to the locality domain described by Marantz, since their interpretations are not restricted to the interpretations of the individual words, but to the entire

construction as a unit. These idioms also conform to (8a), since they do not have fixed agents. From this evidence, it appears that Arad's locality constraint is only one of several locality domains that operate in natural languages.

There is a class of words that seems to defy Arad's locality constraint. Consider the following English words:

- (10) a. *nature* → *natural* → *naturalize*
b. *transmit* → *transmission*

In (10a), the adjective *natural* is derived from the noun *nature*, presumably in the manner illustrated in (3). The interpretation of *natural* is entirely dependent on *nature*. The verb *naturalize*, however, has a separate, idiosyncratic meaning that is not dependent on the word from which it is derived. Similarly, in (10b), *transmission* can have an idiosyncratic meaning that is not dependent on the verb *transmit* (namely, the mechanical device). One could argue that *transmission* is derived directly from the root $\sqrt{\text{transmit}}$ rather than from the verb *transmit*, and thus explain its idiosyncratic meaning, but this explanation does not seem to be available for *naturalize*, since *natural* does not seem to be a root, but rather an adjective derived either directly from the root $\sqrt{\text{nature}}$, or from the noun *nature*.

From these types of words, it appears that there are exceptions to Arad's locality constraint. This is not to say that Arad's generalization should be abandoned. Marantz (1997: 208) states: "In point of fact, the locality domains for special meanings do cut across the Word, sometimes carving out structures smaller than the Word, sometimes bigger." From this argument, perhaps we can assume that *naturalize* is another kind of idiom, albeit one word, that is assigned its interpretation in a locality domain higher than the one argued for by Arad.

3. Japanese Lexical Causatives and the Binyanim

Volpe (2005: 43) presents data from Japanese that at first glance seem to present a problem for Arad's locality constraint. These data are nominalizations of causative verbs:

(11) $\sqrt{\text{aw-}}$ \rightarrow *awase* (v) 'join' \rightarrow *awase* (n) 'a lined kimono'

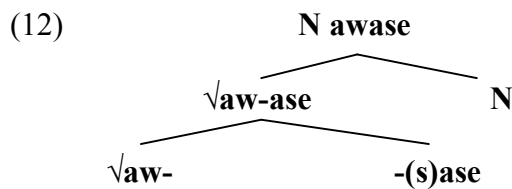
$\sqrt{\text{chir-}}$ \rightarrow *chirasu* 'scatter' \rightarrow *chirashi* 'a leaflet'

$\sqrt{\text{d-}}$ \rightarrow *dasu* 'expel' \rightarrow *dashi* 'soup stock'

$\sqrt{\text{nag-}}$ \rightarrow *nagasu* 'wash away' \rightarrow *nagashi* 'a sink'

In these examples, the nominalizations clearly have idiosyncratic interpretations that are not compositionally derived from the verbs they are derived from. Perhaps these could be analyzed by arguing that there are two locality domains at work here, one on the V head, and another on the N head. Volpe, however, takes a decompositional approach that preserves Arad's generalization.

Volpe argues that the root can merge with what he calls an 'affixal particle' before it merges with a feature bearing head. This leads to a dichotomy of nominalizations: root nominalizations and radical nominalizations. He argues (2005: 59) that there is a semantic difference between these types of nominalizations: "Nominalizations from morphologically simple roots are semantically transparent, typically events, activities, and less frequently agents... On the other hand, nominalizations from radicals are frequently of the non-compositional type..." Using this argument, he analyzes the nouns in (11) to have the following structure, which does not violate Arad's locality constraint:



In (12), *-(s)ase* is joined to the root before the root is merged with the N that assigns the form its interpretation. This explains why the causative meaning of *-(s)ase* is not present in the nominalization ‘a lined kimono’. This also explains why the nominalization is not semantically transparent.

There seems to be evidence for this type of dichotomy in Hebrew as well. Each binyan except *pa'al* has a set of functions that in some cases seem to affect the syntactic structure of the clause. For example the *hif'il* binyan is the causative binyan, the *hitpa'el* is for reflexives, reciprocals, and iteratives, and the *nif'al* is the passive binyan. Occasionally, however, one encounters a verb that is in one of these binyanim, but does not seem to exhibit the functional properties of that binyan. Take for example the word *hitpalel* ‘he prayed’. This verb is in the *hitpa'el* binyan, but it is not reflexive, reciprocal, or iterative. Another example is the verb *niba'*, ‘he prophesied, was a prophet’ which is in the *nif'al* binyan. However, there does not seem to be anything passive about prophesying. Perhaps these verbs can be analyzed as having a structure similar to that of (12) above, where the affixes from the binyanim are added to the root morpheme before it merges with the V head. This would explain why the semantic material of the binyan affixes is not present in the interpretation of the verb.

To summarize thus far: Arad’s locality constraint, allowing for Volpe’s notion of affixal particles, gives us an excellent account as to why some words behave as if they are derived from words, while maintaining the notion of a consonantal root which seems to be psychologically real based on evidence from psycholinguistic experiments. There does seem to be evidence that points to the existence of more than one locality domain, as argued by Marantz. Specifically, idioms are assigned their interpretations not at the word level, but at the level of the head that

assigns an agent. The next section will take up the issue of whether the root is actually a stem of the form CCVC.

4. Root or Stem

Up to now, we have gone along with Arad's argument that the consonantal root exists as the base of affixation in root-derived words. On the other hand, Ussishkin (2005: 183) argues that this is not the case, and in fact, the *pa'al* forms are the base of affixation. Under his analysis, all verbs are word-derived rather than root-derived. Thus, he gives a chart (his example 78) for the inputs of the different binyanim (*pu'al* and *huf'al* are passives of *pi'el* and *hif'il* respectively):

(13) Binyanim and their inputs

pa'al	pa'al
nif'al	pa'al-ni
pi'el	pa'al-i e
pu'al	pi'el-u a
hitpa'el	pa'al-hit- a e
hif'il	pa'al-hi- i
huf'al	hif'il-u a

There seems to be evidence that Ussishkin is correct in arguing that a stem is the base of affixation, however, I will argue that it is not the *pa'al* form, but a stem of the form CCVC.

Ussishkin (2005: 183 fn. 12) notes that a form besides the *pa'al* could be the base of affixation based on the fact that in future, imperative, and infinitival forms of *pa'al* verbs, there is an unpredictable vowel. Specifically, some verbs take an /o/ in these forms, such as *yixtov* 'he

will write’, while others take an /a/, such as *yilmad* ‘he will study’. Similarly, biconsonantal verbs have unpredictable vowels in these forms: *yamut* ‘he will die’, and *yašir* ‘he will sing’. Waltke and O’Connor (1990: 367-8) argue that historically, there was a three-way vowel alternation in Semitic that represented a distinction between fientive (*CaCaCa), temporary state (*CaCiCa), and lasting state (*CaCuCa) verbs, as exemplified by the following examples from Arabic:

- | | | |
|------|---------------|--------------------|
| (14) | <i>nazara</i> | ‘to look at, see’ |
| | <i>salima</i> | ‘to be safe, well’ |
| | <i>hasuna</i> | ‘to be beautiful’ |

However, even in Classical Hebrew, this distinction is not always reliable. In Modern Hebrew, there does not appear to be any pattern to the vowel alternations; rather they are unpredictable. This suggests that this vowel must be part of the root morpheme, since there is no way for the vowel to be determined through grammatical processes. In contrast, the *pa’al* past tense form of the verb has a completely predictable vowel pattern, namely /CaCaC/ for triconsonantal roots and /CaC/ for biconsonantals. This suggests that this past tense vowel pattern is affixed to the root morpheme rather than being part of it. Based on this evidence, it appears that the root morpheme does not have the form \sqrt{CCC} , but \sqrt{CCVC} or \sqrt{CVC} . If this is correct, then vocalic overwriting occurs at all stages of word formation in Hebrew, including the level where the root morpheme is merged with a feature bearing head.

5. Conclusion

Arad’s locality constraint appears to hold cross linguistically, based on the evidence examined here from Hebrew, Japanese, and English. This locality constraint states that the first

feature bearing head with which the root is merged assigns the interpretation of a root. Idioms present evidence that there is more than one locality domain in natural language. Volpe argues that the root morpheme can be merged with affixal particles before it is merged with a feature bearing head, as in the case of Japanese nominalizations of lexical causatives. From this locality constraint, we can see that there is a distinction between words derived from roots and words derived from other words, based on semantic and morphological criteria. This seems to unite the evidence from denominal verbs and verbs formed from borrowed words that shows that verbs are formed from nouns, and psycholinguistic evidence that shows that the root is psychologically real. Finally it was argued that root morphemes contain a stem vowel in addition to the consonants.

References

- Arad, Maya 2003. 'Locality Constraints on the Interpretation of Roots: The case of the Hebrew denominal verbs' *Natural Language and Linguistic Theory* **21**: 737-778.
- Bat-El, Outi 1994. 'Stem Modification and Cluster Transfer in Modern Hebrew', *Natural Language and Linguistic Theory* **12**: 571-596.
- Deutsch, Avital and Frost, Ram 2003. 'Lexical Organization and Lexical Access in a Non-Concatenated Morphology', in *Language Processing and Acquisition in Languages of Semitic, Root-Based, Morphology*, J. Shimron (ed), 165-186. Amsterdam: John Benjamins Publishing Company.
- Marantz, Alec 1997. 'No Escape from Syntax: Don't try morphological analysis in the privacy of your own lexicon', in *University of Pennsylvania Working Papers in Linguistics*, Dimitriadis, Siegel, et al., (eds) Vol. 4.2: 201-225.
- Milon Rav-Milim (online Hebrew dictionary) <http://www.ravmilim.co.il>
- Ussishkin, Adam 1999. 'The Inadequacy of the Consonantal Root: Modern Hebrew denominal verbs and output-output correspondence', *Phonology* **16**: 401-442.
- Ussishkin, Adam 2005. 'A Fixed Prosodic Theory of Nonconcatenative Templatic Morphology', *Natural Language and Linguistic Theory* **23**: 169-218.
- Volpe, Mark 2005. 'Japanese Morphology and its Theoretical Consequences: Derivational morphology in Distributed Morphology', Ph.D. dissertation, Stony Brook University.
- Waltke, Bruce and O'Connor, Michael 1990. *An Introduction to Biblical Hebrew Syntax*. Winona Lake, Indiana: Eisenbrauns.