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Multiple defaults: feminine *-et* and *-a* in Hebrew present tense

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Abstract In this paper, we study the distribution of the feminine singular suffixes *-et* and *-a* in the present tense of Hebrew verb paradigms. The question we ask is which of these two suffixes is the default allomorph. The answer is not trivial. In terms of distribution, *-a* appears with limited environments and *-et* is clearly the elsewhere case, and thus the default. In terms of order, however, *-et* is the feminine singular suffix associated with the present tense, while *-a* emerges only when *-et* is blocked. We thus argue for multiple defaults, distinguishing between *local* and *global default*; *-et* is the local default, uniquely associated with feminine singular verbs in the present tense, while *-a* is the global default, associated with feminine singular but not specified for the present tense. We provide a formal analysis for the distribution of these suffixes within the framework of Optimality Theory, which allows the interaction of phonological constraints with constraints on morpho-syntactic feature mapping. We further study the partially unpredictable distribution of *-et* and *-a* in vowel final verbs, and present the results of an experiment where speakers employed unique strategies in order to assign the local default *-et*.

Keywords Local and Global Default · Suppletive Allomorphy · Feminine Gender · Hebrew

1 Introduction

This is a story of two suppletive allomorphs, *-et* and *-a*, both assigned to Hebrew feminine singular verbs in the present tense (e.g. *meχapés-et* 'search PRES.FM.SG',

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maklit-á 'record PRES.FM.SG').[1] The question we address here is which of these allomorphs is the default, and the somewhat unexpected answer turned out to be that both allomorphs are the default. We propose a domain distinction between the two allomorphs, where *-et* is the *local default* of the feminine singular in the present tense and *-a* is a *global default*. This distinction is based on morpho-syntactic feature specification, whereby the local default *-et* is specified for Tense, while the global default *-a* is not.

Hebrew verbs in the present tense (participle) take either *-et* or *-a* to designate PRES.FM.SG. Within the verb paradigm, the suffix *-et* is the local suffix, associated only with PRES.FM.SG. The suffix *-a*, on the other hand, is not only one of the exponents of PRES.FM.SG but also the sole exponent of PAST.3.FM.SG (e.g. *sagʁ-á* 'close PAST.3.FM.SG', *hitχíl-a* 'start PAST.3.FM.SG').

Within a rule-based approach, *-a* is the first to attach because it appears with phonologically-defined groups of verbs (monosyllabic verbs and verbs with a high vowel in the final syllable). The suffix *-et* is then assigned as the elsewhere case, and thus considered the default suffix.

However, the specific environments calling for *-a* in the present tense arise due to restrictions on the distribution of *-et*. That is, it is not that a rule attaching *-a* in specific environments precedes the default rule attaching *-et*. Rather, first the default *-et* is attached, and in the few environments where it is blocked, *-a* fills in. This is 'a fault of the default', which arises within the traditional rule-based analysis. The default rule is, by definition, the last to apply, but in our case it must be the first to apply.

This fault does not arise within the constraint-based approach of Optimality Theory, which allows reflecting the preference of the suffix *-et* over *-a*, but at the same time presenting the restrictions on *-et*, which allow *-a* to emerge. The analysis provided in this paper maintains *-et* as the *local* default exponent of PRES.FM.SG—local to the present tense. The suffix *-a* is the *global* default, used whenever the local default fails.

This is actually a case of "Lexical Conservatism" (Steriade 1999), whereby an allomorph is selected from a pool of pre-existing forms even in cases of morpho-syntactic feature mismatch. It is similar to the case in Spanish, where the masculine definite article *el-* is used with feminine nouns when the feminine *la-* is blocked (before stems beginning with a stressed *a*). That is, there is a gender match in *el zapáto* 'the shoe MS' and *la puérta* 'the door FM', but not in *el água* 'the water FM' (see a review in Nevins 2011). Likewise in Hebrew, the past tense suffix *-a* is used with present tense verbs when the present tense suffix *-et* is blocked.

Here is the paper's roadmap. We start with a brief discussion on the notion of default (Sect. 2), and then proceed with the relevant details on the feminine singular suffixes *-et* and *-a* in Hebrew verb paradigms (Sect. 3). A formal analysis of the distribution of these two suffixes is provided (Sect. 4), starting with the rule-based approach that accounts for the facts but fails to capture the relevant generalization, and followed by an analysis within the framework of Optimality Theory.

Our argument that *-et* is the local default of PRES.FM.SG is further supported with experimental data from vowel-final (V-final) verbs, where the distribution of *-et* and

[1] FM = feminine; MS = masculine; SG = singular; PL = plural; PRES = present; PST = past; FUT = future.

-*a* is synchronically unpredictable (cf. *koné* – *koná* 'buy PRES.MS-FM.SG' vs. *koʁé* – *koʁét* 'read PRES.MS-FM.SG'). Our discussion on V-final verbs (Sect. 5) begins with details regarding the distribution of post-vocalic -*et* and -*a* in the present tense, showing the preference of -*a* in V-final verbs (Sect. 5.1). We then proceed with an OT analysis that accounts for this preference (Sect. 5.2). Finally, we report on the results of our experiment (Sect. 6), which suggest that against all odds, speakers prefer -*et* over -*a* as the exponent of PRES.FM.SG, including vowel final stems. We propose that this preference arises from the role of -*et* as the local default.

2 On default

It is often assumed that there is only one default rule. Viewing the default as the elsewhere case (Kiparsky 1973), there can be only one rule at the end of the rule-chain that assigns the default structure. This property is inherent to a rule-based approach, where rules apply in serial order and the default rule applies whenever earlier specific rules are inapplicable. However, cases of multiple defaults have been introduced in the literature.

Zwicky (1986) discusses general vs. specific/exceptional cases, where within the general cases he distinguishes between *general as basic* and *general as default*. General as basic is an underlying structure that has not been altered by specific rules and is often associated with the relevant category. General as default is the structure assigned when everything else fails, i.e. the elsewhere case.

Within the framework of Network Morphology, Evans et al. (2002) and Brown and Hippisley (2012) distinguish between *normal* and *exceptional* default. In their study of Mayali's gender and class system (4 genders and 5 classes), Evans et al. (2002) show that each one of the four semantic genders (masculine, feminine, vegetable, and neuter) has a corresponding normal default class, designated by a unique prefix; the fifth class, which hosts mostly human nouns, does not have a prefix. In addition to the normal default class, each gender has an exceptional default class, which hosts outlaws. For example, *biniŋ* 'man' is in the normal default fifth class usually hosting human nouns, but *na-raŋem* 'boy', a male human like 'man', is in the exceptional default class usually hosting masculine nouns.

The above-mentioned studies contribute to the distinction between the two types of default relevant to the present study:

i. *Local default*—the normal exponent of the relevant category.
ii. *Global default*—the general exponent assigned when the local default fails.

These two types of default differ in their domain, where a domain is established via feature specification. For Hebrew feminine singular suffixes in the present tense, the local default -*et* is the unique exponent of the feature bundle PRES.FM.SG, where the values of Tense, Gender, and Number are fully specified. The global default -*a*, assigned when -*et* is blocked, is the exponent of the feature bundle FM.SG, where the value for Tense is not specified. With its impoverished feature specification, the global default -*a* is assigned also to past tense forms. Thus, when the domain is the entire verb paradigm, -*a* is the (global) default, but when the domain is the present tense, -*et* is the (local) default and -*a* fills in when necessary.

3 Hebrew feminine suffixes

The table below displays the verb inflectional suffixes in Hebrew. The relevant morpho-syntactic features are of the categories Tense, Number (Num), Person (Pr), and Gender (Gen).

(1) Hebrew verb inflectional suffixes[2]

PAST				PRESENT			FUTURE			
Num	*Pr*	*Gen*		*Num*	*Gen*		*Num*	*Pr*	*Gen*	
SG	1		-ti	SG	FM	*-a -et*	SG	1		–
	2	FM	-t		MS	–		2	FM	-i
		MS	-ta						MS	–
	3	FM	$\boxed{\text{-a}}$					3	FM	–
		MS	–						MS	–
PL	1		-nu	PL	FM	-ot	PL	1		–
	2		-tem		MS	-im		2		-u
	3		-u					3		-u

Ignoring forms without a suffix (marked with –), every bundle of morpho-syntactic features, but one, has a unique exponent. The odd one out is the feature bundle PRES.FM.SG, which has two exponents, *-a* and *-et* (shaded). Moreover, the exponent *-a* is shared with the feature bundle PAST.3.FM.SG (boxed). The feminine suffixes and their features are depicted below:

(2) Hebrew verb feminine singular suffixes[3]

Tense:	PAST	PAST	PRESENT	FUTURE
Person:	2	3		2
Gender:	FM	FM	FM	FM
Number:	SG	SG	SG	SG
	-t	*-a*	*-et*	*-i*

The distribution of *-a* and *-et* in present tense forms is phonologically conditioned (Ornan 1971). The generalizations provided below are true for consonant-final (C-final) verbs only; V-final verbs display inconsistent behavior (see Sect. 5).

[2]i. Future forms are further distinguished with prefixes, which are not relevant here.
ii. The suffixes *-t* and *-et* can serve as the only surface cue for tense contrast, as in *niχnás-t* 'enter **PAST**.2.FM.SG' vs. *niχnés-et* 'enter **PRES**.FM.SG', both derived from the syncretic form *niχnás* 'enter **PAST/PRES**.3.MS.SG'.

[3]i. Both *-et* and *-a* are used also in the nominal and adjectival system (Schwarzwald 1991). They serve as inflectional suffixes in adjectives (e.g. *aχéʁ – aχéʁ-et* 'different MS-FM', *gadól – gdol-á* 'big MS-FM') and animate nouns (e.g. *zamáʁ – zaméʁ-et* 'singer MS-FM', *χavéʁ – χaveʁ-á* 'friend MS-FM') and as derivational suffixes in inanimate nouns (e.g. *bikóʁ-et* 'criticism', *bakaʁ-á* 'control').
ii. The present tense is actually a participle in Hebrew, and therefore ambiguity in functions arises (Bat-El 2008). For example, *ʃoméʁ* stands for the verb 'guard PRES.MS.SG' and the noun 'guard'; *t͡ʃolélet* for the verb 'dive PRES.FM.SG' and the noun 'submarine'; and *menaχém* for the verb 'comfort PRES.MS.SG', the adjective 'comforting MS.SG', and the noun 'consoler'. This dual behavior of the participle is linked to the historical fact that Modern Hebrew adopted the inflectional paradigms from Tiberian Hebrew (Zadok 2012), where the participle did not have a verbal function (Doron 2005).

(3) The phonological distribution of -*a* and -*et* (C-final verbs)[4]

		Stems with V[high] in the final syllable		Monosyllabic stems	
a. -*a*	MS	makʃív	mapíl	ʃáʁ	kám
	FM	makʃiv-á	mapil-á	ʃáʁ-a	kám-a
		'listens'	'drops'	'sings'	'gets up'

		Elsewhere (polysyllabic only)			
b. -*et*	MS	nofél	nigáʃ	niχnás	mevakéʃ
	FM	nofél-et	nigéʃ-et	niχnés-et	mevakéʃ-et
		'falls'	'approaches'	'enters'	'asks'

The suffix -*a* appears in limited environments (3a): when the masculine base is monosyllabic or the vowel in its final syllable is high (only [i] appears in this environment). In correlation with the limited environment, this suffix is also quantitatively less common in the present tense (4). In the 499 most frequent verbs in a corpus of written Hebrew, only 27 % of the C-final verbs take -*a*: 4 % ($n = 12$) monosyllabic verbs, 21 % ($n = 75$) verbs with a high vowel in the stem final syllable, and 2 % others. A similar distribution is found in Zadok's (2012) natural speech corpus, where -*a* is less frequent than -*et*.[5]

(4) Frequency of PRES.FM.SG -*et* and -*a* in C-final verbs

			-*et*		-*a*		Total
a.	Written corpus:	Types	73 %	257	27 %	94	351
		Tokens	71 %	133,590	29 %	53,349	186,939
b.	Spoken corpus:	Types	66 %	71	34 %	37	108
		Tokens	66 %	184	33 %	93	277

The data in (4) exclude a closed group of verbs ($n = 15$) where -*at* is the exponent of PRES.FM.SG. This suffix is a variant of -*et*, historically derived via lowering in the context of a pharyngeal. Although pharyngeal consonants did not survive in Modern Hebrew (ħ→ χ, ʕ → ʔ / null), historically pharyngeal-final verbs do share a unique structure in present tense. Historically ʕ-final verbs, which are now V-final, end in *a* and in most of them the *a* is immediately preceded by a stressed vowel (e.g. *ʃokéa* 'sink PRES.MS.SG', *mafʁía* 'disturb PRES.MS.SG'). Historically ħ-final verbs, which are now χ-final, have a sequence of two vowels before the χ (cf. the historically ħ-final

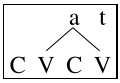
[4]There is an additional group of verbs that takes -*a*, but these verbs are exceptional and are gradually vanishing from the lexicon or changing their shape. *kavéd – kvedá* '(become) heavy MS–FM.SG' and *zakén – zkená* '(become) old MS–FM.SG' are used mostly as adjectives; *gadél – gdelá* 'grow PRES.MS–FM.SG' and *jaʃén – jeʃená* 'sleep PRES.MS–FM.SG' are gradually adopting the regular pattern with -*et*, thus often produced as *godél – godélet* and *joʃén – joʃénet* respectively; and verbs like *katén – ktená* 'become small PRES.MS–FM.SG' and *kamél – kmelá* 'wither PRES.MS–FM.SG' are rarely used.

[5]The written corpus (compiled and kindly contributed by Shmuel Bolozky) was obtained from newspapers and some literary segments written in moderate register; it consists of the 499 most frequent Hebrew verbs (and the verb 'to be') corresponding to 303,929 tokens (out of 5.2 million words). We eliminated from our counting verbs with a paradigm gap in the present tense ($n = 5$), and verbs with a present tense form used almost exclusively as adjectives ($n = 16$), including adjectival passive. The spoken corpus (Zadok 2012) was obtained from 2 hours of recordings of natural speech (conversations and TV/radio shows); it consists of 2964 verb tokens, out of which 9 % were feminine singular verbs in the present tense.

ʃoléaχ 'send PRES.MS.SG' with the historically χ-final *moléχ* 'reign PRES.MS.SG'). Since we limit our discussion to suppletive allomorphy, we ignore here the distribution of -*et* vs. -*at*, which warrants a paper of its own.

Our question as to which of the suffixes is the default could have had a simple answer had one form served as the underlying representation. However, we do not assume that -*et* and -*a* are structurally related. Contrary to our view, within the framework of Government Phonology (Lowenstamm 1996; Scheer 2004), Faust (2013) claims that -*a* and -*et* share an underlying representation consisting of a CVCV unit and the segmental content *at*, but differ in the association between these two structures.

(5) UR: {*at*, CVCV}

SR: -*a* 

-*et* 

These representations tell us that -*a* is structurally more marked than -*et*, assuming that one-to-many association and floating segments, as in the representation of -*a*, are marked. Other than that, they do not tell us anything about the default since the underlying representation, which is often identical to the surface default, is not identical to any of the two surface representations in this case. Although, as noted above, there are cases where -*at* surfaces, these are very limited; that is, -*at* is certainly not the default.

Our formal analysis in the ensuing section incorporates the notion of multiple defaults with the aid of constraints responsible for morpho-syntactic feature mapping. We propose that the local default -*et* is fully specified for PRES.FM.SG, and it is the full specification that grants it the status of the local default. The global default -*a* is underspecified for Tense, and its emergence is facilitated by the interaction of the constraints that block -*et* with the feature mapping constraints.

4 Formal analysis

Within a traditional rule-based approach to morphology, the two allomorphs would be disjunctively ordered (Anderson 1992) such that the assignment of -*a* would precede that of -*et* because -*a* is assigned in limited contexts.

(6) Ordered suffix insertion rules

a. X → -*a* | $[\mathrm{CV(C)}]_{\mathrm{Stem}\_\_}$ (monosyllabic stems)
| $\mathrm{V}^{[\mathrm{high}]}\mathrm{(C)}]_{\mathrm{Stem}\_\_}$ (stems with a high vowel in the final syllable)

b. X → -*et* | elsewhere

The order in (6) relies on distribution only, where the suffix enjoying the more general distribution is the elsewhere case. While this analysis derives the correct outputs (only for C-final verbs), it misses a very important generalization: -*a* is added only where -*et* is blocked (in monosyllabic stems and stems ending with a high vowel). In this state of affairs, the order should be as follows:

(7) The distributional relation of -*a* and -*et*
Insert X, unless A, in which case insert Y
where X = -*et*
Y = -*a*
A = the set of environments where -*et* is blocked

In the following analysis we employ the framework of Optimality Theory (Prince and Smolensky 1993/2004) to account for the distributional relation in (7). Following McCarthy and Prince (1993), we assume that suffixes are attached via alignment constraints of the schema ALIGNR(Aff, PrWd) ≡ every affix is aligned with the right edge of a prosodic word. The suffixes are specified for their morpho-syntactic features, to allow their mapping with the relevant morpho-syntactic context.

(8) Morpho-syntactic specification of the suffixes
a. -*et*]$_{\text{PRES.FM.SG}}$ -*et* is the exponent of the feature bundle PRES.FM.SG.
b. -*a*]$_{\text{FM.SG}}$ -*a* is the exponent of the feature bundle FM.SG.

The suffix -*et* is unique to the present tense, and thus fully specified for PRES.FM.SG. The suffix -*a* appears not only with some verbs in the present tense (3a), but also with all 3rd person feminine singular verbs in the past tense. In order to capture its two functions in the verb paradigm, -*a* must be specified for FM.SG only, without Tense. The full specification of -*et* for Present correlates with its relative markedness. Doron (1983) proposes that Hebrew Past and Future are specified for [+tense], while Present (participle) is specified for [−tense]. Since [−tense] cannot be the default for verbs, Present must be fully specified.

Given the feature specification in (8), it is not necessary to lexically organize the two allomorphs (see Bonet et al. 2007). Rather, Panini's principle, aka 'the elsewhere condition' (Kiparsky 1973) and 'the subset principle' (Halle 1997), is responsible for selecting the allomorph that matches the greatest number of features. Thus, given an input specification of PRES.FM.SG, the suffix -*et* would have priority over -*a* because -*et* is a complete match and -*a* is a partial match. The suffix -*et* would also have priority over any random suffix, which would probably clash with one or more features specified in the input.

Wolf (2008) expresses the subset principle with morphological MAX and DEP constraints, which together require a complete match between the features specified in the input and the features specified in the affix. We restate here Wolf's constraints as follows:

(9) Morpho-syntactic feature correspondence constraints
a. MAX-M(F): Every morpho-syntactic feature in the input has a correspondent in the affix.
b. DEP-M(F): Every morpho-syntactic feature in the affix has a correspondent in the input.

There are no cases in our study where an attached affix bears a morphological feature that has no correspondent in the input; we will therefore exclude DEP-M(F) constraints from the discussion, assuming all constraints of this group are undominated.

MAX-M(PRES) alone predicts that all verbs specified for PRES.FM.SG will prefer *-et*, which is specified for PRES, over *-a*, which is not specified for Tense. Thus, it reflects the local default status of *-et* for 'PRES.FM.SG'; the suffix *-a* emerges only when the attachment of *-et* is blocked; the suffix *-i*, specified for FUT.FM.SG, never emerges in the present tense.

The attachment of *-et* is blocked due to a restriction on trochaic feet in native Hebrew, which requires the leftmost vowel in a trochaic foot to be mid, if the rightmost is mid. This phonological pattern—right-aligned trochaic foot with mid vowels—is associated with the suffix *-et* and a subgroup of native nouns called "segholates" (Bat-El 1989, 2012; Bolozky 1995). For example, the loan noun *kábel* 'cable' does not comply with this pattern, but its native counterpart *kével*, does.

This phonological restriction is expressed within the framework of Optimal Domains Theory (Cole and Kisseberth 1994 and subsequent studies) with the constraint WIDE SCOPE ALIGNMENT LEFT (WSA-LEFT).

(10) WSA-LEFT The left edge of the domain of [mid] is aligned with the left edge of a trochaic foot.

This constraint requires *-et* to be preceded by a mid vowel, which can be either a base vowel (e.g. *loméd – loméd-et* 'learn PRES.MS–FM.SG') or derived via lowering (e.g. *niχnás – niχnés-et* 'enter PRES.MS–FM.SG'). Note that WSA-LEFT does affect forms with consonant-initial suffixes (e.g. *niχnás-tem* 'enter PAST. PL') since in these forms the strong foot is aligned with the right edge of the stem and not that of the prosodic word (Graf and Ussishkin 2003).

When the mid vowel is derived, the output-output faithfulness constraint IDENTV is violated. Note that we assume that all feminine forms of the verb are derived from their masculine counterparts and thus all phonological faithfulness constraints are output-output constraints. The ranking is thus WSA-LEFT, MAX-M(PRES) » IDENTV.[6]

As shown below, MAX-M(PRES) rules out the *-a* candidates (11c, d) and WSA-LEFT rules out the *-et* candidate that does not harmonize (11a). The optimal candidate (11b) tolerates violation of the low-ranked IDENTV (Harmonically bound candidates are ignored throughout).

(11) Vowel alternation to satisfy WSA: *niχnás – niχnéset* 'enter PRES.MS–FM.SG'

	niχnás PRES.FM.SG	WSA-LEFT	MAX-M(PRES)	IDENTV
a.	niχnás-et PRES.FM.SG	*!		
b. ☞	niχnés-et PRES.FM.SG			*
c.	niχnas-á FM.SG		*!	

There are, however, two cases where the base vowel is preserved without alternation: when the vowel is high and when the vowel is in a monosyllabic stem (the vowel in

[6] We do not present here a full analysis of [Mid] harmony patterns in Hebrew. Note, however, that in order for WSA-left to have an effect, we assume the rankings WSA-LEFT » BA-LEFT and EXPRESSION-MID » INSERT-MID (see Cole and Kisseberth 1994 and subsequent studies).

monosyllabic verbs is *a*).[7] High vowels are perceptually marked (Walker 2004) and their faithfulness is considered "preservation of the marked" (de Lacy 2006). Monosyllabic stems are 'small units', almost like affixes (Casali 1997), and preservation of their elements enhances their accessibility. In these cases of preservation, the suffix -*a* emerges, as in *matχíl* – *matχilá* (**matχélet*) 'start PRES.MS–FM.SG' and *kám* – *káma* (**kemet*) 'get up PRES.MS–FM.SG'.

These two cases require reference to a family of IDENTV constraints, with the following relevant members:

(12) IDENTV family

a. IDENTVMONO Correspondent vowels in a monosyllabic stem have identical feature values.

b. IDENTV[high] Correspondent vowels have identical values for the feature [high].

As suggested by the reviewers, IDENTVMONO could be replaced with a positional faithfulness constraint (Beckman 1997), which targets word initial position (see Becker et al. 2012). While positional faithfulness is the first explanation that comes to mind, there is evidence from vowel deletion in nouns, which may suggest otherwise. In nouns, a vowel is deleted at the beginning of the stem, thus violating positional faithfulness (e.g. *gamál* – *gmal-ím* 'camel SG–PL'; Bat-El 2008). Nevertheless there is no deletion in monosyllabic nouns (e.g. *saʁ* – *saʁím* 'minister SG–PL'; **sʁim*). That is, regardless of the target position, monosyllabic stems resist alternation.

In order to have an effect, the specific faithfulness constraints are ranked above the general IDENTV, and most crucially, above the competing markedness constraints. The ranking IDENTV[high] » MAX-M(PRES) rules out **matxél-et* in (13a) below, and the ranking IDENTVMONO » MAX-M(PRES) rules out **kém-et* in (13b). The ranking is thus IDENTV[high], IDENTVMONO, WSA-LEFT » MAX-M(PRES) » IDENTV.

(13) Resisting vowel alternation

a. High vowel in stem-final syllable: *matχíl* – *matχilá* 'start PRES.MS–FM.SG'

	matχíl PRES.FM.SG	IDENTV[high]	WSA-LEFT	MAX-M(PRES)
a.	matχíl-et PRES.FM.SG		*!	
b.	matχél-et PRES.FM.SG	*!		
c. ☞	matχil-á FM.SG			*

b. Monosyllabic stem: *kám* – *káma* 'get up PRES.MS–FM.SG'

	kám PRES.FM.SG	IDENTVMONO	WSA-LEFT	MAX-M(PRES)
a.	kám-et PRES.FM.SG		*!	
b.	kém-et PRES.FM.SG	*!		
c. ☞	kám-a FM.SG			*

[7] The analysis predicts that monosyllabic verbs with *e* would take -*et*. There is only one such verb in Hebrew, *met* 'die', which takes -*a*, against our prediction. The story could be a type of paradigm uniformity, where structurally identical verbs (here monosyllabic) have the same inflectional paradigm.

This analysis reflects the generalization that *-a* fills in whenever *-et* is blocked. The first choice for the exponent of PRES.FM.SG is the local default *-et*, which must be preceded by a mid vowel (WSA-LEFT). However, there is a limit as to which alternations are allowed in order to satisfy the requirement of *-et*. A non-high vowel in a polysyllabic stem can be altered (11), but not a high vowel (13a) or a vowel in a monosyllabic stem (13b). Since all three constraints (IDENTV$^{[high]}$, IDENTVMONO, and WSA-LEFT) must be respected, *-et* is blocked, allowing *-a* to emerge.

5 Vowel-final verbs

So far we have shown that *-et* and *-a* are in complementary distribution, with *-a* being limited qualitatively (3) as well as quantitatively (4). However, this distribution is true only for C-final verbs. V-final verbs are characterized by unpredictable distribution of the exponent *-et* and *-a*, which adds up to their various morpho-phonological idiosyncrasies (Zadok 2012). Phonologically similar verbs take different feminine suffixes (e.g. *bone-a* → *boná* 'build PRES.FM.SG' vs. *boʁe-et* → *boʁét* 'create PRES.FM.SG'). Consequently, although spelling allows disambiguation, as the letters corresponding to the historical final segments survived, deviation from the norm is found among all speakers (though to different degrees) and even in writing. Some examples, drawn from the Internet, are given below (the normative form is in parenthesis):

(14) Deviation from the normative forms

a. t͡saʁiχ liktof oto jaʃaʁ, im lo aklipa *mitkaʃet* (*mitkaʃa*)
'It is necessary to pick it right away, otherwise the peel becomes hard'
http://www.tapuz.co.il/forums2008/viewmsg.aspx?forumid=465&messageid=162170719

b. im lemiʃeu *mitpanet* (*mitpana*) ʃuʁa ani ʁo͡tsa
'If someone gets a free row I want (it)'
https://he-il.facebook.com/permalink.php?story_fbid=266290180077060&id=262354643803947

c. ani *mekana* (*mekanet*) bekol aχat
'I envy everybody'
http://www.breslevcity.co.il/ברסלב_שות_1052

In this section we display the relevant data and generalization for which we then provide a constraint-based analysis.

5.1 Variability

V-final verbs are historically derived from three types of C-final verbs: glottal-final, glide-final, and historically pharyngeal-final verbs (where the latter ones are excluded from this discussion here; see Sect. 3). Each of these final consonants conditions a different suffix: *-et* appears with historically glottal-final verbs and *-a* with historically glide-final verbs. As shown below, these consonants did not survive in final position in the current paradigm of Modern Hebrew and consequently, the distribu-

tion of these suffixes is not synchronically predictable (see, however, an analysis in Faust 2012).

(15) The historical source of vowel final verbs

		Source paradigm[8]		Current paradigm		
		MS	FM	MS	FM	
a.	Final glottal stop:	boréʔ	borét	boʁé	boʁét	'reads'
b.	Final glide:	bonéj	boná	boné	boná	'buys'

The ambiguity in the current paradigm is due to the structural identity of the masculine forms (shaded) in (15a) and (15b). Such ambiguity arises only in *e*-final verbs.

(16) Unpredictable suffixation with *e*-final verbs

MS	FM -*et*		MS	FM -*a*	
boʁé	boʁét	'creates'	boné	boná	'builds'
meχaté	meχatét	'disinfects'	meχaké	meχaká	'waits'
mitnasé	mitnasét	'towers'	mitnasé	mitnasá	'experiences'

However, some V-final verbs display a predictable distribution. Like C-final verbs (3a), V-final monosyllabic stems and stems with V[high] in the final syllable take -*a* (e.g. *bá-a* 'come PRES.FM.SG', *maχbi-á* 'hide PRES.FM.SG'). Other predictable distributions are partially morphologically conditioned. Hebrew verbs are distributed among five classes (*binyanim*), where one of the characteristics of a class is its vocalic pattern (Bat-El 2002). Class II verbs (traditionally called *nifʕal*) take -*et* regardless of whether the verb is C-final (e.g. *niχnés-et* 'enter PRES.FM.SG'), or *a*-final (e.g. *nimt͡sa-et* → *nimt͡sét* 'is present PRES.FM.SG') or *e*-final (e.g. *nivne-et* → *nivnet* 'is built PRES.FM.SG'). However, the normative *e*-final stems are gradually becoming *a*-final due to paradigm migration (Zadok 2012; Zadok and Bat-El 2015), and we could thus resort to phonological environment, i.e. that *a*-final stems take -*et*. Class III verbs (traditionally called *hifʕil*) are those with the final high vowel and thus, as noted earlier, always take -*a*, regardless of whether they are C-final or V-final. However, there are also a few *e*-final verbs in class III, and they also take -*a* (e.g. *mafne-a* → *mafna* 'turn PRES.FM.SG'), probably for the sake of paradigm uniformity. Note that the classes are identified on the basis of their phonological structure. For example, class III verbs in the present tense start with *ma* (where *m* is a prefix), which can serve as a cue for paradigm uniformity. Similarly, class II verbs in the present tense start with *ni*, which signals speakers to assign -*et*. In general, we could say that the assignment of feminine suffixes to *e*-final verbs is unpredictable (16), with the exception of class II and class III *e*-final verbs, which take -*et* and -*a* respectively.

Unpredictable suffixation serves as a fertile ground for examining the speakers' preferred suffix, which may shed light on the role of local default. But before turning to the experiment and its results, we provide an analysis of the relevant morphophonology.

[8]Evidence for the final consonants is found in the paradigm, as in the forms *bnuʒá* 'build PASSIVE.FM.SG' and *bru*(ʔ)*á* 'create PASSIVE.FM.SG'.

5.2 Hiatus resolution

When a V-initial suffix is added to a V-final verb, one of the vowels is deleted in order to rescue the violation of *HIATUS (18a). We assume that the feminine form is derived from the masculine one, which means that the input of suffixation is a surface form with stress (i.e. output-output relation).

(17) Hiatus resolution

a.	koné-a	→	koná	'buys'
	maʃvé-a	→	maʃvá	'compares'
	meχaké-a	→	meχaká	'waits'
	mitnasé-a	→	mitnasá	'experiences'
b.	koʁé-et	→	koʁét	'reads'
	nivné-et	→	nivnét	'is built'
	meχaté-et	→	meχatét	'disinfects'
	mitnasé-et	→	mitnasét	'towers'

With the suffix *-a* (17a), it is clear that the stem-final *e* is deleted. With the suffix *-et* (17b), however, it is not obvious which of the vowels is deleted because the stem-final vowel and the suffix-initial vowel are identical. We argue that the deleted *e* belongs to the suffix (i.e. *meχaté-et* → *meχaté-__t*) because stressed vowels tend to survive deletion more than unstressed ones. In addition, given an output like koʁét 'read PRES.FM.SG', the stressed vowel cannot be the suffix vowel since *-et* is never stressed, neither in verbs (e.g. *niχnéset* 'enter PRES.FM.SG', *boχéʁet* 'select PRES.FM.SG') nor in nouns (e.g. *maχbéʁet* 'notebook', *któvet* 'address', *kidómet* 'prefix').

To account for the site of vowel deletion we adhere to the MAXV family of constraints (18c). Resolving hiatus by deleting the suffix vowel allows maintaining an exponent for PRES.FM.SG in the case of *-et* but not in the case of *-a*. The cross-linguistics preference for preserving an exponent (Casali 1997) is expressed with the constraint REALIZE MORPHEME (18b):

(18) Constraints active in hiatus resolution

a.	*HIATUS	Two adjacent vowels are prohibited
b.	REALIZE MORPHEME	The morphological feature FM.SG has an exponent
c.	MAXV family	
	MAXV^{STR}	A stressed vowel in the input has a correspondent in the output
	MAXV	A vowel in the input has a correspondent in the output

We assume an undominated DEP, which excludes candidates with an epenthetic consonant (**koneCá*, **koʁéCet*); that is, *HIATUS violation is never resolved by epenthesis. This assumption is most relevant for our discussion on the experimental results, in particular Sect. 6.4. Note also that in cases where the suffix is unpredictable, as in

(19a, b), we introduce the suffix in the input. That is, as noted above, *koné* 'buys' and *koʁé* 'reads' are structurally identical and a deterministic grammar cannot predict one suffix over the other.

(19) Hiatus resolution in *e*-final verbs

a. *e*-final verbs plus -*a*: *koné* – *koná* 'buy PRES.MS–FM.SG'

	koné-a	*HIATUS	REALZMORPH	MAXV^{STR}	MAXV
a.	koné-a	*!			
b.	koné		*!		*
c. ☞	kon-á			*	*

b. *e*-final verbs plus -*et*: *koʁé* – *koʁét* 'read PRES.MS–FM.SG'

	koʁé$_i$-e$_j$t	*HIATUS	REALZMORPH	MAXV^{STR}	MAXV
a.	koʁé$_i$e$_j$t	*!			
b.	koʁé$_j$t			*!	*
c. ☞	koʁé$_i$t				*

With C-final verbs (as well as nouns and adjectives), -*et* is preceded by a mid vowel in a stressed syllable (e.g. *mekabél-et* 'receive PRES.FM.SG'), that is, -*et* resides in a trochaic foot with a mid stressed vowel. These unique properties do not surface with V-final verbs since the vowel of -*et* is deleted (19b). The constraint WSF-LEFT (10) is vacuously satisfied since there is no trochaic foot which the mid-domain must align to. That is, the second rightmost vowel is not a mid vowel in *meχaté-t* 'disinfect PRES.FM.SG' because WSF-LEFT is relevant only when in a trochaic foot.

(20) Satisfying WSF-LEFT in *e*-final verbs with V-deletion

a. meχaté – meχatét 'disinfect PRES.MS–FM.SG'

	meχaté$_i$-e$_j$t	*HIATUS	WSF-LEFT	MAXV^{STR}	MAXV
a.	meχaté$_i$-e$_j$t	*!			
b.	meχat-é$_j$t			*!	*
c. ☞	meχaté$_i$-t				*

b. *koʁé* – *koʁét* 'read PRES.MS–FM.SG'

	koʁé$_i$-e$_j$t	*HIATUS	WSF-LEFT	MAXV^{STR}	MAXV
a.	koʁé$_i$-e$_j$t	*!			
b.	koʁ-é$_j$t			*!	*
c. ☞	koʁé$_i$-t				*

Back to *HIATUS, there is one case where it is violated—when the verb final vowel is high. As in the case of C-final verbs (13a), where high vowels resist alternation, in the case of V-final verbs, high vowels resist deletion.

(21) Hiatus preservation

makpi-a → makpiá 'freezes'
mevi-a → meviá 'brings'

Thus, similar to the constraint IDENTV[high] (12b), which blocks lowering of a high vowel, the constraint MAXV[high] blocks deletion of a high vowel.[9]

(22) Hiatus preservation: *makpí – makpiá* 'freeze PRES.MS–FM.SG'

	makpí-a	MAXV[high]	REALZMORPH	*HIATUS	MAXV[STR]	MAXV
a. ☞	makpi-á			*		
b.	makp-á	*!			*	*
c.	makpí		*!			*

So far in this section, we refrained from considering both *-et* and *-a* within the same tableaux; when we do so a problem arises because the distribution of both *-et* and *-a* is unpredictable with *e*-final verbs (Sect. 5.1). As shown in (23) below, the grammar provided for the distribution above predicts that *e*-final verbs should select *-et*.

(23) Prediction for *e*-final verbs

a. Predicted: *meχaté – meχatét* 'disinfect PRES.MS-FM.SG'

	meχaté PRES.FM.SG	*HIATUS	MAX-M(PRES)	MAXV[STR]	MAXV
a.	meχaté-et PRES.FM.SG	*!			
b.	meχate-á FM.SG	*!	*		
c.	meχat-ét PRES.FM.SG			*	*
d. ☞	meχaté-t PRES.FM.SG				*
e.	meχat-á FM.SG		*!	*	*

b. Against prediction: *meχaké – meχaká* 'wait PRES.MS-FM.SG'

	meχaké PRES.FM.SG	*HIATUS	MAX-M(PRES)	MAXV[STR]	MAXV
a.	meχaké-et PRES.FM.SG	*!			
b.	meχake-á FM.SG	*!	*		
c.	meχak-ét PRES.FM.SG			*	*
d. ☛	meχaké-t PRES.FM.SG				*
e. ☹	meχak-á FM.SG		*!	*	*

Although the grammar in (23) predicts that all *e*-final verbs would take *-et* for PRES.FM.SG, our corpora suggest that this is not always the case. Actually, as the quantitative data in (25) below suggest, V-final verbs with a final *e* more frequently take *-a*.

In the following section we ask: what is the speakers' choice? Do they follow the distribution of the suffixes in the lexicon and select *-a* for V-final verbs, or are they affected by the grammar in (23) (i.e. the status of *-et* as the local default) and prefer *-et* everywhere?

6 Speakers' choice

As shown in (23) above, the phonological grammar does not always make the correct predictions. While the grammar predicts *-et* in all cases except monosyllabic verbs

[9] Actually, MAXV[high] and IDENTV[high] could be represented together as FAITHV[high], and so are all the MAXV and IDENTV constraints in the present analysis.

and verbs with a high vowel in the final syllable, there is a certain degree of variability, where either suffix can appear, subject to lexical specification.

This state of affairs allows inquiring into the interaction between internal and external effects on speakers' tacit knowledge, i.e. between grammar and frequency. In order to address this issue, we conducted an experiment and compared its results with the frequency -*et* and -*a* in spoken and written corpora.

6.1 Frequency in corpora

In the two corpora introduced in Sect. 3, the suffix -*et* is more common than -*a* in the present tense verbs (24); more so in the written corpus.

(24) Distribution of -*et* and -*a* in the two corpora[10]

		-*et*		-*a*		Total
Spoken corpus:	Types	56 %	75	44 %	60	135
	Tokens	53 %	196	47 %	172	368
Written corpus:	Types	67 %	275	33 %	133	408
	Tokens	62 %	152,474	38 %	92,326	244,800

Our quantitative analysis is further refined with reference to the contrast between C-final and V-final verbs; as shown in (25), this contrast plays a role in the distribution of the suffixes: C-final verbs prefer -*et* while V-final verbs prefer -*a*, $p < .0001$; FET (in both written and spoken corpora).

(25) Distribution of PRES.FM.SG -*et* and -*a*: C-final vs. V-final

a.

C-final stems		-*et*		-*a*		Total
Spoken corpus:	Types	70 %	71	30 %	31	102
	Tokens	77 %	184	23 %	56	240
Written corpus:	Types	76 %	257	24 %	82	339
	Tokens	74 %	133,590	26 %	47,345	180,935

b.

V-final		-*et*		-*a*		Total
Spoken corpus:	Types	12 %	4	88 %	29	33
	Tokens	9 %	12	91 %	116	128
Written corpus:	Types	26 %	18	74 %	51	69
	Tokens	30 %	18,884	70 %	44,981	63,865

In (26) below we provide the design of our data analysis in both the corpora and the experiment's results. Within the distinction between C-final and V-final verbs (26a), we attend to the quality of the vowel in the final syllable (26b) and show whether there is variation in the suffix (26c); there is no variation in the suffix when the vowel in the final syllables is high (*i*) or low (*a*), regardless of whether the verb is C-final or V-final. However, when the vowel in the final syllable of the verb is mid (*e*), some verbs take -*et* (e.g. *koʁé* – *koʁét* 'read PRES.MS-FM.SG', *meχaté* – *meχatét* 'purify PRES.MS-FM.SG') and others take -*a* (e.g. *koné* – *koná* 'by PRES.MS-FM.SG', *mefané*

[10] As our experiment did not include monosyllabic verbs and verbs that take the suffix -*at* (see Sect. 3), these two types of verbs are also excluded from the corpora.

– *mefaná* ‘clear PRES.MS-FM.SG’). At this point, the distinction between C-final and V-final verbs becomes crucial, since in the corpora C-final verbs with *e* prefer *-et* while V-final verbs with *e* prefer *-a*.

(26) Design of data analysis

	C]$_{Stem}$			V]$_{Stem}$		
a. C- vs. V-final stems:						
b. Vowel in the final syllable:	iC]$_{Stem}$	aC]$_{Stem}$	eC]$_{Stem}$	i]$_{Stem}$	a]$_{Stem}$	e]$_{Stem}$
c. Variability:	*no* -a	*no* -et	*yes* -a / -et	*no* -a	*no* -et	*yes* -a / -et
d. Frequency-based preference:			-et			-a

This variability is a fertile ground for a wug test (Berko 1958), which would examine the role of the grammar in selecting the feminine suffix. The distribution of these two suffixes in the corpora (25) predicts the preference of *-et* with C-final verbs and of *-a* with V-final verbs. The grammar, however, predicts the local default *-et* across the board (with the exception of monosyllabic words and words with a high vowel in the final syllable). Here is the summary of the predictions under the two hypotheses: distribution (in the two corpora) and grammar (the OT analysis).

(27) Expected suffix for PRES.FM.SG stems with *e*-final syllable

	Hypothesis	C-final preference	V-final preference
a.	Distribution	-et	-a
b.	Grammar	-et	-et

For C-final verbs, there is a convergence towards *-et*, and we do not expect the experiment results to show otherwise. For V-final verbs, the distribution in the lexicon favors *-a*, but the grammar favors the local default *-et*.

A preference for *-a* in V-final verbs would fail to tell us anything about the local vs. global default distinction. However, a preference for *-et* (local default) over *-a* (global default) in V-final verbs, which is not motivated by the distribution in the corpora, would support our claim that *-et* is the local default. Preference refers to significant deviation from the lexical distribution in (25).

6.2 Method

In order to verify our theoretical analysis with respect to the default suffix, we conducted a wug test, which required speakers to add a feminine suffix to nonce verbs in frame sentences.

6.2.1 Participants

Twenty-five Tel-Aviv University students participated in the experiment (8 males and 17 females; mean age 25), all monolingual Hebrew speakers with no history of hearing or language impairment.

6.2.2 Materials

The participants were presented with 52 frame sentences with nonce verbs (and 52 with nonce nouns as fillers), all recorded by a native Hebrew speaker in a quiet environment. There were 26 verbs in three stem types:

(28) Types of wug verbs used in the experiment
a. C-final ($n = 10$) joʁém
b. C-final with identical C_1 and C_2 ($n = 6$) ʁoʁém
c. V-final ($n = 10$) joké

The nonce verbs were controlled for similarity as much as possible, such that they systematically differed from existing verbs. For each of the five verb classes (*binyanim*),[11] we selected two actual verbs from the two edges of the frequency scale and substituted the onset of the final stressed syllable with a consonant that differs from the original one in place and/or manner of articulation. With the consonant exchange in the perceptually most prominent position (i.e. onset of the final stressed syllable) the contrast between the wug verbs and the actual verbs is optimal. In addition, with the $C_1 = C_2$ verbs (28b), we could further control the effect of similarity to actual verbs because there are hardly any such verbs in Hebrew.

(29) Wug verbs

Class	Actual verbs			Wug verbs		
			Frequency	C-final	$C_1 = C_2$	V-final
I	loméd	'studies'	1626	loʃed	ʃoʃed	lotse
	jozém	'initiates'	36	joʁem	ʁoʁem	joke
II	niχnás	'enters'	1681	niχpas		niχda
	nimlát	'flees'	72	nimkat		nimta
III	matχíl	'begins'	2406	matmil		matpi
	mafχít	'reduces'	75	mafzit		mafmi
IV	medabéʁ	'talks'	2477	medaʃeʁ	meʃaʃeʁ	medaʁe
	menaχéʃ	'guesses'	77	menabeʃ	mebabeʃ	menate
V	mitkajém	'subsists'	823	mitkaχem	mitχaχem	mitkane
	mitbonén	'observes'	67	mitbaken	mitkaken	mitbase

The nonce verbs were equally distributed among the five verb classes, with the exception of classes II and III which cannot host stems with identical C_1 and C_2 because these two consonants are adjacent (e.g. *niχnás* 'enter PRES.MS.SG (class II)', *maχnís* 'put in PRES.MS.SG (class III)'. Hebrew allows identical C_1 and C_2 within a stem, though much below chance (Yeverechyahu 2014), but it does not allow adjacent identical consonants. That is, the Obligatory Contour Principle is fully respected when the consonants are adjacent, but can be sometimes violated across a vowel (Bat-El 2002).

The distribution of the nonce verbs among the verb classes allows us to examine the three phonological environments for suffixation in both C-final and V-final structures: (a) In class II the vowel in the final syllable is always *a*, and the suffix is always -*et*. (b) In class III, the vowel in the final syllable is usually *i*, and the suffix is

[11] The traditional reference to the classes (*binyanim*) is as follows: class I—*paʔal*, class II—*nifʔal*, class III—*hifʔil*, class IV—*piʔel*, class V—*hitpaʔel*. We exclude passive counterparts of class III and class IV because they are often used as adjectival passives, which take -*et* as expected, because they have *a* in the final syllable (e.g. *mugdál* – *mugdélet* 'is enlarged MS-FM class III' *mevukáʃ* – *mevukéʃet* 'is wanted MS-FM class IV').

always -*a*. (c) In classes I, IV and V the vowel in the final syllable is *e*, and the suffix, as noted above, can be either -*et* or -*a*.

Each of the 26 nonce verbs appeared in the two sentence frames below:

(30) Sentence frames

a. [proper.name] [nonce.verb]
e.g. *jósi joʁém* 'Yosi <nonce.verb>'

b. [proper.name] [nonce.verb] [locative.indirect.object]
e.g. *jósi joʁém bamesibá* 'Yosi <nonce.verb> in the party'

All nonce verbs were inflected for PRES.MS.SG and were preceded by a typical male proper name (*Yosi*).

The purpose of the two frames was to control for the adjectival behavior of the present tense (Sect. 3). The frame without an object (30a) allows the interpretation of the nonce word as either an adjective or a verb, and the frame with an object (30b) allows the interpretation of this nonce word as a verb only. A comparison of the results of these two frames would indicate whether the adjectival interpretation has an effect, as adjectives prefer -*a* as their FM.SG suffix.

6.2.3 Procedure

The participants were seated in front of a computer with the instructions written in Hebrew. In the instructions, the participants were told they are about to hear sentences in the present tense about *Yosi* (a typical male name). They were asked to repeat the original sentence they hear once, and then say it again in a female form while replacing *Yosi* with *Ruti* (a typical female name). The replacement of *Yosi* (male) with *Ruti* (female) automatically triggers a replacement of the masculine agreement marker with the feminine one. There were no instructions beyond the first page.

The participants were presented with randomly ordered 104 stimuli, using Survey Gizmo online surveying platform. The presentation was auditory, where each page of the survey contained a virtual audio player that played the stimulus automatically. The subjects were allowed to re-play the stimulus without limitation. Once the experimenter had made sure the instructions were clear, the participants were permitted to begin the experiment. From that point, all answers were recorded and later transcribed by the experimenter.

6.3 Quantitative results

The results of the experiments are compared in this section with the distribution of -*et* and -*a* in our corpora. We exclude from the results the occurrences of -*at* ($n = 26$), as we did in the corpora, cases of misperception of the stimulus ($n = 2$) and missing responses ($n = 1$).

The distinction between C-final and V-final verbs found in the corpora is maintained in the experiment's results, with preference for -*et* in C-final verbs and for -*a* in V-final verbs, $p < .0001$; FET.

(31) Distribution of -*et* and -*a*: C-final vs. V-final

a.

C-final stems		-*et*		-*a*		Total
Spoken corpus:	Types	70 %	71	30 %	31	102
	Tokens	77 %	184	23 %	56	240
Written corpus:	Types	76 %	257	24 %	82	339
	Tokens	74 %	133,590	26 %	47,345	180,935
Experiment:		84 %	675	16 %	125	800

b.

V-final		-*et*		-*a*		Total
Spoken corpus:	Types	12 %	4	88 %	29	33
	Tokens	9 %	12	91 %	116	128
Written corpus:	Types	26 %	18	74 %	51	69
	Tokens	30 %	18,884	70 %	44,981	63,865
Experiment:		35 %	167	65 %	304	471

However, the C-final vs. V-final distinction is not sufficiently fine-grained. Recall from the design in (26) that there is variability when the vowel is mid, but not when it is high or low. Below we provide a more detailed analysis of the data, with reference to the vowel in the final syllable of the verb stem.

6.3.1 C-final verbs

There was a perfect match between the distribution in the corpora and the experiment's results when the vowel in the final stem syllable was high (32a) and mid (32c). We would expect a perfect match also in (32b), where the vowel in the final stem syllable is low, as there is no variability in this case in the corpora. However, we did not get a perfect match neither in the current study nor in our pilot study (Bat-El 2014), suggesting that this is not a coincidence. The absence of a perfect match is due to syncretism in class II verbs (Bat-El and Stern 2015), where the past and the present stems are identical (e.g. *niχnás* means both 'he entered' and 'he enters'). That is, the 23 % -*a* in (32b) were actually due to a wrong interpretation of the wug verbs as past forms instead of present (despite the instructions indicating that all verbs are in the present tense).

(32) C-final verbs

a.

. . . iC]$_{\text{Stem}}$		-*et*		-*a*		Total
Spoken corpus:	Types	0 %	0	100 %	30	30
	Tokens	0 %	0	100 %	53	53
Written corpus:	Types	0 %	0	100 %	75	75
	Tokens	0 %	0	100 %	37,659	37,659
Experiment:		0 %	0	100 %	100	100

b.

. . . aC]$_{\text{Stem}}$		-*et*		-*a*		Total
Spoken corpus:	Types	100 %	5	0 %	0	5
	Tokens	100 %	10	0 %	0	10
Written corpus:	Types	100 %	46	0 %	0	46
	Tokens	100 %	17,368	0 %	0	17,368
Experiment:		77 %	77	23 %	23	100

c.

… eC]$_{\text{Stem}}$		*-et*		*-a*		Total
Spoken corpus:	Types	99 %	66	1 %	1	67
	Tokens	99 %	174	1 %	3	177
Written corpus:	Types	97 %	211	3 %	7	218
	Tokens	92 %	116,222	8 %	9686	125,908
Experiment:		99.7 %	598	0.3 %	2	600

6.3.2 V-final verbs

C-final and V-final verbs behave alike when the vowel in the final syllable is high or low. Also in V-final verbs there is a perfect match between the corpora and the experiment when the final vowel is high (33a), and a partial match due to misinterpretation of the syncretic form when the final vowel is low (33b). The interesting data are when the final vowel is mid (33c). Recall from (26) that verbs with a mid vowel in their final syllable demonstrate variability between *-et* and *-a* in the corpora.

(33) Vowel final verbs

a.

… i]$_{\text{Stem}}$		*-et*		*-a*		Total
Spoken corpus:	Types	0 %	0	100 %	11	11
	Tokens	0 %	0	100 %	17	17
Written corpus:	Types	0 %	0	100 %	9	9
	Tokens	0 %	0	100 %	5461	5461
Experiment:		0 %	0	100 %	99	99

b.

… a]$_{\text{Stem}}$		*-et*		*-a*		Total
Spoken corpus:	Types	100 %	2	0 %	0	2
	Tokens	100 %	4	0 %	0	4
Written corpus:	Types	100 %	9	0 %	0	9
	Tokens	100 %	9278	0 %	0	9278
Experiment:		84 %	66	16 %	13	79

c.

… e]$_{\text{Stem}}$		*-et*		*-a*		Total
Spoken corpus:	Types	10 %	2	90 %	18	20
	Tokens	7 %	8	93 %	99	107
Written corpus:	Types	18 %	9	82 %	42	51
	Tokens	20 %	9606	80 %	39,520	49,126
Experiment:		34 %	101	65 %	192	293

(33c) holds the crucial data. The preference for *-a* found in the corpora of (33c) is maintained in the experiment, but to a lesser degree, $p < .0026$; FET (spoken corpus), $p < .0022$; FET (written corpus). That is, although the distribution in the corpora shows a strong preference for *-a* (80–93 %), the speakers' preference is significantly reduced (65 %). This, we argue, is the effect of the grammar (23), which predicts the local default *-et* in *e*-final verbs.

6.3.3 Adjectival vs. verbal interpretation in V-final participle

As noted in Sect. 3, the present tense is also participle, and thus adjectival interpretation is possible. Since adjectives tend to take *-a* as their feminine suffix, we wanted

to make sure that any use of -*a* is not due to the interpretation of the nonce verb as an adjective. For this reason, each wug verb appeared in two frames (Sect. 6.2.2): One frame with an indirect object, which ensures an interpretation of a verb, and another without an object, which allows an interpretation of either an adjective or a verb.

(34) Distinction between frames in ambiguous *e*-final group (33c)

Without indirect object					With direct object				
-*et*		-*a*		Total	-*et*		-*a*		Total
31 %	45	69 %	102	147	38 %	56	62 %	90	146

There were indeed more responses with -*a* in the frame that allows interpretation of both verb and adjective (69 %) than in the frame that allows interpretation of verb only (62 %). However, this distinction was not significant, $p = .0178$; FET.

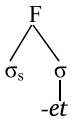
The quantitative results thus suggest that participants selected -*et* for V-final wug verbs significantly above expectation. In the following section we provide some actual responses, which show the unique strategies speakers have taken in order to add -*et* to vowel final wug verbs.

6.4 Qualitative results

When faced with vowel final wug verbs, the participants are eager to use -*et* because it is the default exponent of PRES.FM.SG, but they have two obstacles: First, -*et* rarely appears with *e*-final verbs (7–20 %), and second, it displays an unusual stress pattern in this context.

With C-final verbs, -*et* is always preceded by a stressed open syllable (e.g. *χotém-et* 'sign PRES.FM.SG'), but with V-final verbs one of the vowels is deleted to rescue hiatus (e.g. *χoté-et* → *χotét* 'sin PRES.FM.SG'), as analyzed in Sect. 5, and the suffix does not have its regular trochaic pattern (Bat-El 2008). This pattern of -*et*, which is lost in *e*-final verbs, is illustrated in (35).

(35) Stress pattern of -*et*



The higher distribution of -*et* in the experiment than in the lexicon in V-final verbs (33c) suggests that the participants were reluctant to let go of the local default -*et*. The qualitative results below display a creative, and even innovative strategy of regularization, which allows -*et* to stay in its natural prosodic environment, i.e. in a trochaic foot.

The strategy was consonant addition, which can be classified into three types (36): (a) assimilatory addition, i.e. reduplication of the last consonant in the stem; (b) non-assimilatory addition of a random consonant (a glottal, a coronal, or a bilabial nasal); and (c) addition that results in a real word, either assimilatory or non-assimilatory.

(36) Consonant addition with *-et*

a. Assimilatory		b. Non-assimilatory		c. Real word		
MS	FM	MS	FM	MS	FM	
joké	jokéket	lot͡sé	jot͡sélet	joké	jokédet	'burns'
medaʁé	medaʁéʁet	medaʁé	medaʁédet	menaté	menatéʁet	'hops'
mitkaχé	mitkaχéχet	mitbasé	mitbasédet	mitbasé	mitbaséset	'is based'

In wug verbs with a mid vowel in the final syllable 34 % (101/293) got *-et*, out of which, 32 % (32/101) were with consonant addition, with almost equal distribution among the three types. It should be noted that forms of this type were found also in the pilot study (Bat-El 2014) and are familiar from children's innovations, in particular in an experimental setting (Berman 1989).

Hebrew morphology is rich with assimilatory consonant addition, i.e. reduplication (e.g. *χam* 'hot'—*χamím* 'warm'—*χimém* 'to heat'—*χamamá* 'green house'). However, reduplication in Hebrew is limited to derivational morphology, with a handful of plural forms, such as *lev – levav-ót* 'heart SG-PL', *t͡sel – t͡slal-ím* 'shadow SG-PL' (Bat-El 2006). Crucially, there is never reduplication in the verb inflectional paradigm and there is no masculine–feminine relation in the language that involves reduplication, not even in the nominal paradigm.

These innovative forms strongly suggest that the participants were willing to go beyond the grammar of the relations in the paradigm in order to get not only the local default *-et*, but also its regular trochaic structure.

7 Local and global defaults

In a paradigm with more than one allomorph, there is often one default allomorph. Two major properties characterize the default allomorph in a rule-based theory: (i) it is the last to be assigned, after all specific cases are taken care of, and (ii) it is naturally associated with its category such that it is used for new words and in experiments with nonce words.

English plural system serves as a straightforward example. With regard to precedence, the default *-z* derives forms such as *bʌsɨz* 'buses', *kæts* 'cats', *dɔgz* 'dogs' and *biːz* 'bees' only after specific plural forms, such as *oksən* 'oxen', *fiːt* 'feet', *koɹpəɹə* 'corpora' and *ələmniː* 'alumni', are derived. In terms of natural association with the category, loan words and nonce words often take the default plural, and specific plural forms may be regularized (e.g. *koɹpəsɨz* 'corpuses').[12]

The case presented in this study is entirely different. Indeed, *-a* seems to be associated with limited and partially irregular groups of verbs and thus could be considered specific, like the English plural suffix *-ən*. The crucial observation that proves this wrong is that *-a* appears only when *-et* is blocked. That is, although it seems specific, *-a* must attach *after -et*. Moreover, *-a* is also the exponent of PAST.3.FM.SG.

We thus argued for local and global default; *-et* is the local default of PRES.FM.SG and when its assignment is blocked *-a* leaks into its territory.

[12] As shown in Albright and Hayes (2003), also similarity effects may play a role in the selection of the form in nonce words. However, we controlled similarity effects in our study (Sect. 6.2.2) and thus this issue is not relevant here.

(37) Illustration of local and global default

```
    a a a a a a a a a a a a a a a a a a a a a a
a a a a| et et et et et et et et et et |a a a a a
a a a a| et et et  et et et et|a a a a  a a a a a
  a a a| et et et et et et et et et et |a a a a a
a a a a a a a a a a a  et et et et et  a a a a
  a a a| et et et et et et et et et et |a a a
    a a| et et et et et et et et et et |a a a
a a a a a a a a a a a a a a a a a a a a a a a
```

Further evidence supporting -*a* as the global default is drawn from its distribution in nouns; -*a* seems to associate with FM.SG more than any other feminine suffix in Hebrew. All but two nouns ending in -*a* are FM.SG (the exceptions being *lájla* 'night' and *ʃulijá* 'apprentice'), including loans like *televízja* 'television', *pid͡ʒáma* 'pajama', *máskaʁa* 'mascara' and *diéta* 'diet'.[13] Nouns ending in *et* are not immediately interpreted as FM.SG; the native nouns *séʁet* 'film', *kélet* 'input', and *pélet* 'output' (where the final *t* is historically not a feminine suffix) and the loans *diskét* 'disc' and *pakét* 'package' are all masculine.[14]

We thus conclude that a morphological system can have two default suffixes for a particular bundle of features, where the two differ in their domain. The domain, in turn, is defined in terms of feature specification, where the larger the domain of an affix the smaller is the number of its specified features.

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[13] In other *a*-final masculine nouns, the */a/* is part of the stem as the word historically ends in a guttural. This contrast arises under suffixation. A stem *a* survives when a plural suffix is added (e.g. *mas**á** – mas**a**-ót* 'journey SG–PL'), but the feminine marker */a/* does not (e.g. *kalá – kal-ót* 'bride SG–PL', *ʃulijá – ʃulij-ót* 'apprentice SG-PL').

[14] We thank Noam Faust for suggesting these examples.

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