

**volume 4, 2022**

**Bolozky, Shmuel**

**Productivity of Word  
Formation Patterns:  
Modern Hebrew vs.  
Earlier Phases of the  
Language**

---

Bolozky, Shmuel. 2022. "Productivity of Word Formation Patterns:  
Modern Hebrew vs. Earlier Phases of the Language". *Radical: A  
Journal of Phonology*, 4, 329-356.

Editor: Noam Faust  
Reviewers: Aviad Albert, Yael Reshef

# **PRODUCTIVITY OF WORD FORMATION PATTERNS: MODERN HEBREW VS. EARLIER PHASES OF THE LANGUAGE**

BOLOZKY, SHMUEL (UNIVERSITY OF MASSACHUSETTS AMHERST)

In Biblical, Mishnaic and Medieval Hebrew, the degree to which certain *mifkalim* (discontinuous word-formation patterns; called *binyanim* in the verb system), as well as some linear words formation patterns, tended to be associated with some semantic characteristics is far less noticeable than it (often) is in Modern Hebrew. The proposed reason is that when new words were coined, the “revivers” of Modern Hebrew as a spoken language as well as later word-coiners made a conscious effort to neologize words based on what looked like existing historical semantic traits, which caused the sometimes-tenuous form-meaning relationships in the original *mifkalim* to become more regular, and consequently more productive, in Modern Hebrew. It is also argued that the innovators preferred *mifkalim* including prefixes and suffixes, which tend to be more transparent than affix-less ones. Thus, for instance, less new segholate nouns (without affixes) were introduced in Modern Hebrew than in all periods of Classical Hebrew combined, since segholates are typically not associated with particular semantic traits, whereas realizations in Modern Hebrew of patterns like *maCCeC* and *maCCeCa*, which in a noticeable number of cases tend to

be associated with instruments/tools, significantly outnumber those introduced in all earlier periods (Biblical, Mishnaic, Medieval) put together. Independently of that, it has also been shown (Bolzky forthcoming) that forms derived in Modern Hebrew by linear suffixation (of *+i*, *+ut*, *+on*, etc.) overwhelmingly outnumber those introduced in earlier phases of the language, owing to the greater transparency of the derivation base resulting from linear suffixation – as well as of the suffix, of course.

Modern Hebrew; Morphology; Neologisms; Productivity; Transparency

## 1 PREFACE

For over 1,700 years after the failure of the Bar-Kokhva revolt, the Hebrew language survived essentially as a written and liturgical language – mostly for ritual purposes, but also in medieval and early modern religious texts, in rabbinic responsa, in some poetry, in philosophical writings, in religious textbooks, letters, etc. Occasionally it was also used in basic spoken communications involving oral interaction between members of Jewish communities who did not share a common Jewish language, e.g., Yiddish, Judeo-Spanish or Judeo-Arabic. In the middle of the 19<sup>th</sup> Century, with the emergent Enlightenment (Haskalah) and later the Zionist movement, secular Hebrew literature (poetry included) began to be published, mostly in Eastern Europe. The followers of the Haskalah movement tried to write in pure Biblical Hebrew – only in poetry and belletristic prose, whereas other types of texts, e.g., science or philosophy, were written in a mixed style. In belletristic texts they obviously made an effort, but often failed to comply with the rules of Biblical Hebrew. The revivalists and Zionists, who realized that the Bible was a rather limited corpus (of merely 8000-9000

lexical items), determined (starting with the example of the writer Mendele Mokher Sfarim) that **any** historical level of the history of Hebrew is a legitimate source to draw from when “reviving” the spoken language – which was a central goal of the national revival process. Even the exclusively-written Medieval Hebrew was regarded as an appropriate source for drawing lexical items that will reflect the current needs of its speakers. So following this literary revival, the European Zionists, primarily those who had already immigrated to Palestine, concentrated their efforts on reviving spoken Hebrew based on all available historical sources. Considerable credit goes to the lexicographer Eliezer Ben-Yehuda, who compiled a major Hebrew dictionary, and who, in the 1880’s, raised his son in an exclusively-Hebrew-speaking environment, as artificial as it was. Most of the work, however, was undertaken by a new cadre of teachers in Palestine, who were determined to teach all subjects at their schools in a total “Hebrew immersion” environment. Consequently, by the end of the second decade of the 20<sup>th</sup> Century, there was already a group of children and adolescents who could be regarded as true “native speakers” of Hebrew.

Clearly, for the needs of the modern world, the historical sources were rather limited, so there was urgent need, already felt in the early Enlightenment period, for new words and terms reflecting current realities – hence the urgent drive to neologize, for both written and spoken purposes. As is commonly known, word-formation mechanisms in Semitic languages are essentially of two types: linear affixation (of prefixes or suffixes), as in most European languages, or discontinuous derivation, in fixed patterns of consonant-vowel configurations, plus affixes when required, in which non-concatenative consonant sequences (representing consonantal “roots” which often share some basic semantic content) are “inter-digitated,” similarly to what happens in small groups of English “strong” verbs e.g., TaKe-TooK-TaKen, SHaKe-SHooK-SHaKen, FoRSaKe-FoRSooK-FoRSaKen (Bolzky 1999). Although both types of mechanism are productive in the language (see Berman 1987, Bolzky and Schwarzwald 1992,

Bolozky 1999, and elsewhere), linear derivation has been on the increase for quite a while, in particular derivations that involve suffixes (see Bolozky forthcoming), because both the stem, whose syllabic structure is not affected by the derivation process, and the suffix, which in itself is prominent, transparent and fixed, maintain one-to-one correspondence between the “underlying structure” and the structure of the derivation output (Dressler 1989).

The claim made below is that the “revivers” and later word-coiners who introduced new words into Modern Hebrew were primarily motivated by their intention that the new lexical items be transparent enough to be easily processed and easily understood. In the case of linearly-derived items, it was achieved by attaching familiar affixes to existing familiar stems; furthermore, linear suffixation has the additional prominence of a word-final component. In cases where the derivation was essentially linear, but not totally so, semi-automatic phonological processes bridged between the linearly-combined morpheme sequence and the output, which did not significantly interfere with the processing of the resulting output, e.g. vowel elision in *bitaxon* ‘confidence, trust, faith, security, defense’ + *i* > *bitxoni* ‘of security (adj.).’ In discontinuous derivation the preference was, generally: (a) a familiar consonant-vowel pattern, with or without an associated prefix/preformative or suffix/afformative, preferably one that has some stable characteristic semantic trait; (b) a familiar skeletal consonantal “root,” preferably also one that is associated with some semantic core; (c) absence, or just minimal presence, of opacity-causing elements, particularly in the stem, e.g., gutturals, assimilated root elements (like *n*), or elided/weakened ones (like *w*, *y*) that may obscure the identity of the “root.” We will also argue that at least in one or two patterns, the intention to achieve maximal transparency resulted in semantic traits that were either never intended to be conveyed as such in the original texts, or were quite marginal. The characterization of the development of such patterns is essential to proving the claim made here that achieving maximal transparency was the primary motivation of the

revivers and later word-coiners, even if the evidence from historical precedents was slim.

## 2 TWO LINEARLY-DERIVED PATTERNS AND THEIR DISCONTINUOUS COUNTERPARTS

We will now look at two very productive linearly-derived patterns in Modern Hebrew, and their discontinuous counterparts: *+i* adjectives and *+on* (or fem. *+ónet*) diminutives.

### 2.1 *+i*-ADJECTIVES AND THEIR DISCONTINUOUS COUNTERPARTS

As pointed out in Bolozky (1999), The largest group of **adjectives** is of those ending with *+i*, about 2,100 (plus another 750 borrowed ones). Next come (discontinuous) verb-related ones: *meCuCaC* (about 1,300), *CaCuC* (over 1,100), *muCCaC* (over 370), *CaCiC* (close to 300), and *niCCaC* and *CaCeC* (each around 100). Clearly, the productivity of *meCuCaC* is due to the great productivity of its related *pi`el binyan*, where it functions as the passive participle, which accounts for its adjectival status. The patterns are well-known, so below are only a few illustrations, taken from Bolozky (1999):

## (1) NEW ADJECTIVES IN THE 1983 EVEN-SHOSHAN SUPPLEMENT (NOT FOUND IN EVEN-SHOSHAN 1970 PROPER)

FORM	GLOSS	SOURCE	GLOSS
<b>+i Adjectives:</b>			
<i>btixuti</i>	of safety	<i>b(e)tixut</i>	safety
<i>mimsadi</i>	of the establishment	<i>mimsad</i>	establishment
<b>meCuCaC:</b>			
<i>medupBas</i>	depressed	<i>dipBes</i>	depress ( < <i>dipBésya</i> ‘depression’)
<i>memuxfav</i>	computerized	<i>muxfav</i>	be computerized ( < <i>maxfev</i> ‘computer’)
<b>muCCaC:</b>			
<i>mulad</i>	inborn, innate	<i>hulad</i>	be caused to be born ( < <i>yalad</i> ‘give birth’)
<b>CaCiC:</b>			
<i>’axif</i>	enforceable	<i>’axaf</i>	enforce
<i>hafix</i>	reversible	<i>hafx</i>	turn over, reverse
<b>niCCaC:</b>			
<i>niBhav</i>	majestic	<i>maBhiv</i>	majestic

As in the case of *meCuCaC*, the participle-adjective relationship applies to the other verb-related adjectives as well, but the *CaCiC* pattern is exceptional. Although it is close to *CaCuC*, the passive participle of *pa`al*, today it is used mostly for *-able*-type adjectives referring to the possibility that the associated noun can be affected by the underlying verb, such as *šaviB* ‘fragile, that can break/be broken’ (from *šavaB* ‘break’), *kavil* (historically *qavil*) ‘acceptable’ (from *kibel/qibel* ‘accept’), *daxis* ‘compressible,’ (from *daxas* ‘compress’), *xadiB* ‘penetrable’ (from *xadaB* ‘penetrate,’ etc.). (Gadish

2008) points out that this is by no means the exclusive meaning associated with *CaCiC*, which also denotes non-able-type adjectives (*baxiB* ‘senior,’ *zahiB* ‘careful,’ *yaxid* ‘single, singular, sole,’ *na`im* ‘pleasant,’ *`adiv* ‘polite,’ etc.), as well as nouns (*gaviṣ* ‘crystal,’ *navi* ‘prophet,’ *nasi* ‘president,’ *`atid* ‘future,’ *ṣatīax* ‘rug,’ *ṣalīax* ‘messenger,’ *xaviṣ* ‘ploughing,’ *kaciB* ‘harvest,’ etc.); there are also other patterns (partially) denoting possibility, and there are indirect ways of expressing it. Nevertheless, in most speakers’ consciousness, *CaCiC* is clearly the preferred pattern to denote possibility: *`atim* ‘impermeable,’ *`axil* ‘edible,’ *ba`iB/dalik* ‘inflammable,’ *caviB* ‘accumulable,’ *gamiṣ/kafiṣ* ‘flexible,’ *xadiB* ‘permeable,’ *hadiB* ‘repeatable,’ etc., as well as similar items found in dictionaries that are not commonly used in everyday speech, but are still understandable and accessible to most Israeli speakers, such as *gaṣiB* ‘bridgeable,’ *gaziB* ‘cuttable,’ *kavis* ‘washable,’ *lamid* ‘teachable; easily learned,’ *laviṣ* ‘wearable,’ and many more. However, examining all *CaCiC* realizations that were introduced in Classical Hebrew, we found only one true able-type adjectives: *paBix* ‘breakable, crumbling’ in Medieval Hebrew (Med). *xasin* ‘strong’ and *baxiB* ‘older, senior’ in Biblical Hebrew (BH) come close, but that’s about it, it seems. In other words, the word-coiners realized (as also suggested by Gadish) that the able-type category, which exists in most European languages, has no parallel in Classical Hebrew, and in order to “hang it” on some precedent, picked up very few items in *CaCiC* that appeared to justify productively creating new able-type adjectives. Speakers easily process the presumed *CaCiC*/able-type connection, and use it in ever-increasing productivity rate – although admittedly, mostly in the higher register; the only truly-colloquial use of it that we are aware of is in items like *naṣik* ‘kissable,’ e.g., *yéled naṣik* ‘a kissable child...’ (personal communication, Dorit Ravid). Regardless, this is our first clear indication of the modern trend to characterize historical patterns with semantic traits so as to increase semantic transparency, even if those traits were hardly there to start with. It was not a common practice, but it did exist. It should be mentioned, though, that the word-coiners



may have (possibly) been aware that the morpheme expressed by the morph *CaCuC* is also associated with an alternative morph *CaCiC*, which is close to it phonologically as well as semantically (state vs. “potential for state”), and as pointed by Faust (forthcoming), Modern Hebrew speakers have also been able to use it so as to avoid the potential unintended repetition of a sequence of two *u*’s in related abstract nouns, *CaCuCut* > \**CCuCut*, ending with *CCiCut* through haplology. Because of the similarity/closeness, *CCiCut* serves as the nominalization pattern of both *CaCiC* and *CaCuC*, and possibly makes further word formation more likely in either pattern.

As noted in Bolozky (forthcoming), the first and primary reason for the dominance of linear derivation with the suffix *+i* in the adjective category is its constituting the “default” pattern for deriving adjectives which denote “minimal” modification of the stem noun, meaning ‘having the quality of,’ or ‘related to,’ e.g., *xafmal* ‘electricity’ + *i* > *xafmali* ‘electric,’ *mizBax* ‘east’ + *i* > *mizBaxi* ‘eastern,’ *taBbut* ‘culture’ + *i* > *taBbuti* ‘cultural,’ etc. As noted above, although many of the realizations are strictly linear, some involve phonological rules that used to be phonetically-conditioned and/or purely automatic phonetic processes, e.g., *lafon* ‘tongue; language’ + *i* > *lefoni* ‘lingual, linguistic’ involves a formerly-phonetic *a*-reduction two syllables away from the main stress, as well as maintaining a phonetically-necessary minimal *e* in order to prevent a syllable-initial sequence violating the sonority hierarchy (*lf...* > *lef...*). Such processes hardly seem to interfere with the listener’s ability to process the pattern and its components. Furthermore, there are numerous instances that can be regarded as either linear derivation with an *-i* suffix, or as realization of some discontinuous pattern; *hitpatxuti* ‘developmental,’ for instance, may be characterized either as linear *hitpatxut* ‘development’ + *i* > *hitpatxuti*, or as a realization of the discontinuous *hitCaCCuti* pattern, similar to *hitnadvuti* ‘volunteering (adj.),’ *hitBafsmuti* ‘impressionistic,’ etc. The list is long; for an extensive one, see Bolozky (2020), which in addition to an alphabetical index also includes a parallel one arranged by pattern.

Forms ending with the suffix *-i* could already be found in Biblical Hebrew, but their distribution then was limited (only 65), and served primarily to denote gentile terms (*yehudi* ‘Judean,’ *kna`ani* ‘Canaanite,’ *plisti* ‘Philistine,’ *’arami* ‘Aramaic,’ *’emori* ‘Amorite’), or ‘residents of...’ (*gil`adi* ‘from Gilead,’ *tifbi* ‘from Tifb,’ *yevusi* ‘from Yevus, Jebusite’), for directions (*cafon* ‘north’ + *i* > *cfoṇi* ‘northern’). There were a few ordinary ones (e.g., *pnimi* ‘internal’), but those were rare. In Mishnaic Hebrew the use of this pattern expanded by another 65 entries, but it was still rather limited, and far from constituting the default adjectival realization of “having the quality of.” In Medieval Hebrew, though, when the influence of Arabic peaked, the Jews adopted the Arabic *nisba* (linear suffix of +*i* to a noun that converts it to a related adjective), which resulted in a significant jump in *nisba*-type word formation (another 320). The word-coiners needed such a derivation pattern, since it provided maximal transparency that will immediately be recognized as the “having the quality of” default adjective. Consequently, the number of words with the suffix +*i* added in the Modern period is quite large, some of it by word-coiners’ initiative, and many by the Hebrew Language Academy’s creations and by writers and by lexicographers, as well as by the public at large: 1655 or so, plus another 750 borrowed ones – cf. also Berman (1978), Ravid and Shlesinger (1987), Ravid *et al* (2016). In productivity tests, Bolozky (1999) reports *ad hoc* creations like *bagác(it)* ‘presented the Supreme court’ (from *bagac*, the acronym for the Supreme Court), *gBili* ‘made on a grill’ (from *gBil*), etc. By now, the formation of +*i* adjectives is the **most productive** word-formation device in the language, regardless of category.

## 2.2 +*on*-DIMINUTIVES AND RELATED DIMINUTION PATTERNS

Another essentially-linear pattern involves the suffix +*on*, and its feminine counterpart, -*ón-et*. We will discuss it here because similarly to the *CaCiC* able-type pattern, it originally had very little to do with what it tends to designate today. The word-coiners

were looking for a transparent derivation for diminution that will be based on Classical Hebrew texts, and there was little there. Still, they saw some possible precedents, and determined that those precedents justify using *+on* to construct a transparent diminution pattern that will be similar to what is found in most European languages. Today the *+on* pattern dominates the semantic category of diminution, being, essentially, its default pattern; for detailed descriptions of the historical development of the diminution category and its current pattern distribution, see Bolozky (1994, 1999). Below are some data from Bolozky (1999):

(2)

BASE	GLOSS	DIMIN. FORM	GLOSS
<b><i>+on/+ón+et</i></b>			
<i>'abuv</i>	oboe; tube	<i>'abuvon</i>	small oboe; tube-shaped fish
<i>'avatíax</i>	watermelon	<i>'avatixon</i>	small watermelon
<i>'ekdax</i>	pistol	<i>'ekdaxon</i>	small pistol
<i>'aBnav</i>	rabbit	<i>'aBnavon</i>	small rabbit
<i>bdixa</i>	joke	<i>bdixónet</i>	little joke
<i>xavila</i>	package	<i>xavilónet</i>	small package
<i>paBgit</i>	young chicken	<i>paBgiyónet</i>	young, inexperienced girl

Diminution mechanisms other than *+on/+ónet* are available as well, but are used less frequently:

***+it***

<i>dugma</i>	example	<i>dugmit</i>	sample
<i>magaf</i>	tray	<i>magafit</i>	small tray

<i>koxav</i>	star	<i>koxavit</i>	asterisk
<i>sulam</i>	ladder	<i>sulamit</i>	# sign
<i>pitka</i>	note, letter	<i>pitkit</i>	small printout
<i>maBkol</i>	supermarket	<i>maBkolit</i>	mini-market
<i>cinoB</i>	pipe	<i>cinoBit</i>	narrow pipe; capillary
<b>+čik</b>			
<i>baxuB</i>	young man	<i>baxúBčik</i>	boy (affectionate)
<i>katan</i>	small	<i>katánčik</i>	very small (affectionate)
<i>napolyon</i>	Napoleon	<i>napolyónčik</i>	small, but with big ambitions
<b>+iko</b>			
<i>xayal</i>	soldier	<i>xayaliko</i>	young soldier (affectionate)
<b>Reduplication</b>			
<i>bahiB</i>	light colored	<i>behaBhaB</i>	quasi-light colored
<i>bacal</i>	onion	<i>b(e)calcal</i>	small onion
<i>géveB</i>	man, male	<i>gvaBvaB</i>	young man pretending to be a man

For a formal, insightful analysis of reduplication (and its sub-types) as a diminutive device, see Faust (2014). Except for reduplication, though, most diminutive-formation patterns involve suffixes. *+on* also refers to some other semantic categories, like certain abstract nouns (such as *zikaBon* ‘memory,’ *dimyon* ‘imagination’), list of items (*mexiBon* ‘price list,’ *Je’elon* ‘questionnaire’), types of periodicals (*fvu’on* ‘weekly,’ *mekomon* ‘local newspaper’), temporary units of residence (*paxon* ‘tin shack,’ *badon* ‘tarp unit; tent’), statistical units (*xecyon* ‘median,’ *asiBon* ‘decile’), geological period units (*flifon* ‘Tertiary,’ *Bevi’on* ‘quartile’), or instruments (‘*afpaton* ‘garbage container,’

*mešivon* ‘answering machine’), each with limited productivity, but still, *+on* (and its feminine counterpart *+ón+et*) is most productive in denoting diminutives.

The productivity of *+on* as the preferred diminutive category is also manifest in its being appended even to forms to which other diminutive suffixes have been attached earlier, even to a form to which an earlier *+on* suffix had been appended. This is not semantically vacuous suffixation, since further suffixation further diminutivizes the form – a clear indication of productivity:

(3)

FORM	GLOSS	DIMINUTION	GLOSS	FURTHER DIM. GLOSS	
<i>xatul</i>	cat m.	<i>xataltul</i>	kitten m.	<i>xataltulon</i>	tiny kitten (m.)
<i>xatula</i>	cat f.	<i>xataltula</i>	kitten f.	<i>xataltulónet</i>	tiny kitten (f.)
<i>gag</i>	roof	<i>gagon</i>	small roof; awning	<i>gagonon</i>	tiny roof/awning

This amazing productivity is surprising, in view of the fact that the *+on* suffix is not used uniquely for diminutives, and marks other lexical items with clearly different semantic traits that distinguish them as separate coherent groups. And what is even more surprising is that the evidence supporting this feature in the Classical sources was so slim! Observe the summaries of *+on* diminutives below:

(4) *+on* Dimin.    BH 1                      Mish 2                      Total Pre-MH 3                      MH 127

As far as we could tell (and as also noted in Segal 1925), there were only three possible instances of *+on* diminution in pre-modern Hebrew: *’ifon* ‘the pupil of the eye’ (the explanation being that it looks like a small person...) in BH, *Helbon* ‘egg white’ (diminutive of *xalav* ‘milk’?), and *saharon* ‘crescent’ (diminutive of *sáhar* ‘moon’?). But the word-coiners needed a clear, transparent identifier of diminution, preferably a

suffix. And they were unbelievably successful in promoting this essentially-new pattern. The diminutive +*on* is so productive today, that it can be attached to virtually any noun. If *fulxan* is ‘table,’ ‘a small table’ is *fulxanon*, if *`acic* is ‘flowerpot,’ ‘a small flowerpot’ is *`acicon*...

### 3 DISCONTINUOUS PATTERNS WITHOUT AFFIXES – THE SEGHOLES

Disyllabic segholate nouns without affixes are not that transparent. The absence of affixes means that there are no markers that would classify them as belonging to any particular semantic or syntactic category, except that by definition, they are nouns (although rarely, they may develop and “spill over” into other syntactic categories). They are penultimately-stressed CVCeC sequences (or CVCaC when a guttural is involved) whose underlying stem is CVCC, and can be classified according to their assumed historical base, as realized when a suffix is added, e.g., *dégel* ‘flag’ ~ *diglon* ‘small flag,’ *degel* ~ *digli* ‘my flag...’ The historical explanation: when the base, in this case *CiCC*, did not have a vowel-initial suffix appended to it, the final consonant cluster was hard for speakers of Classical Hebrew to articulate, and they consequently split it with a *seghol*; afterwards the base vowel assimilated to the following *seghol*, to facilitate articulation, but stress stayed on the base vowel, as it was before the split, which accounts for the penultimate stress. In some cases, the base *i* was not assimilated, but rather lowered to a *ceḲe* in the isolation form, and if the base vowel was *o*, that *o* was maintained. Clearly, when suffixes were appended, there was no articulation problem, since re-syllabification eliminated final clusters, e.g., *dig-lon*. The plural form is by itself a kind of *mifkal* on its own: *CCaCim* (Bolzky 1995, Bat-El 2012, and others).

What this means is that the processing of a segholate, other than its obvious identification as a noun, centers on the identification of the tri-consonantal root. We obviously cannot tell how concerned speakers of Biblical or Mishnaic Hebrew were

with the transparency of segholate nouns, although they would clearly process each form based on its consonantal root. The word-coiners must have assumed the same, but at the same time realized that except for denoting nouns, the suffix-less segholate patterns rarely carry semantic features as *mifkálím* on their own, and that with the main clue to segholate meaning being the consonantal root proper, speakers of Modern Hebrew would not find it that easy to process and decipher them. We believe that this is probably the reason why realizations in the various affix-less segholate patterns in Modern Hebrew are not as common as they were in earlier historical stages of the language, as the following table shows (for illustrations and details see Bolozky 2020):

(5) BI-SYLLABIC SEGHOLATE NOUNS W/O AFFIXES:

BH	MISH	MED	TOTAL	PRE-MH	MH	TOTAL
<i>CéCeC</i>	314	169	164	647	201	848
<i>CóCeC</i>	109	60	39	208	43	251
<i>CáCaC</i>	69	28	64	161	38	199
<i>CóCaC</i>	29	12	13	54	14	67
<i>CáCeC</i>	6	1		7	7	
<i>CáyíC</i>	25	11	5	41	15	56
<i>CóCi</i>	19	6		25	3	28
<b>Totals</b>	571	227	285	<b>1,083</b>	<b>314</b>	1,397

Thus, the segholate patterns are still fairly productive in Modern Hebrew, but not as are patterns marked with affixes. Note that the total number of segholate realizations in Modern-Hebrew is less than a third of the pre-modern totals. Compare with the distribution of the very productive *+i* adjective formation pattern discussed above:

(6) + *i* adjectives: BH 65      Mish 65      Med 320      Total Pre-MH 450  
 MH 1,655 (about 750 borrowed realizations excluded...)

Because of the absolute transparency of this pattern, of both stem and its prominent, unique suffix, the number of realizations in Modern Hebrew is almost four times the number of realizations of all three earlier periods combined. In other words, the proportions of comparative productivity of the segholate patterns and the *i*-adjective pattern in the Modern Hebrew period and in the Classical period are reversed...

#### 4 SOME PRODUCTIVE DISCONTINUOUS PATTERNS WITH AFFIXES

We will now briefly look at three discontinuous patterns and how their productivity is affected by the presence of affixes.

As noted above, although both linear patterns and discontinuous ones are productive in Modern Hebrew, patterns with affixes tend to be more productive and easier to process today, particularly those that include prominent suffixes, which are often identified with some categories or semantic traits, even when they are discontinuous. We will start with *maCCeC* (and its variants *maCaCeC* and *maCCéaC* when a guttural is involved):

(7)

<i>maCCeC</i> :	BH 18	Mish 18	Med 6	Total Pre-MH 42	MH 134
<i>maCaCeC</i> :	BH 3	Mish 1	Med 1	Total Pre-MH 5	MH 14
<i>maCCéaC</i> :	BH 4	Mish 3	Med 2	Total Pre-MH 8	MH 15
Totals:	BH 21	Mish 19	Med 7	Total Pre-MH 47	MH 148

In Modern Hebrew, most realizations denote instruments; in Biblical Hebrew, of the 25 realizations, about 9 refer to instruments:



(8)

<i>mazleg</i> ‘flesh hook, fork’	<i>maxtef</i> ‘mortar’	<i>malben</i> ‘brick mold’
<i>malmed</i> ‘goad, ox goad’	<i>macref</i> ‘crucible’	<i>masret</i> ‘frying pan’
<i>ma` (a)der</i> ‘weeding hook, hoe’	<i>marcéa`</i> ‘awl’	<i>maftéaH</i> ‘key’

and in Mishnaic Hebrew about 11 out of 18 – a higher proportion:

(9)

<i>maglev</i> ‘whip’	<i>magref</i> ‘trowel, rake’	<i>maHger</i> ‘ratchet lock’
<i>matHen</i> ‘grinding mill’	<i>maxbef</i> ‘pressing instrument’	<i>maxtev</i> ‘stylus, pencil’
<i>masreq</i> ‘comb’	<i>marzev</i> ‘gutter’	<i>mafpex</i> ‘watering can’
<i>malgez</i> ‘fork-like agricultural implement’		<i>malqeT</i> ‘pincers, tweezers’

In Medieval Hebrew, 4 out of 6 realizations are instruments, again a high proportion:

(10)

<i>mazreq</i> ‘injector’	<i>maHbeT</i> ‘carpet beater’	<i>masret</i> ‘metal scribe’
<i>maHtex</i> ‘cutters; -tome (in compounds)		

Thus, there existed a sufficient number of instrument realizations in Classical Hebrew to justify expanding the use of *maCCeC* to any new potential instruments in Modern Hebrew, almost all the 134 instances found. Here are some; more in Bolozky (2020):

(11)

<i>mavded</i> ‘electrical insulator’	<i>mavzek</i> ‘flash (photog.)’	<i>mav`eB</i> ‘burner’
<i>mavBeg</i> ‘screwdriver’ ‘amplifier’	<i>mavBez</i> ‘screw-tap’	<i>magbeB</i>
<i>maghec/megahec</i> ‘iron’	<i>madpes(et)</i> ‘printer’	<i>maxjev</i> ‘computer’
<i>maf`e`ax/mefac`e`ax</i> ‘nutcracker’	<i>makBeB/meKaBeB</i> ‘refrigerator’	<i>mafgeB</i> ‘launcher’

This is a typical case illustrating expansion of pattern use based on historical precedents. Another one is *maCCeCa* (or *maCaCeCa* when a guttural is involved):

(12)

<i>maCCeCa</i> :	BH 13	Mish 6		Total Pre-MH 21	MH 77
<i>maCaCeCa</i> :	BH 2		Med 1	Total Pre-MH 3	MH 9
Totals:	BH 15	Mish 6	Med 1	Total Pre-MH <b>24</b>	MH <b>86</b>

It also often refers to instruments. In Biblical Hebrew, only 5 out of 15 occurrences denoted instruments:

(13)

<i>magzera</i> ‘saw or axe’	<i>mazmera</i> pruning shears	<i>max(a)refa</i> ‘plough’
<i>maf`ena</i> ‘something to lean on’	<i>margema</i> ‘stone-throwing device’	

In Mishnaic Hebrew, 4 out of 6 refer to instruments.

(14)

*magrefa* ‘rake’                      *magrefa* ‘ancient musical instrument’  
*macrefa* ‘cricible’  
*mafḲexa* ‘press beam (stone)’

However, these 9 instrument realizations in pre-Modern-Hebrew sufficed for the word-coiners to characterize this pattern as referring to instruments as well, and to lead the way for this meaning to become the predominant semantic trait of *maCCeCa* as well (possibly because of the obvious connection to *maCCeC?*). Again, almost all 86 instances in Modern Hebrew denote instruments, and some of them refer to larger implements compared to the smaller *maCCeC* ones (possibly because of the size of *maxḲefa* ‘plow’? see, for instance, *mavḲega* ‘screwing machine’ vs. *mavḲeg* ‘screwdriver’). Below are just a few of the 86 instances; for more, see Bolozky (2020):

(15)

*mavxena* ‘test tube’                      *mavḲega* ‘screwing machine’                      *mavḲela*  
‘cooker’  
*magḲefa* ‘chute’                      *magḲesa* ‘crusher, grinding mill’  
*madpesa* ‘printing machine’   *makḲena* ‘projector’                      *matxexa* ‘clod crusher’

The last pattern to be discussed here is the *CaCéCet* pattern (with its variant *CaCáCat* when a guttural is involved):

(16)

<i>CaCéCet</i> :	BH 27	Mish 12	Med 4	Total Pre-MH 43	MH 135
<i>CaCáCat</i> :	BH 10	Mish 4	Med	Total Pre-MH 14	MH 12
Totals:	BH 37	Mish 16	Med 4	Total Pre-MH <b>57</b>	MH <b>147</b>

In Modern Hebrew most of the 147 occurrences refer to either sicknesses, to bodily defects, or to some other items carrying negative connotation. Of the 37 realizations in Biblical Hebrew, 15 refer to sicknesses etc.:

(17)

<i>bahéret</i> ‘white spots on skin’	<i>daléqet</i> ‘inflammation; high fever’	<i>yabélet</i> ‘ulcer’
<i>yaléfet</i> ‘itching scab or tetter’	<i>‘avéret</i> ‘blindness’	<i>‘acévet</i> ‘wound; sorrow; image/idol’
<i>carévet</i> ‘scar caused by a burn, ulcer or inflammation’		
<i>JaHéfet</i> ‘tuberculosis; leanness’	<i>saréTet</i> ‘cut, or incision’	
<i>gabáHat</i> ‘bald forehead’		
<i>sapáHat</i> ‘scurf, scab’	<i>cará`at</i> ‘leprosy’	
<i>qadáHat</i> ‘burning, fever’		
<i>qaráHat</i> ‘baldness of the crown of the head or of the back of the head’		

In Mishnaic Hebrew, only 2 of the 16 realizations refer to sicknesses etc.:

(18)

<i>maténet</i> ‘lumbago’	<i>caléqet</i> ‘scar’
--------------------------	-----------------------

In Medieval Hebrew 2 of the 4 forms refer to sicknesses etc.:

(19)

*bahéqet* ‘leukodermia, albinism’                      *Hacévet* ‘measles’

Although the number of precedents was not large, they provided the impetus for extensive use of the *CaCéCet/CaCáCat* pattern in Modern Hebrew (though in this case not as overwhelming) for sicknesses, bodily defects, and a few terms with negative connotation. A few illustrations follow; many of them, admittedly, are high-register innovations with which most speakers are not familiar. For the rest see Bolozky (2020):

(20)

<i>'adémet</i>	‘rubella	<i>'atéBet</i>	‘being left-handed’	<i>bacéket</i> ‘oedema’
<i>ba'éfet</i>	‘stench’	<i>gabévet</i>	‘verbosity; idletalk’	<i>galéfet</i> ‘eczema’
<i>gaBévet</i>	‘scabies’	<i>gazézet</i>	‘ringworm’	<i>dabéBet</i> ‘logorrhoea, torrent of talk’
<i>damémet</i>	‘hemophilia’	<i>vaBédet</i>	‘erysipelas’	<i>zapéket</i> ‘strumosis’
<i>xazéBet</i>	‘mumps’			
<i>xatétet</i>	‘urunculosis’	<i>xanéxet</i>	‘gingivitis’	<i>mayémet</i> ‘ascites’

## 5 CONCLUSION

Except for some attempts on the part of Ben-Yehuda, who initially advocated the use of additional roots from other Semitic languages, particularly from Arabic, the word-coiners insisted on following only existing Hebrew sources from past phases of the language. In many cases, they found appropriate patterns on the basis of which they could neologize new lexical items whenever the need for them arose. In a few cases, however, there hardly existed appropriate historical precedents, but they still found some that resembled what they were looking for, and were determined that they

constituted legitimate prototypes to build upon. Regardless, their guiding principle was as much transparency as possible, so that any neologism would be easy for the hearer/reader to process.

## 6 REFERENCES

- Bat-El, O. 2012. "Prosodic alternations in Modern Hebrew segolates". In M. Muchnik and T. Sadan (eds), *Studies in Modern Hebrew and Jewish Languages*. 116-129.
- Berman, R. A. 1987. "Productivity in the lexicon: New-word formation in Modern Hebrew". *Folia Linguistica* xxi. 425-461.
- Berman, R. A. and Y. Sagi. 1981. "'al daḥxey tecuḅat hamilim vexidushan begil tsa'ir (About tendencies in word formation and neologizing at a young age)". *Hebrew Computational Linguistics* 18. 31-62.
- Bolozky, S. forthcoming. "On the Role of Suffixes in the Formation of Hebrew Nouns and Adjectives."
- Bolozky, S. 2020. *Dictionary of Hebrew Nouns*, Jerusalem: Rubin Mass Publishers. 828.
- Bolozky, S. 2017. "ʃney sugim ʃel yacḅanut bitecuḅat milim, ḅexavat hekef 'o memukedet: tecuḅat ʃemot ute'aḅim basiyomot +an ve +on (Two types of productivity in word formation, broad or focused: formation of nouns and adjectives with the endings +an and +on)." *Baʃʃanut 'Ivḅit* 71. 7-16.
- Bolozky, S. 1999. *Measuring Productivity in Word Formation: the Case of Israeli Hebrew (Studies in Semitic Languages and Linguistics 27)*. Leiden: Brill. 253.
- Bolozky, S. 1995. "Hasegoliyyim -- gziḅa kaviv 'o mesoḅeget? (The segolates -- linear or discontinuous derivation?)". In O. R. Schwarzwald and Y. Shlesinger (eds.), *Hadassah Kantoḅ Jubilee Book*. Ramat Gan: Bar-Ilan University. 17-26.
- Bolozky, S. 1994. "On the formation of diminutives in Modern Hebrew morphology." *Hebrew Studies* 35. 47-63.
- Bolozky, S. and O. R. Schwarzwald. 1992. "On the derivation of Hebrew forms with the

- +ut suffix”. *Hebrew Studies* 33. 51-69.
- Dressler, W. M. 1989. “Prototypical Differences between Inflection and Derivation”. *Z. Phon. Sprachwiss. Komun. Forsch. (ZPSK)* 42. Berlin. 3-10.
- Even-Shoshan, A. 1963, 1970 (1980), 1983. *Ha-milon he-hexadaf* (The New Dictionary). Jerusalem: Kiryat Sefer.
- Faust, N. forthcoming. “Avoidance of Unintended Repetition”. Université Paris 8/ CNRS Structures Formelles du Langage Ms.
- Faust, N. 2014. “The diminutive morphology of Modern Hebrew”. In Nicola Grandi and Livia Kortvelyessy (eds), *The Edinburgh Handbook of Evaluative Morphology*. Edinburgh University Press. 238-245.
- Gadish, R. 2008. “daḥxey hahaba’a šel šem hatō’aḥ leciyun ha’ešfaḇut: ‘iyun bema’agaḥ hamunaxim šel ha’akademya uvamilonut ha’ivḇit (Manners of expressing the adjective denoting possibility)”. In A. Maman, S. Fassberg and Y. Breuer (eds), *Ša’aḇey Lašon: Mexkaḇim balāšon ha-’ivḇit, be-’aḇmit u-vilšonot ha-yehudim mugafim le-moše baḥ-’ašeḥ* Vol. 3. Jerusalem: Bialik Institute. 71-85.
- Ravid, D. et al. 2016. “Hebrew Adjective Lexicons in Developmental Perspectives: Subjective Register and Morphology.” *The Mental Lexicon* 11:3. 401-428.
- Ravid, D., and Shlesinger, Y. (1987). On the classification and structure of -i suffixed adjectives. *Hebrew Linguistics* 25. 59–70. [in Hebrew]
- Segal, M.Z. 1925. “ha-ze’eḇut be-’ivḇit (Diminution in Hebrew).” *Mada’eḇ ha-Yahadut I (Yedi’ot ha-Maxon le-Mada’eḇ ha-Yahadut III)*. 139-152.

---

**DISCUSSION WITH AVIAD ALBERT**  
**(UNIVERSITY OF COLOGNE)**

---

Albert, A. 2022. Discussion in Bolozky, Shmuel (auth), Productivity of word formation: Modern Hebrew vs. earlier phases of the language. *Radical: A Journal of Phonology*, 4, 351-356.

**COMMENTS**

This paper is highly recommended to anybody who is interested in the morphology of Modern Hebrew (MH). It focuses on the history of a few systematic and productive morphological derivations that, unbeknownst to many speakers of MH, were very different in both their scope and functionality in classical Hebrew varieties (Biblical, Mishnaic and Medieval Hebrew). The abundance of *+i* adjectives and *+on* diminutives in MH, alongside a few other systematic derivations that are mentioned in this paper, is a direct result of their high degrees of productivity and transparency, which could not have stemmed directly from the old textual sources of Hebrew. The high productivity and transparency of *+i* adjectives and *+on* diminutives in MH is, in fact, a new characteristic of these derivational processes, that was "injected" by design, as this paper claims.

The paper makes an interesting case for the apparent advantage of affixes compared to strictly base-internal morphological processes (that are characteristic of the Semitic root+template "discontinuous" derivation), for the purpose of anchoring systematic meanings with morphological forms in MH. Although very possible and perhaps true, it is hard to establish a convincing causal relationship between affixes and advantages in anchoring systematicity based on these facts.

To begin with, the relative absence of new words from the disyllabic Segholate template, which is devoid of additional templatic affixes (as demonstrated in Section 2), can be quite simply the result of this template being already highly populated with many



frequent nouns that are semantically varied such that no systematic meaning can readily arise in conjunction with it historically, or be easily attributed to it in modern times by design. Similarly, the most densely populated verbal templates—*pa'al* and *pi'el*—also lack any systematic function that other verbal templates may exhibit (e.g. reciprocity in the *hitpa'el* template). Indeed, as demonstrated in Subsection 1.1, there are counterexamples for adjectival vocalic templates like CaCiC that exhibit no affixes and were still successfully injected with new systematic meaning, akin to the *-able* forms in English.

Note also that the vast majority of the adjectives in Subsection 1.1 are derived from verbs, where the dominance of the Semitic root+template derivation is absolute, and extends to passives and verbal adjectives. new nouns in MH—as opposed to new verbs—have a variety of paths, and the Semitic derivation of consonantal roots and vocalic templates is probably not the leading one among them, surely not for bottom-up inventions. If a Semitic root+template derivation is used for a new noun it is usually a top-down novelty of the type that this paper nicely captures and analyzes.

A summary of these facts may be that since nouns have such diverse morphology in MH (optionally using one or non of the many Semitic nominal templates), derivational processes that are based on nouns do not lend themselves to a straight-forward root+template derivation as easily as verbs that must always adhere to one of five Semitic verbal templates in MH. These may be stronger and more consistent biases for the observed patterns than the distinction between linear and discontinuous derivation types.

This paper can also attract the attention of anybody who is interested in the very current discussion about iconicity and systematicity in the psycholinguistic literature, with emphasis on the notion of systematicity (see overview in Dingemanse et al. 2015). Iconicity covers a broad spectrum of non-arbitrariness in the linguistic symbol, whereby something about the form is iconic with respect to meaning or function. A familiar

example for iconicity comes from onomatopoetic words such as *tick-tock* or *oink*. Systematicity, in contrast, can be used to explain examples like phonaesthemes such as *glisten*, *glitter*, *glimmer*, *gleam*, *glow* etc., where the *gl-* onset seems to be systematically linked to light reflection, but there's nothing iconic about this link (see Bergen 2004). Systematicity can be described as “a statistical relationship between the patterns of sound for a group of words and their usage” (Dingemanse et al. 2015:606).

What is especially interesting is that iconicity and systematicity are often assumed to be characteristic of early stages in the acquisition time-scale and the evolution time-scale of natural languages, yet these aspects tend to erode in order to accommodate more arbitrariness as languages develop and evolve, giving way to the expressive compositional flexibility that characterizes natural languages (e.g. Fay et al. 2014; Perry et al. 2018; Monaghan and Roberts 2021; Raviv et al. 2021). In that sense, systematicity may serve as a "bootstrap" for complex language systems at acquisition stage (e.g. Raviv and Arnon 2018), as well as at the language genesis stage, which we very rarely get a glimpse into (see Sandler et al. 2011 on the Al-Sayyid Bedouin Sign Language). The story of how the revivers of MH injected systematicity into the language and how well this was followed up by the new generations of native MH speakers is a strong testament to the advantages of systematicity in the introduction phase of new complex systems. It is also an interesting piece of circumstantial evidence for the discontinuity between classical Hebrew varieties and the quasi-genesis of a brand new Modern Hebrew language.

**Bergen**, B. K. (2004). The psychological reality of phonaesthemes””. *Language* 80(2). 290-311. doi:10.1353/lan.2004.0056. **Dingemanse**, M., **Blasi**, D. E., **Lupyan**, G., **Christiansen**, M. H., and **Monaghan**, P. (2015). “Arbitrariness, iconicity, and systematicity in language”. *Trends in Cognitive Sciences* 19(10). 603-615. **Fay**, N., **Ellison**, T. M., and **Garrod**, S. (2014). “Iconicity: From sign to system in human communication and language”. *Pragmatics and Cognition* 22(2). 244-263. doi:10.1075/pc.22.2.05fay. **Monaghan**, P., and **Roberts**, S. G. (2021). “Iconicity and

diachronic language change”. *Cognitive Science* 45(4). e12968. doi:10.1111/cogs.12968. **Perry**, L. K., **Perlman**, M., **Winter**, B., **Massaro**, D. W., and **Lupyan**, G. (2018). Iconicity in the speech of children and adults. *Developmental Science* 21(3). e12572. doi:10.1111/desc.12572. **Raviv**, L., and **Arnon**, I. (2018). “Systematicity, but not compositionality: Examining the emergence of linguistic structure in children and adults using iterated learning”. *Cognition* 181. 160-173. **Raviv**, L., **de Heer Kloots**, M., and **Meyer**, A. (2021). “What makes a language easy to learn? A preregistered study on how systematic structure and community size affect language learnability”. *Cognition* 210. 104620. **Sandler**, W., **Aronoff**, M., **Meir**, I., and **Padden**, C. (2011). “The gradual emergence of phonological form in a new language”. *Natural Language and Linguistic Theory* 29(2). 503-543.

#### REPLY OF SHMUEL BOLOZKY

First, and most importantly, I wish to emphasize that at no time did I argue that the productivity in Israeli Hebrew of discontinuous root+template derivation, the hallmark of Semitic languages, is weakening; it is as strong as ever. Israeli Hebrew is a Semitic language still, and discontinuous derivation continues to be strong, independently of the strengthening of linear derivation. Thus, it was shown (Bolzky 1999), for instance, that discontinuous derivation continues to exist productively alongside linear formation in both +*an*-related and +*ut*-related forms, and since there is no significant communicative distinction associated with choice of derivational device, there is little reason to believe that Israeli Hebrew is gradually losing the Semitic (non-linear) character of its word-formation component. Although a linear suffix increases the productivity of patterns like +*an* and +*ut*, the *miškalim* themselves have not weakened. This is clearly supported by the continued preference for *CaCCan* and its still being the preferred realization for agentives in spite of the increase of linear formation with +*an*. Also, discontinuous derivation of +*ut* forms is at least as productive as linear +*ut* formation (Bolzky and Schwarzwald 1992), and the preference for discontinuous *miškal* derivation is

independently supported by Berman's (1987) findings in productivity tests: of all forms whose mechanical derivation strategy could be determined in open-ended productivity tests, 60% were discontinuous and 40% linear, i.e. a 3:2 ratio in favor of non-linear derivation. It is also indeed the case that verb-related noun formation is in general more productive than nominal-based new noun formation. In general, however, linear derivation is stronger than it was in earlier phases of the language, particularly when suffixes are involved, owing (as noted in the paper) to the transparency of the base for derivation, which is unaltered by the derivation process, and the semantic (and syntactic) transparency and prominence of the associated suffixes.

Although disyllabic segholates (without suffixes) are relatively less productive than they were in Classical Hebrew, Aviad Albert may be right that in addition to their carrying no semantic features as a pattern, fewer were introduced in Modern Hebrew also because many existing slots for potential new realizations were already occupied by earlier segholate formation. It would be an interesting hypothesis to explore in the future through productivity tests...

The productivity of *CaCiC* may indeed be related in part to its being verb-based, since discontinuous derivation is dominant in verb-based derivation, but it also appears (as noted in this paper) that it is reinforced by the proximity of the semantic and phonological closeness to *CaCuC*. As pointed by Faust (forthcoming), Modern Hebrew speakers have also been able to use this proximity so as to avoid the potential unintended repetition of a sequence of two *u*'s in related abstract nouns, *CaCuCut* > \**CCuCut*, ending with *CCiCut* through haplology. Thus, *CCiCut* turns out to be the nominalization of both *CaCiC* and *CaCuC*, and possibly promotes further coinages in both.

Insofar as the effect of the Arabic *nisba* (linear suffix of *+i* to a noun that converts it to a "default" related adjective) on formation of "default" adjectives is concerned, there is a consensus among scholars that it received significant impetus in the Middle Ages

under the influence of Arabic, which was the dominant language in the whole region then – see for instance, Avinery (1964). More importantly, with 65 realizations in Biblical Hebrew and 65 in Mishnaic Hebrew, the increase of another 320 in Medieval Hebrew, when the language was not even spoken, is significant. As for the Albert's hypothesis that it was promoted by Jewish native speakers of Arabic, the number of those among the revivers and the early coiners of new words was **not** significant.

Regarding the fact, observed in the paper, that the suffix *+on* is by no means restricted to diminutives, it still does not by itself mean that it is not productive as a diminutive device. This is evident not only from dictionary comparison (counting innovations from an earlier dictionary listed in a newer one, as well as comparing the supplement of a dictionary to an earlier version), 33% of the total number of diminutives, but more importantly from productivity tests, 67% in open tests and 75% in judgment ones (Bolozky 1999).

What I find to be particularly interesting is Albert's proposing the potential relevance of the theory of systematicity (of which I have not been aware): the statistical relationship between the patterns of sound for a group of words and their usage. It sounds quite reasonable, as Albert puts it, that the revivers and later word-coiners of Modern Hebrew "injected" systematicity into the language, and it is indeed amazing to perceive how well this was followed up by the new generations of native speakers of the language. I agree that it may constitute "a strong testament to the advantages of systematicity in the introduction phase of new complex systems."

**Avinery**, Isaac. 1964. *Yad Halashon: Lexicon of Linguistic Problems in the Hebrew Language*. Tel Aviv: Izreel Publishing House. [In Hebrew]