

A Study on Nominal Reduplication in Modern Hebrew

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This study on reduplication is conducted for studying templatic word formation in the nominal system of Hebrew. Hebrew, as other Semitic languages, is known for its templatic word formation. In the traditional grammar, as taught to this day in schools, templates exist both in the nominal system and in the verbal system and dictate the prosodic shape and the vocalic content of the word. In the last two decades (at least) researchers' attention focused mainly on the verbal system. The reason is obvious: the verbal system is solely templatic, in the sense that there exists no verb form, and there cannot exist any verb form, which does not conform to some template (a cell in the paradigm of a specific *Binyan*).

Little attention was paid to the nominal system. The nominal system of Hebrew is not homogeneously templatic like the verbal system. There are not many instances of clear templatic formation. The most conspicuous are the cases of the Segolates and the diminutive-formation via reduplication, to be discussed here. However, if you look closely you can find instances of templatic formation all over the nominal system, for almost or all cases combined with suffixation (*pakid* → *pkid+ut*). That is, we observe templatic effects in derivational formation. These instances were not systematically handled until now.

Previous research on templates, and especially on reduplication – in Hebrew and elsewhere – has shown that the grammar of Semitic languages, which was taken to be cross-linguistically unique (non-concatenative), can be simplified and brought closer to the grammar of other studied languages.¹ For that purpose templates should not be listed as CV-shapes in the mental lexicon (and there are dozens of them) but should be partly merged together in the grammar as restrictions on the prosodic well-formedness of words. Another argument against templates as morphemes was nicely put by Ratcliffe (1998:29), where he claims that a templatic account “... falls short in its ability to account for

¹ See especially Ratcliffe's work on Arabic 1998.

derivational relationships between words”. The data to supply that claim are diminutive formation and broken plurals in Arabic. The parallels to the Hebrew system are obvious.

Taking this background, this study builds the first stone out of my perspective for questions, which are posed on two levels:

- (i) Language specific – how can we formalize the relations between derived words? What further insights can be found in the nominal system? Can these findings be compatible with research on the verbal system?
- (ii) Theoretically – what does this research teach us about the existence / representation of templates? Are they morphemes, are they restrictions in the grammar, can this donate something to the debate on the status of the root?

This was the general perspective. In this talk I confine myself to some more earth-bound matters:

In this talk I will look closely at nominal reduplication, which I take to be an instance of templatic derivation, or in other words, a strategy of word formation. The pattern of reduplication was not taken very seriously in previous work with the argument that it is not productive. According to the findings of Bolozky (1999) and to my own intuition, I probably have to agree, that this is true. However, I claim that the principles operating behind nominal reduplication are still very much active in the nominal system at least, and probably in the language as a whole and as such are worth studying. Studying these principles is the issue of the first part of the talk.

The number of listed reduplicated items is pretty restricted.² Some of the generalizations apparent from the data rely only on one or two items. For that reason I conducted an experiment, in which I tried to elicit not-yet-existing reduplicated forms from native speakers. Due to the poor productivity of the pattern, I do not have many tokens and some of them show clear confusion of the speakers with regard to vowels. Nevertheless, the experiment has shown that the pattern is still available for the speakers in some passive manner, such that it is possible to draw synchronic conclusions. I will present the experiment in detail in the second part of the talk.

² See Appendix I.

1. The phenomenon

Modern Hebrew exhibits a process of reduplication in the nominal system that applies to bases that are nouns, as well as to adjectival bases. The reduplication process denotes nouns a diminutive meaning and adjectives an associative meaning.

(1) Examples of nominal reduplication for nouns and adjectives

NOUNS	zakan	,beard'	zkankan	,little beard'
	xatul	'cat'	xataltul	'kitten'
ADJECTIVES	kaxol	'blue'	kxalxal	'bluish'
	ʃamen	'fat'	ʃmanman	,chubby'

Traditionally speaking, we are confronted here with a reduplication template (*mishkal*), defining a specific CV-form and containing a specific vocalic melody for the formation of a new stem with the assigned meaning. In terms of syllabic structure the template has the properties of being (i) bisyllabic; (ii) containing the vowel /a/ (instead of the distinct vowel of the base).



A template was taken traditionally to be rigid, that is, consonants had to fit into a given shape. For the case of reduplication: $C_1C_2aC_3.C_2aC_3$. Various cross-linguistic studies of reduplicative formations have led to the insight that reduplication instantiates The Emergence of The Unmarked (TETU) (McCarthy & Prince 1997). For the case of Hebrew word formation this principle refers to syllable structure. While reduplicating, we would expect the most unmarked syllable to emerge: CV. Instead, what we get is a syllable with a complex onset CCV. This effect is clearly due to some principles of syllable structure that we can observe in other word formation instances in Hebrew.

Some interesting questions as this point are:

- What triggers the word initial consonant cluster (=complex onset)

- What are the restrictions on the formation of that consonant cluster (sonority)
- What happens to the vowels of the base?

I claim that a template should be understood as an ‘ideal’ or optimal prosodic shape, which may not always be realized on the surface. The shape is defined according to general principles on syllable structure, but various properties of the consonants and the vowels of the base may influence the shape of the output according to other principles of the language (to be addressed shortly). This is an indication for relations between words, that is, surface representations as opposed to mapping root consonants in a template. In OT-terms output-output correspondence.

2. A sketch of an OT-analysis

I wish to describe reduplication as reduplicating of the final syllable of a bisyllabic base. However, since the output has to ‘fit’ into a template, we observe significant differences in the prosodic structure and in the segmental content of the reduplicated form (henceforth Output) when compared to a faithful reduplicated form (simple suffixation):

(1) ‘Simple’ reduplication versus ‘templatic’ reduplication

BASE	FAITHFUL PARTIAL REDUPLICATION	ACTUAL OUTPUT
za.kan.	za.kan.kan.	zkan.kan.
ka.xol.	ka.xol.xol.	kxal.xal.
xatul	xa.tul.tul	xa.tal.tul.

The actual output is different from an expected faithful reduplication in the following respects:

- It is bisyllabic and not trisyllabic, which implicates that one vowel of the expected output is not parsed.
- The initial syllable contains a complex onset.
- The second vowel of the base is not parsed faithfully, unless it is a high vowel. If that vowel is non-high, the syllables of the output contains an *a*. If that vowel is high, the final syllable of the output contains that high vowel. The first syllable does not.

I follow Gafos (1998) in assuming that reduplication is affixation of a RED-morpheme and a specified vowel *a* (the vocalic melody).³ The RED-morpheme causes the copying of the last syllable of the base. But how do we get a bisyllabic form if we have three syllables? In accordance with the Generalized Template Theory (McCarthy&Prince 1997), I assume that the bisyllabic template itself (“[σσ]”) is not a constant (=not a template), but a result of general principles governing the shape of derived forms in the language. In OT-terms, [σσ] is not a constraint defining a templatic shape, but is emergent as a consequence of other constraints. So speaking, we don’t really have a template but a series of demands on the prosodic shape of derived words, which results in bisyllabicity.

How is the shape of the derived word determined?

The structure of the prosodic word - The highest demand on the output is bisyllabicity, known from other phenomena in the language, especially verbal forms. The demand [σσ] is taken to be a label for a set of hierarchically ranked demands on alignment of prosodic units. I adopt the proposal of Ussishkin (2000) for the following hierarchy for MH verbs:

(2) Bisyllabicity of derived forms (Ussishkin 2000)

SYLL-ALIGN >> FAITH I-O >> PRWDBRANCH

The sub-grammar in (4) generates bisyllabic forms from inputs that would result in trisyllabic forms, according to maximality and minimality conditions and the alignment of the syllable to the edges of the prosodic word.

The structure of the syllables – because of the dominant demand on bisyllabicity, one vowel of an expected output cannot be parsed: of three syllables make two. This process reveals some general properties and strategies, which are language specific (and maybe even domain specific).

(i) Which syllable or which vowel is to remain unparsed?

(ii) All consonants must be parsed. The result is an accumulation of consonants in the place of simple syllables with maximally one onset-consonant and one coda-consonant.

(iii) The position of the ‘stray’, or superfluous consonants has to be determined.

³ The vowel can be a part of the RED-morpheme or a separate morpheme. I don’t have anything to say about that at the moment.

We're already *confronted* here with a robust observation, valid for all Semitic language to the best of my knowledge, and that is that *all consonants have to be parsed*. Vowels of the stem / base may be parsed or not, vowels of the suffixes must surface. Defined as constraints we would say that MAX-C ; MAX-V-AFF >> MAX-V-STEM. The demand MAX-C is undominated.

Compare possible bisyllabic outputs for the case when one vowel is unparsed and all consonants are parsed (ignore for the time being the quality of the vowel):

(3)	Input: varod + RED	va.ro ₁ d.ro ₂ d. → ?	(CV.CVC.CVC)
	Unparsed vowel		
	↻ a	vrad.rad.	
	o ₁	var.drard.	
	o ₂	va.radrd.	

The actual output of derived words is the CV-structure presented in (5a). This output involves an initial syllable with an initial consonant cluster. The initial onset cluster is created due to the very high ranking of a constraint prohibiting three consonants in a row, also known from other Semitic languages (see Gafos 2001 on Arabic). *CCC >> *CMLXCODA >> *CMLXONS.

The syllabic structure of the template, both the syllable internal structure as well as the ordering of the syllables in the prosodic word, is determined by the grammar and not by the lexicon. The structure shown in (5a) is the optimal structure according to the constraint hierarchy. I claim that this structure will always emerge when a CVC-syllable contacts another CVC-syllable. There is no need to specify the vowel that should be deleted. The nominal system displays other cases of derivation and inflection even where the CVC-syllable contacts a VC-syllable.

(4) Word initial consonant cluster⁴

Segolates: singular ~ plural kelev → **kla.vim.** *kal.vim.

Participles: masculine ~ feminine sagur → **sgu.ra.** *sag.ra.

Nominal derivation: adj. ~ abstract noun gamiṣ → **gmi.ṣut.** *ga.mi.ṣut./ *gam.ṣut.

I assume a markedness hierarchy of vowels which allows *a* and *e* to be deleted, but not *i* and *u*. *o* is a special case in the sense that it does not behave uniformly. Thus, if it possible to delete *a*, we will do that. If there is no *a*, but there is an *e*, we will delete the *e*. If there is *a* and *e*, we will delete the *a*. And if there is none we cannot delete.

The syllable structure of the output is determined in the grammar according to the following principles, formulated as OT constraint-hierarchies (sub-grammars):

- Faithfulness to consonants is higher ranked than faithfulness to vowels, such that one vowel of the input is not parsed.

MAX-C >> MAX-V-STEM

- The consonants of the syllable without a vowel are parsed, such that both of them occupy the onset position of the first syllable in the output.

*CCC >> *CMPLXCODA >> *CMPLXONS

Some deviations in the shape of the output are attested due to what I call phonotactic conditions. These conditions are apparent in all word formations in MH and are never violated (undominated). These can be summarized as follows:

- *Sonority sequence hierarchy*: sonority in the syllable onset must be even or rising. Sonority of syllable coda must be even or falling; if we assume plateaus, MH allows plateaus unless the two segments are sonorants (*rl, *rn, *ml etc.). In our case the onset is relevant: if in the derivation an impermissible onset cluster is created (=falling sonority), an epenthetic vowel /e/ is inserted to break the cluster, i.e. *jarok* ‘green’ → *je_rakrak* ‘greenish’ **jrakrak*
- (*Historical*) gutturals: if the first consonant in the created initial onset cluster is an historical guttural, an epenthetic /a/ is inserted⁵. Gutturals (even if not articulated as

⁴ It must be noted that these prosodic structures are found only when the first vowel of the base is an ,a’ (known as the a-deletion rule after stress shift). I suggest instead a feature markedness hierarchy which allows the less marked vowels to be ‘deleted’, but where the most marked vowels (the high vowels ‘i’ and ‘u’) practically never get deleted.

gutturals anymore) are not allowed to be part of a consonant cluster. *xatul* ‘cat’ → *xataltul* ‘kitten’ **xtaltul*; *ʔadam* ‘red’ → *ʔadamdam* ‘reddish’ **ʔdamdam*.

We get two variants of the output (or the traditional pattern) according to restrictions on sequences of segments. For shortage of space I will not get into this interesting issue in detail. These restrictions are never violated. (SON and GUTT to be formalized).⁶ The consonants never hinder the derivation: we never get a faithful partial reduplication like *jarokrok*, and we don’t get a blockade of the derivation. The high-ranking constrictions on consonantal sequences result in a trisyllabic form: SON ; GUTT >> [σσ]. (3-syllable → 2-syllable → 3-syllable)

A different kind of deviation from the expected output regards the vowels of the base. I assume the input to specify the vowel ‘a’ as a suffix and the grammar to generate an output that parses the suffix vowel ‘a’ in both syllables. However, if the vowel of the second syllable of the base is a high vowel (/i/ or /u/), the vowel is reproduced faithfully in the second syllable of the output: *xatul* ‘cat’ → *xataltul* ‘kitten’ **xataltal*. This can be taken as evidence for output-output relations. The derived form has to be faithful to the base for some marked features (in this case [+high]). This implicates that the high vowels, when appearing, must always be parsed faithfully, thus giving some clue to the stable status of these vowels in Hebrew (may not be deleted not reduced).

According to the suggested mini-grammar, reduplicative word formation shares properties with other derivational formations in the language known for templatic effects:

- (i) The demand for bisyllabicity (=minimal word);
- (ii) Preference for parsing affixal vocalic material rather than the vocalic input material;
- (iii) Preference for onset-consonant clusters over coda-consonant clusters and the prohibition of three consonants in a row.
- (iv) Restrictions on consonantal sequences in terms of sonority and feature spreading
- (v) Faithfulness to the vocalic feature [+high] of the base

⁵ Vowels in the neighborhood of (historical) gutturals must be low.

⁶ See some more on this in the study on MH loanword phonology with Adam Ussishkin.

The principles formalized in that mini-grammar show a great similarity to OT-grammars proposed in previous works for other morphological formations. As such, the reduplication process can be viewed as providing further evidence for restrictions on the prosodic structure of MH derived word, previously studied in Bat-El (1989, 1994, 1999 and work in progress) Gafos (1998, 2001) and formulated as an OT-grammar in studies on stress and metrical structure in Graf & Ussishkin (to appear) and on verbal derivation in Ussishkin (2000).

3. Restrictions on the base

The base of a derivation in the normal case is not an issue of interest. The only interesting aspects of the base are the ones that influence the output in some discernable way, such as high vowels (in our case), the position of certain segments etc. For a Semitic language, I assume, the base must have a further quality, and that is its correspondence with a specific template, such that a Derivational Pattern X can only be generated when operating on a base Y_x . This relationship between output units is an issue for further research. For the time being it is enough to state that there are restrictions on the base of reduplication:

- *Morphological*: the base is masculine. Feminine forms are usually polymorphemic. Such forms are not reduplicated even if their prosodic structure equals that of a selected base (compare *laxut_F* with *xatul_M*). The experiment entails one such item *kapit* which was not even once reduplicated according to the pattern. Some feminine forms are monomorphemic, such as *laSon* (compare to *varod*). But even for these cases, reduplication is not an option.
- *Prosodic*: the base is bisyllabic. The initial syllable is open (CV); the last syllable is closed (CVC). Notice that this prosodic shape is one of the most common, if not the commonest, in the language. These two types of syllables are the core syllables of Hebrew.
- *Segmental*: the vowel of the initial syllable is an *a*.
 - One task of the experiment was to find out, whether bases with a different vocalism can be reduplicated in the same manner. In other words, are the segmental restrictions on the base crucial, or is it only the prosodic shape which matters?

Until now we have established:

- (i) The manner of generation of the reduplicated (=derived) form.
- (ii) The restrictions on the base of reduplication.
- (iii) Some correspondence relations between the base and the output.

4. The experiment

4.1 *The subjects* - The experiment was conducted with Hebrew native-speakers adults. I have evaluated the results of 11 subjects.

4.2 *The items* – the items chosen for the experiment were all existing words of Hebrew with the bisyllabic form an open syllable followed by a closed syllable and consisting of nouns and adjectives in more or less equal numbers. The items differ in the conditions on the segmental content of consonants and vowels:

- Vowels: V1 = a; V2 = I, V2 = u and one control group where V1 ≠ a
- Consonants: C1 = ʔ; C1 = ʕ ; C1 = h ; C1 = son (m, n, r, l or j)

4.3 *The method* - The subjects were asked to fill gaps in constructed, written sentences with the specific request to fill in the gaps with words of their own creation. It was explicitly explained to the subjects that they should not use suffixing mechanism, in particular the *-on* suffixation for diminutive, for expressing the desired meaning.

4.4 *Results*

The results are a mix of different strategies used by the subjects. It was obvious from the start that speakers feel uncomfortable with producing reduplicated forms and prefer to arrive at the desired meaning by the popular and very productive suffixing strategy. Nevertheless, when obliged to abandon suffixation, the speakers displayed a notion of the reduplication template. It is interesting to note that each subject seems to have a preferred strategy.

It turned out that the different conditions on consonants were not very interesting. The tokens show an almost 100% compliance with the expected structures: after (historical) guttural an /a/ was inserted, by even sonority in a cluster an /e/ was

inserted. Since there were no deviations from these structures I take the relevant markedness constraints SON and GUTT to be higher ranked than the demand on bisyllabicity and indeed to be undominated.

Interesting variations were found in the vocalic conditions. There the expected reduplicated forms were only a minor part of the actual results, to be discussed in detail below.

The strategies:

4.4.1 *(Simple) concatenation* – although the subjects were asked to obtain from suffixing, some of the results consist of suffixed forms. In order to avoid the productive mechanism of *on*-suffixation (as demanded), the subjects turned to sub-standard alternatives:

- *-uf*: the suffix *-uf* is used mostly in children's' language as hypocoristic *fatil* → *fatiluf*
- *-on+-uf*: suffixation of both suffixes in that order with a hypocoristic meaning *karif* → *kri fonuf*
- *-on+-on*: doubling of the standard diminutive suffix to generate a sub-standard form *karif* → *kri fonon*

Notice that in these cases there is a variation between simple concatenation resulting in a trisyllabic word (*fatiluf*), and suffixation combined with the wish to avoid forms longer than three syllables (which seems to be the maximal desired size) resulting in the deletion of the first vowel of the base (*kri fonuf*; *kri fonon*).⁷

Further, the suffixation-strategy is not very appropriate for adjectives. From a semantic point of view, there is no morphological operation I know of, which can be attached to adjectives with the meaning denoted by the reduplication pattern. However, some of the subjects used the childish *-uf* suffix even for an adjectival form (cf. *xarifuf* 'a little spicy').

4.4.2 *Copying of the last segment* – subjects copied the last segment of the base (a consonant) and inserted a vowel preceding the copy, in order to create a syllable. *ʔagas* → *ʔagasis* 'pear' but also *ʔanaf* → *ʔanfif*

⁷ Forms that are longer than 3 syllables are rare in Hebrew. One of the reasons is main stress, which should fall within the three-syllable-window. *-uS*, typical for childrens' language is not stressed as opposed to *-on*.

‘branch’ that is bisyllabic. The inserted vowel *i* cannot be considered to be an epenthetic vowel in MH. The motivation for epenthising this vowel while copying the last segment of the base must derive from an analogy to other common nominal patterns familiar to the speakers (cf. *daxlil* ‘scarecrow’, *xamcic* ‘a kind of soury flower’). Here too, we can discover faithfulness to vocalic features of the base: if the second vowel of the base was other than *a*, this vowel was copied too: *?amok* → *?amokok* ‘deep’. There is a correspondence relation between the second, distinct vowel of the base and the epenthised vowel. (I don’t have any tokens of items with V2=e). If the second vowel was an *a*, the unmarked case, an *i* was inserted.

4.4.3 *Choosing a different pattern for the derived form* – instead of reduplicating, some subjects preferred to ‘switch’ to a different familiar nominal template. One minor pattern for adjectives was a participle form: *carud* → *macrud* ‘hoarse’. Note that this is an Arabic participle form! borrowed into Hebrew in forms like *mabsut* ‘happy’. A template used more systematically by at least two subjects is demonstrated by *kaluf* → *kalif* ‘unlikely’ (adj.); *?anaf* → *?anif* ‘branch’ (noun). A possible motivation might be an analogy to an existing pattern C₁a.C₂iC₂, which is the reduplicated form for monosyllabic bases, denoting the same meaning connected with the pattern that is our issue here. Thus, *dak* → *dakik* (adj.) and *dag* → *dagig* (noun). Speakers might have connected this pattern with the base they were presented with, although the base was not monosyllabic. This can serve as an indication that the pattern C₁aC₂iC₂ is not an explicit reduplication pattern and can accommodate bases with three consonant as well as bases with two consonants via copying.

4.4.4 *Reduplicative template* – the expected form involves reduplication of the final syllable. The vocalization depends on the vowel of the final syllable. Some of the tokens agree with the expectation *?amok* → *?amakmak* ‘deep’ (o-a) ; *xarif* → *xarafrif* ‘spicy’ (i-i). Some forms show faithful copying of the base vowel in both syllables of the output ‘*xarif* → *xarifrif* ‘spicy’. (Statistics are not available yet).

The word *ʔagas* ‘pear’ is a good example for all strategies. We ignore the fact that the first consonant is a guttural, a fact which results in an epenthesis of *a* in the first syllable of the reduplicated form.

(1) Illustration of the subjects’ strategies with *ʔagas* ‘pear’

<i>Concatenation</i>	ʔagas	ʔagas onon
<i>Copying last segment</i>	ʔagas	ʔags is
<i>Different template</i>	ʔagas	ʔag is
<i>Reduplication</i>	ʔagas	ʔagas gas

Restrictions on the base

- *Morphological* restrictions on the base seem to be inviolable. Two of the presented items were feminine: one polymorphemic item: *kap-it* ‘teaspoon’ and one monomorphemic item: *lafon* ‘tongue’. Both items were not reduplicated according to the reduplication template **kpatpit*, though I found copying of the last segment for *kapit* → *kapitit* ‘teaspoon’. For *lafon* all subjects chose a strategy of feminine diminutive formation via suffixation: *lafon* → *lefon-it* ‘tongue’.
- *Segmental* - I used a ‘control group’ of items in order to see if the vocalic segmentism of the base is of any relevance to the reduplication option. The ‘control items’ had the same CV-shape as all others, an open syllable followed by a closed syllable. The first vowel of the item was either *o* (*gozal* ‘little bird’; *pofer* ‘lukewarm’), *i* (*xitul* ‘diaper’) or *u* (*sulam* ‘ladder’). The item with $V_1=u$ was not reduplicated at all. Instead, a feminine suffix was attached by all subjects. The item with *i* was reduplicated *xitul* → *xitultul*, but the first vowel of the base /i/ was never deleted, such that the output was always trisyllabic. The items with $V_1=o$ were found to be more flexible. One token of *gozal* corresponds to the reduplicative template *gzalzal*, though all other tokens (5) parsed the *o* of the base.

4.5 Discussion

More on the strategy of reduplication

The forms, which I count to be a part of this strategy, are all forms that contain a reduplicated syllable of the type:

Base = $\sigma_1\sigma_2$ reduplicated form = (onset of σ_1) $\sigma_2\sigma_2$

The produced forms are mostly bisyllabic, reducing three syllables to two syllables by not parsing the vowel of the initial syllable of the base, and creating a complex initial onset, as predicted [$\sigma\sigma$] = CCVC.CVC. Deviations are observed with the vocalism. Thus, the expected reduplicated form contains an *a* in both syllables of the output if V_2 of the base is non-high. If V_2 of the base is a high vowel, the reduplicated form contains an *a* in σ_1 and a copy of the high vowel in σ_2 .

The collected tokens show the following combinations of vowels:

- (i) Faithful copying of a non-high vowel in σ_1 and σ_2 of the output
ʔamok → ʔamokmok
- (ii) Faithful copying of a non-high vowel in σ_2 of the output
ʔarox → ʔaraxrox
- (iii) Faithful copying of a high vowel in both σ_1 and σ_2 of the output
xarif → xarifrif
- (iv) Unfaithful copying of a high vowel in σ_2 of the output
xarif → xarafraf

All these different results might not be very surprising, considering the complexity of the pattern:

Expected vocalic parsing:

- iff V_2 -base \neq [+high] parse the affix *a* in σ_1 and σ_2 of the output
- iff V_2 -base = [+high] parse the affix *a* in σ_1 and a copy of V_2 -base-high in σ_2 of the output

In OT-terms:

MAX-F-HIGH^{B-R} >> MAX-V-AFF >> MAX-V^{B-R}

The results indicate an individual ranking of the constraint MAX-FEATURE-HIGH. Some positioned it very high, such that both vocalic slots of the output were realized as a high vowel. Some positioned it below MAX-V-AFF, such that both vocalic slots were realized as /a/. Some extended MAX-FEATURE to the vowel /o/ as well (which seems to switch between the two classes of vowel anyway).

To sum up, speakers are aware that the vowels of the affix have priority over the vowels of the base when the decision is if a vowel should be parsed – yes or no (when reducing a trisyllabic form to a bisyllabic form). Speakers are also aware of the fact that nominal outputs are faithful to the feature [+high] of the vowels of the base (‘keep the high vowel of the base’), whereby *o* is sometimes affiliated to that group. What speakers are not sure about is how to combine these two demands in a complex derivation like the reduplicative form. Speakers seem to have no difficulties when the vowels of the base belong to the unmarked class /a/ (trivially) and /e/. (Unfortunately I don’t have enough items with $V_2=e$: *namer* → *nemarmar* ‘tiger’).

Strategy choice and lexical category

The results show a difference between *nouns* and *adjectives*. The number of reduplicated tokens for the adjectival items is much larger than the number of reduplicated tokens for noun items. This is true even if an adjective and a noun are very similar in their segmental structure, as far as being a minimal pair (see *xamud*_{Adj.} ~ *?amud*_{Noun}). For diminutive, speakers prefer to use nominal suffixes like *-on*, *-uf*, combined *-onuf*, *-onon* or other (childish) versions of the same. Interestingly, some nouns were reduplicated *and* suffixed (*fatil* → *stiltilon* ‘seedling’). I take it to indicate that speakers are not very comfortable with the reduplication option and try to make the produced form more “acceptable” by adding some sort of suffix. With adjectives this is not so easy. There is no suffixal option for adjectives as attested for nouns. Thus, speakers are forced to use the reduplicating pattern, or else, not to produce at all. It turns out that adjectives, which are not very common in use (*harus* ‘broken, shattered’), were extremely difficult to reduplicate. The speakers preferred not to produce at all. Adjectives which are more common in use and which belong in some way to a semantic field that entails such reduplicated forms (in a broad sense), were more easily produced. Thus we get *kravrav* from *karov* ‘near’ and *rexakxak* from *raxok* ‘far’ (we already have *kcarcar* from *kacar* ‘short’).

5. Conclusions

The experiment was useful in substantiating the general principles explored by examining the lexical data. We could establish that for the speakers:

- (i) The preferred structure of the first syllable of the output contains a consonant cluster.

- (ii) The initial consonant cluster is subject to undominated restrictions on consonantal sequences with respect to sonority and guttural features.
- (iii) Bisyllabicity is high-ranking.
- (iv) If the designated output contains too many vowels, having to determine which vowel will not be parsed, the vowels of the affix have priority over the vowels of the base / stem.
- (v) If one of the vowels of the base is [+high] that vowel must be parsed at the cost of the vowel of the affix. Sometimes the vowel /o/ was affiliated to that class.
- (vi) Segmental restrictions on the base seem to present further evidence for the stable status of the high vowels. This issue has to be looked into closer.
- (vii) Morphological restrictions on the base are undominated.

In terms of OT we could establish the following sub-grammars:

Markedness: SON; GUTT >> >> *CCC >> *CMLXCODA >> *CMLXONSET

Faithfulness: MAX-F-HIGH >> MAX-V-AFF >> MAX-V-BASE

We could establish correspondences between the base and the output in terms of vocalic features. The experiment confirmed the assumption that the vowels of the base are relevant for the derived form. Thus the claim that root consonants can be extracted from one form and mapped into a template in order to form a derived form is again disputed. The base is relevant as a unit with consonants and vowels. It remains to be studied if further correspondence relations between the base and the output can be established and if the generated grammar can be extended for further data in the nominal system.

References:

- Bat-El, Outi, 1989. *Phonology and Word Structure in Modern Hebrew*. Doctoral Dissertation, UCLA, CA.
- Bat-El, Outi, 1994. Stem *modification* and cluster transfer in Modern Hebrew. *Natural Language and Linguistic Theory* **12**, 571-596.
- Bat-El, Outi. *to appear*. Semitic Verb Structure with a Universal Perspective. In: Shimron, J. (ed.) *Language Processing and Language Acquisition in a Root-Based Morphology*. Amsterdam: John Benjamins.
- Bolozky, Shmuel, 1999. *Measuring Productivity in Word Formation*. Leiden: Brill.
- Gafos, Adamantios. 1998. Eliminating long-distance consonantal spreading. *Natural Language and Linguistic Theory* **16**:223-278.
- Gafos, Adamantios. 2001. *The initial state and verbal stems in Classical Arabic*. To appear. (<http://www.nyu.edu/gsas/dept/lingu/people/faculty/gafos/vesca.pdf>)
- Graf, Dafna & Adam Ussishkin. *to appear*. Emergent Iambs: Stress in Modern Hebrew. *Lingua*.
- McCarthy, John & Alan Prince, 1990. Foot and Word in Prosodic Morphology: The Arabic Broken Plural. *Natural Language and Linguistic Theory* **8**, 209-83.
- McCarthy, John & Alan Prince, 1997. *Faithfulness and Identity in Prosodic Morphology*. ROA #216
- Ratcliffe, Robert, 1998. *The "Broken" Plural problem in Arabic and Comparative Semitic*. Amsterdam: John Benjamins.
- Ussishkin, Adam, 2000. *The Emergence of Fixed Prosody*. Ph.D. Dissertation, UC Santa Cruz.

Appendix I: The Data

<i>Base</i>	<i>Gloss</i>	<i>Reduplicated form</i>	<i>Gloss</i>	<i>V₂ of base in reduplicant</i>
<u>Nouns</u>				
xazir	‘pig’	xazarzir	‘little pig’	i → i
xatul	‘cat’	xataltul	‘kitty’	u → u
ʃafan	‘rabbit’	ʃfanfan	‘little rabbit’	a → a
batsal	‘onion’	btsaltsal	‘little onion’	a → a
zakan	‘beard’	zkankan	‘little beard’	a → a
safam	‘mustache’	sfamfam	‘little mustache’	a → a
géver	‘man’	gvarvar	‘little man’	e --> a (Segolate)
kélev	‘dog’	klavlav	‘puppy’	e --> a (Segolate)
<u>Adjectives</u>				
ʃaxor	‘black’	ʃxarxar	‘blackish’	o → a
jarok	‘green’	jerakrak	‘greenish’	o → a
tsahov	‘yellow’	tshavhav	‘yellowish’	o → a
varod	‘pink’	vradrad	‘pinkish’	o → a
lavan	‘white’	levanban	‘whitish’	o → a
kaxol	‘blue’	kxalxal	‘bluish’	o → a
ʔadom	‘red’	ʔadamdam	‘reddish’	o → a
ʔafor	‘gray’	ʔafarfar	‘grayish’	o → a
sagol	‘purple’	sgalgal	‘purplish’	o → a
ʃamen	‘fat’	ʃmanman	‘chubby’	e → a
katan	‘small’	ktantan	‘smallish’	a → a
matok	‘sweet’	metaktak	‘sweetish’	o → a
xaluʃ	‘weak’	xalaʃluʃ	‘weakish’	u → u
xamuʔs	‘sour’	xamuʔsmuʔs	‘sourish’	u → a
ʔagol	‘round’	ʔagalgal	‘roundish’	o --> a
xalak	‘smooth’	xalalak	‘slippery’	a → a
katsar	‘short’	ktsartsar	‘very short’	a → a

Appendix II: The Items

The items in bold are the ones to which I have collected tokens. All other items were either presented to the subjects but were not accepted as a basis for derivation, or were ruled out for other reasons (cf. *gamad* was not a good idea since all speakers used the established form *gamadon*).

V1=a	tavas ; gamad; salat; magaf; kapit ; karov ; kacar
V1 ≠ a	sulam ; gozal ; kosem; milon; simun; xitul ; pofer
V2 = i	kariŝ ; zamir ; nativ ; ŝatil ; zamin ; ʔadif; gamiŝ; zahir ; ragil
V2 = u	ʔ amud ; mabul; kaluŝ ; matun; sagur ; ŝafuj ; carud
C1 = ħ	xaver; xalom; xalav; xavit; xazak ; xarif ; xadaŝ ; xamud
C1 = ʕ	ʕ amud ; ʕ anaf ; ʕ agur ; ʕ amok ; ʕ anak ; ʕaluv; ʕacum
C1 = ʔ	ʔ avaz ; ʔ agas ; ʔagam; ʔajom; ʔ arox ; ʔafuj
C1 = h	harus; hafux
C1 son > C2	manof ; laŝon ; nahar; magaŝ ; makel ; naxaŝ ; namer ; raxok ; raxav ; ratuv