



# Syncope, opacity and maximal word size in Modern Hebrew

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## 1 Introduction

### 1.1 The problem

Hebrew suffixed forms show a pattern of vowel deletion when compared to their unsuffixed bases.

- (1) Verbal forms with /a, e, o/ deletion under affixation
- |    |                 |           |                  |
|----|-----------------|-----------|------------------|
| a. | a. katáv        | /katav-a/ | katvá            |
|    | 'he wrote'      |           | 'she wrote'      |
| b. | e. dibér        | /diber-a/ | dibrá            |
|    | 'he spoke'      |           | 'she spoke'      |
| c. | o. tipól        | /tipol-u/ | tiplú            |
|    | 'you will fall' |           | 'they will fall' |

- (2) Nominal forms in which /a/ or /e/ delete
- |    |        |             |         |                      |
|----|--------|-------------|---------|----------------------|
| a. | katsár | /katsar-im/ | ktsarím | short ~ pl.          |
|    | pakíd  | /pakid-ut/  | pkidút  | clerk~ clerical work |
|    | gader  | /gader-ot/  | gderót  | fence sg. ~ pl.      |
| b. | tipés  | /tipeS-a/   | tipśá   | stupid ~ fem. *tpeśá |

This has been attributed to a maximal word size condition in Hebrew (Bat-El 1994 et sequ., Ussishkin 2000).

The pattern is complicated by several factors:

- Phonotactics: CCC clusters are avoided (3a,c); verbs do not allow word-initial clusters (3b), nominals avoid coda consonants (3c).
- High vowels are never deleted (4).
- In some forms /a/ and /o/ are replaced by surface [e] (5a,b).
- There is no replacement if the target vowel is high (5c).

Conditions (b), (c) and (d) have escaped satisfactory explanation so far.

### (3) Avoidance of consonant clusters

- |    |                     |             |                     |                             |
|----|---------------------|-------------|---------------------|-----------------------------|
| a. | tedabér             | /tedaber-i/ | tedabrí             | *tedbrí, *tdabrí, *tdbrí    |
|    | 'you m. will speak' |             | 'you f. will speak' |                             |
|    | kamcán              | /kamcan-ut/ | kamcanút            | *kmcánút, *kmcánút, *kmcnút |
|    | 'stingy'            |             | 'stingyness'        |                             |
| b. | katáv               | /katav-a/   | katvá               | *ktavá, *ktvá               |
|    | 'he wrote'          |             | 'she wrote'         |                             |
| c. | katsár              | /katsar-im/ | ktsarím             | *katsrím, *ktsrím           |
|    | 'short'             |             | 'short.pl'          |                             |

### (4) Forms in which /i/ and /u/ don't delete under affixation

- |    |             |            |              |                  |
|----|-------------|------------|--------------|------------------|
| a. | tipél       | /tipej-a/  | tipśá        | *tpeśá           |
|    | 'stupid'    |            | 'stupid.fem' |                  |
| b. | mitún       | /mitun-im/ | mituním      | *mtunim, *mitnim |
|    | 'recession' |            | 'recessions' |                  |

### (5) Verb forms in which a non-high vowel is realized as [e]

- |    |                     |            |                     |          |
|----|---------------------|------------|---------------------|----------|
| a. | a. hutxál           | /hutxal-a/ | hutxelá             | *hutxlá  |
|    | 'he was started'    |            | 'she was started'   |          |
| b. | o. yigmór           | /yigmar-u/ | yigmerú             | *yigmrú  |
|    | 'he will finish'    |            | 'they will finish'  |          |
| c. | i. tatxíl           | /tatxil-i/ | tatxilí             | *tatxelí |
|    | 'you m. will start' |            | 'you f. will start' |          |

### Aims of the paper:

- analyse Hebrew vowel deletion as effect of markedness restrictions on unstressed syllables, rather than word size restriction;
- explain notorious resistance of high vowels to deletion;
- give a parallelist account of apparent derivational effect (deletion-insertion interaction)

## 1.2 Outline of the solution

Hebrew unstressed syllables are subject to markedness constraints against too sonorous nuclei. These are satisfied by reduction to i, u and schwa in Bulgarian and other languages (Crosswhite 2001), by deletion in Hebrew.

Deletion is another strategy to avoid violation of the same constraints that trigger reduction (Gouskova 2003).

- (6) The fate of unstressed vowels - Surrender or die:
- Reduction: MAX-V >> MARKEDNESS >> IDENT(F)
  - Deletion: IDENT(F) >> MARKEDNESS >> MAX-V (Gouskova 2003)

## 2 Analysis

### (7) Prominence Scales:

- Nucleus (Prince & Smolensky 1993): a > e, o > i, u > schwa  
\*Peak i,u >> \*Peak e,o >> \*Peak a
- Sonority driven prominence reduction (Crosswhite 2001):  
\*UNSTRESSED /a >> UNSTRESSED /e,o > \*UNSTRESSED /i,u >  
\*UNSTRESSED /schwa

Unstressed vowels should be less sonorous than stressed vowels.

### 2.1 Word -/Foot -binarity?

Derived words strive to be disyllabic, i.e. minimal. Disyllabicity can be accounted for in different ways: by aligning the syllable to the edges of the Prosodic Word (Ussishkin 2000) or by foot-binarity and foot alignment (Bat-El 2004). Downing (2005) suggests a morphological approach correlating a morpheme to a syllable.

Different accounts have in common the assertion that disyllabicity is enforced upon a word by some constraints and is a trigger for phonological processes such as vowel deletion (Adam, Bat-El, Ussishkin).

### (8) Vowel deletion by force of word minimality (adapted from Bat-El 2003): gadal-a 'she grew'

	/gadal-a/	*CCC	WORD/MIN	MAX-V
a.	gà.dalá		*!	
b.	gad.lá			*

### (9) New proposal

	/gadal-a/	*CCC	*UNSTRESSED /V	MAX-V
a.	gà.da.lá		*!	
b.	gad.lá			*
c.	gd.lá	*!		

### (10) Why not reduction?

	/gadal-a/	*CCC	IDENT (F)	*UNSTRESSED /a,e,o	MAX-V
a.	gad.lá			*	*
b.	gid.lá		*!		

(Note that schwa doesn't exist in Modern Hebrew.)

### 2.2 Cluster avoidance in nouns and verbs

### (11) Why not deletion of the first vowel in Verbs? complex onsets are not tolerated.

	/gadal-a/	*CCC	*COMPLEX ONSET	*UNSTRESSED /a,e,o	MAX-V
a.	gad.lá			*	*
b.	gd.lá		*!	*	

Nouns prefer candidate (b).

Why are nouns different?: Different ranking for nouns.

### (12) NoCoda enforced in nominals - complex onsets tolerated

	/katsar-im/	*CODA	*UNSTRESSED /a,e,o	*CMLX ONS	MAX-V
a.	katsrím	*!			*
b.	ktsarím		*	*	

### (13) Interim rankings

- Verbs:  
\*CCC, \*COMPLEX ONSET, IDENT (F) >> \*UNSTRESSED /a,e,o >> \*CODA, MAX-V
- Nominals:  
\*CCC, \*CODA, IDENT (F) >> \*UNSTRESSED /a,e,o >> \*COMPLEX ONSET, MAX-V

### (14) No deletion of high vowel: /mitun+im/ 'recessions'

	/mitun-im/	IDENT (F)	*CCC	*UNSTRSSD /a,e,o	MAXV	*UNSTRSSD /i,u
a.	mituním					***
b.	mtnim		*!		*	
c.	mtuním				*!	**
d.	mitnim				*!	**

Trisyllabic forms or longer forms are the result of:

- Restrictions on syllable margins
- Differential syncope (i.e., low sonority vowels are not targeted).

- We assume co-phonologies for verbs and for nominals
- The assumption is supported by further phonological processes

### 2.3 "Pseudo-reduction" in verbs

### (15) Some verbs display a change of unstressed a,o to e. This is not found in nouns.

- |          |        |            |         |                     |
|----------|--------|------------|---------|---------------------|
| Verb:    | yigmór | /yigmar-u/ | yigmerú | 'will finish m./f.' |
| Nominal: | migdál | /migdali-/ | migdálí | 'tower/my tower'    |

The verbal strategy: syncope + epenthesis

The nominal strategy: syncope blocked to avoid CCC cluster, epenthesis not possible.

If /a/ deletes and is replaced by an epenthetic vowel to avoid a consonant cluster, why is it not a high vowel, that is favoured here?

The epenthetic vowel is chosen by

- the split-up \*UNSTRESSED scale (ruling out a)
- recovery constraints (ruling out i,u):

### (16) RECOVER /x: "A syllable nucleus with prominence x must have a correspondent in the input." (Alderete 1999, Gouskova 2003)

### (17) REC/i,u: "High vowels have to be recoverable in the input."

### (18) Parallel deletion and epenthesis

	/hutxal-a/	IDENT (F)	*CCC	REC /i,u	*UNSTRESSED /a > a,o > a,o,e	MAX-V	DEP-V
a.	hutxalá				*!	*	*
b.	hutxlá		*!				
c.	hutxilá	*!					
d.	hutxilá			*!		*	*
e.	hutxolá				*!	*	*
f.	hutxelá					*	*

(In the analysis, we implement de Lacy's (2002) theory of markedness scales, rather than a fixed ranking. This will be crucial in (20) below.)

Why do not all verbs do this?

Many verbs don't show epenthesis as a response to cluster avoidance, only blocking of deletion.

### (19) hitparka 'she broke apart' no deletion plus epenthesis

	/hitparek -a/	IDENT (hi,lo)	*CCC	REC /i,u	*UNSTRESSED /a > a,o > a,o,e	MAX-V	DEP-V
a.	hitpareká				*	*!	**
b.	hitprká		*!				**
c.	hitpreká		*!		*	*	*
d.	hitparká			*	*!	*	*
e.	hitperká				*	*	*
f.	hitpereká					**!	*

Candidate (e) wrongly wins; candidate (f) threatens candidate (d) as well.

Ranking the scalar markedness constraints on unstressed vowels eliminates (f). Two unstressed vowels are worse than one.

### (20) Candidate (f) eliminated by ranking the markedness constraints:

	/hitparek -a/	IDENT (hi,lo)	*CCC	REC /i,u	*UNSTRESSED /a,o,e > a,o > a	MAX -V	DEP -V
a.	hitpareká				**!	*	*
b.	hitprká		*!				**
c.	hitpreká		*!		*	*	*
d.	hitparká			*	*!	*	*
e.	hitperká			*	*	*	*
f.	hitpereká				**!	*	*

Candidate (e) has deletion/epenthesis in a closed syllable. Generalisation: Blocking of deletion and epenthesis occurs in closed syllables only.

This is a CONTIGUITY effect: Contiguity punishes unfaithfulness inside constituents but not at margins (McCarthy & Prince 1995, 1999, Alber 2001, Krämer 2005).

### (21) I-CONTIGUITY ("No Skipping", McCarthy & Prince, 1995): The portion of S1 standing in correspondence forms a contiguous string. Domain (S1) is a single contiguous string in S1. xyz/ → xz

Here, CONTIGUITY is restricted to the syllable: Vowels at the syllable margin in the surface form can be deleted; vowels embedded between two tauto-syllabic consonants cannot.

### (22) I-CONTIG-\$ (Pater 1997: 226) The portion of S1 standing in correspondence with the constituents of a syllable forms a contiguous string.

### (23) Violations of I-CONTIG-\$ (diverging from Pater's interpretation):

	/psatka/	I-CONTIG-\$	MAX-IO
a.	.psat.ka	√	√
b.	.psa.ka	√	†
c.	.sa.ka	√	b,†
d.	.pst.ka	*	a
e.	.pat.ka	*	r
f.	.pt.ka	*	r,a
g.	.psa.ta	√	k
h.	.ps.ta	√	a,k

### (24) hitparká: no deletion/epenthesis

	/hitparek -a/	I-CONTIG-\$	*UNSTRESSED /a,o,e > a,o > a	MAX-V	DEP-V
a.	hit.pa.re.ká		**!	*	*
d.	hit.par.ká		*	*	*
e.	hit.per.ká	*!	*	*	*
f.	hit.pe.re.ká		**!	*	*

### (25) Deletion and reinsertion in open syllables:

	/hutxal-a/	IDENT (F)	*CCC	REC /i,u	I-CONTIG-\$	*UNSTRSSD /a,o,e > a,o > a	MAX -V	DEP -V
a.	hutxalá					*	*!	*
b.	hutxlá		*!					
c.	hutxilá	*!						
d.	hutxilá			*!			*	*
e.	hutxolá					*	*!	*
f.	hutxelá					*	*	*

© The apparent opaque interaction of deletion and insertion is accounted for in a purely parallelist fashion. No need for extensions to the theory (Sympathy, Stratal OT, candidate chains etc.).

## 3 Conclusions

- Vowel deletion in Hebrew is an effect of sonority requirements on unstressed nuclei.
- No word-size restrictions are needed.
- High vowels are of low sonority and thus conform to the above markedness restrictions.

There is no reason to delete high vowels if deletion happens to reduce markedness in unstressed syllables rather than because of a maximal word size.

Change from /a, o/ to [e] is not reduction, but rather deletion plus epenthesis.