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*Selecting the best of the worst: the grammar of Hebrew blends**

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1 Why bother with blends?

Blends, also called portmanteau words, are formed by fusing two words into one new word, where internal portions of the base words are often subtracted (one segmental string from the right part of the first word and another from the left part of the second word). For example, the English blend *nixonomics* has been formed by combining *nixon* and *economics* and subtracting the string *neco*. (For clarity of exposition, blends will be usually represented as *nixo*<*n•eco*>*nomics*, where the subtracted material is enclosed in angled brackets and the boundary between the base elements is indicated by •). Similarly, *mo*<*tor•ho*>*tel*→*motel* and *reco*<*gn-ise• re*>*flect*→*recoflect* (see §5 for more examples from English).

Some morphology textbooks do not concern themselves with blends. They mention blends in a footnote, along with acronyms and clipping, as not 'of any importance to morphological theory' (Spencer 1991: 461, n. 16) or as 'minor word formation processes' (Scalise 1984: 98, n. 1).[1] Those who are concerned with blends, such as Bauer (1983, 1988) and Berman (1989), are often reluctant to conclude that blends have a grammar, though they specify some degree of restriction.

Bauer looks at English blends and notes that 'in most cases...the new word is created from parts of two other words, with no apparent principles guiding the way in which the two original words are mutilated' (Bauer 1988: 39) and 'the coiner is apparently free to take as much or as little from either base as is felt to be necessary or desirable' (Bauer 1983: 235). However, there are blends 'where the rules for blending are more obvious' (Bauer 1983: 235). 'In some cases two words are simply merged where they overlap, so that no information is lost, but repetition of letter combinations is avoided' (Bauer 1988: 39).

Berman (1989) reaches a similar, mixed conclusion in her study of Hebrew blends. Berman's study, based on the ability of speakers to coin and select new terms, concludes that blending is 'a productive lexical device'. In the selection experiment, 25% chose a blend, and in the coining experiment, 15% provided a blend (the rest were compounds and affixed forms). As Berman notes, this is a rather surprising result, considering the fact that blends are a minor word type in the Hebrew lexicon. As noted in Ravid (1990), blending, as well as clipping and acronym formation, is restricted to a sophisticated, literate population. Berman's finding for the productivity of blending does not lead her to conclude that blending involves a systematic device of word formation. On the contrary, 'knowledge of how to form blends is not strictly speaking part of the grammar of the Hebrew speaker... Hebrew does not as yet possess structure-dependent mechanisms or sets of rules for blend-formation, of the kind which govern and constrain the construction of new words on the one hand, and of new compounds, on the other' (Berman 1989: 59). She notes, however, that 'there may be quite general agreement as to which forms are more or less acceptable – hence more or less likely to be incorporated in the conventional lexicon'.

Unlike the studies mentioned above, Kubozono's (1990) analysis of blending in English and Japanese, to which I will briefly return in §6, strongly suggests that blending is part of the grammar. Blending refers to grammatical structures and constraints, and it does not have any characteristics which are not found in natural language. The study of Hebrew blending presented here provides further support for Kubozono's view.

Hebrew blending, as will be argued in this paper, is governed by hierarchically ordered well-formedness constraints, all phonological in nature (i.e. they refer to phonological entities, segmental and prosodic). Therefore, blending can be used as a window into the theory of Prosodic Morphology (McCarthy & Prince 1986 and subsequent studies), which is concerned with the effect of well-formedness phonological constraints on word structure. Moreover, these constraints can be found in other aspects of the grammar. The data discussed in this paper include only existing blends (and not slips of the tongue or blends coined in experiments), many of which are brand names which were probably formed by a contrived process. Nevertheless, I will show that most blends are governed by the same principles.

Not all the constraints are satisfied by all blends; however, within the framework of Optimality Theory (Prince & Smolensky 1993 and subsequent studies) this is the case in all grammars. Following Optimality Theory, the approach taken here is that there are several possible blends that can be derived from a given base (two elements). Out of these possible candidates only one survives to surface as the actual output. The selection of this optimal candidate is determined by evaluating the possible candidates against the constraint hierarchy. The optimal candidate very often violates one or more constraints.

The intuition behind this theoretical approach can be found in the studies of blends mentioned above. Berman (1989) refers to 'relative well-formedness' (as she notes, speakers can identify 'which forms are more or less acceptable'), Kubozono (1990) speaks about 'strong tendencies' and Bauer (1983: 234–235) considers the possible outputs for the base *dove, hawk*. The fact that these authors had the intuition behind the basic idea of Optimality Theory, and that two of the studies could not reach conclusive results regarding the grammar of blends, while the third (Kubozono) had to speak in terms of 'tendencies', suggest that blends can be analysed only within a constraint-based framework such as Optimality Theory, which allows constraints to be violated. In this respect, the study of blends is of interest as providing support for Optimality Theory.

The paper is organised as follows: §2 discusses the non-prosodic morphological aspects of blends. It shows that the elements in the base of the blend are not restricted to particular lexical categories, and that the notion of head is not relevant for either the base of the blend or the blend. It concludes that the order of the elements in the base is not given by an independent principle. §3 outlines the principles of Optimality Theory and Correspondence Theory relevant for the discussion. §4 introduces the major constraints involved in the grammar of Hebrew blends and their interaction. §5 discusses some other constraints that emerge in several cases. §6 looks at some aspects of Kubozono's (1990) analysis of English blends and recommends reanalysing the data along the lines of the analysis proposed here. The paper is followed by two appendices. Appendix A draws attention to the distinction between blends and combining forms. Appendix B provides a list of the blends considered for this paper and their gloss (to reduce clutter, the gloss is usually omitted in the examples given in the text). The source of the data includes written material such as dictionaries and newspapers, brand names and spoken language. The list of the blends provides information regarding the status of the blend in the language: whether it is listed in the dictionary (thus relatively old), new or a brand name.

2 The base of the blend

The base of the blend consists of two words (i.e. full surface forms of words), which I will refer to as the elements of the base. In this respect blends are similar to compounds, but this is as far as the similarity goes; blends, unlike compounds, do not have internal morphological structure (though speakers can often recognise the base elements). This is true not only for blends that involve subtraction, but also for those which do not. Moreover, I will show that, again, unlike compounds, the notion of head is not relevant even for the base of the blend, and that the elements of the base are not restricted to particular lexical categories.

2.1 Word-internal structure

The distinction between blends and compounds in Hebrew is straightforward. In compounds, the internal morphological structure is visible to further morphological processes: the definite article is attached to the left edge of the second element, and the plural suffix is attached to the right edge of the first element (see Berman & Ravid 1985 and Borer 1989). In blends, as in monomorphemic and affixed words, the definite article is attached at the left edge of the blend and the plural suffix (as well as other suffixes) at the right edge of the blend (below, *-ey* is the allomorph of *-ím*).[2]

(1)

			DEF ART	PLURAL
simple word	kadúr	'ball'	hà-kadúr	kàdur-ím
affixed word	kàdur-ón	'little ball'	ha-kàdurón	kadùron-ím
blend	kàdur•sál	'basketball'	ha-kàdursál	kàdursál-im
compound	kadùr šéleg	'snowball'	kadùr ha-šéleg	kàdur-èy šéleg

Notice also the distinction in the stress pattern. Secondary stress in blends, as in simple words, falls on every other syllable away from the main stress, while in compounds it falls on the syllable that bears primary stress in the first element (main stress in compounds falls on the syllable that bears primary stress in the second element; see Bat-El 1993).

In colloquial speech, the definite article may attach to the left edge of the compound and the plural suffix to the right edge. Nevertheless, the distinction between blends and compounds remains, since only compounds, but not blends, allow the two options. For example, the compound *ʔorex din* 'lawyer' (arranger-law) has the characteristics of a blend in colloquial speech with respect to all three properties mentioned above (definite article, plural suffix and stress):

(2)

		DEF ART	PLURAL
standard speech	ʔorèx dín	ʔorèx ha-dín	ʔorx-èy dín
colloquial speech	ʔòrexdín	ha-ʔòrexdín	ʔòrexdín-im

I thus conclude that blends do not have internal morphological structure of the type characterising compounds. Moreover, the fact that many blends involve subtraction, where the subtracted material is not a constituent (either phonological or morphological), suggests that blends do not have the internal morphological structure of the type found in affixed words. Assuming that the internal structure of affixed words can be often recognised by identifying the edge of the formatives, this strategy is not available for blends where the internal edges of the elements are eroded due to subtraction.

2.2 The lexical category of the base elements

Hebrew compounds may have one of the following two forms: $[NN]_N$, as in *kadùr šéleg* 'snowball' (ball-snow), or $[AN]_A$, as in *kàl ragláim* 'fleet-footed' (light-legs). The relevant properties of compounds are the following: (i) compounds are left-headed; (ii) a noun compound may only consist of two nouns (and not, say, a noun plus a verb), and an adjective compound may only consist of an adjective plus a noun (and not, say, two adjectives).

The following examples show that these properties of compounds do not characterise blends. First, the semantic head of the blend (indicated by X′), in case there is one, is not in a fixed position. Second, a noun blend, unlike a noun compound, may consist of a noun plus a noun, an adjective or a verb (see more examples in Appendix B).[3]

(3)	*blend*	*base elements*	
a. $[NN']_N$	prígurt	prí	yógurt
	'fruit yogurt'	'fruit'	'yogurt'
$[N'N]_N$	kadurégel	kadúr	régel
	'football'	'ball'	'foot'
b. $[N'A]_N$	maškár	maškė́	kár
	'cold drink'	'drink'	'cold'
$[AN']_N$	kalcéfet	kál	kacéfet
	'easy-to-make whipped cream'	'easy, light'	'whipped cream'
c. $[N'V]_N$	sukrazít	sukár	razít
	'saccharin'	'sugar'	'you (FEM SG) lost weight'
$[VN']_N$	ramzór	ramáz	ʔor
	'traffic light'	'to hint'	'light'

Moreover, many blends are compositionally exocentric (semantically similar to appositional compounds such as *deaf-mute*), where the notion of a semantic head is irrelevant.

(4)			
$[NN]_N$	pomelít	poméla	ʔeškolít
	'a hybrid fruit of pomelo and grapefruit'	'pomelo'	'grapefruit'
$[AA]_A$	šmanmúx	šmanmán	namúx
	'dumpy'	'plump'	'short'
$[VV]_V$	mištaxcéf	mištaxcén	mitxacéf
	'to be boastful and insolent (PRT)'	'to boast (PRT)'	'to be insolent (PRT)'

The data in (3) and (4) point to two important differences between blends and compounds. First, in compounds the semantic head is in a fixed position, while in blends it is not (in case there is a head). Second, compounds impose severe restrictions on the lexical category of the input elements, but blends do not. In compounds, the left element (the head) is restricted to the class of substantives (i.e. nouns and adjectives), and the right element can be only a noun. In blends, there are no lexical category restrictions on either element.[4]

From the discussion above it is clear that the notion of head (Williams 1981) is irrelevant to the formation of blends: Hebrew blends do not have a head (see a different view in Kubozono 1990). This is expected, following the argument given in §2.1 above that blends lack internal morphological structure, not only under the a-morphous view of Anderson (1992), but also under a more conservative view such as Selkirk (1982). While a semantic head may often be identifiable in blends, it does not have a fixed position and it is never referred to by the grammar.

The notion of head is crucial for determining the order of the elements in (endocentric) compounds. Since blends do not have heads, the question is then what determines the order of the elements in the base. I argue in this paper that the order of the elements in the base, as much as any other structural aspect of blends, is determined by constraint interaction; the constraints are independently motivated and do not refer directly to the order of the base elements. I will consider, in the spirit of Optimality Theory, several output candidates for each base, exploring also the two possible orders of the elements of the base. It will appear that one order of elements is better than the other, not because of the lexical category of the elements, nor because of their meaning, but rather because of the interaction of independently motivated constraints. These constraints do not refer to the order of the elements but rather to phonological relations between the base and the output blend, and the markedness of the phonological structure of the blend.

A type of candidate consistently ignored here is the one where the candidate is identical to one of the elements of the base. I assume an absolutely inviolable constraint called Uniqueness, which states that a blend must be phonologically distinct from each of its base elements.[5] This constraint rules out the candidates in the rightmost column in (5), some of which would be otherwise selected as optimal.

(5)

base elements	*optimal blend*	*absolutely ill-formed blend*
sukarya, ʔugiya	su<karya•ʔu>giya	*ʔugi<ya•sukar>ya
galgal, galac	gal<gal•>galac	*gal<ac•gal>gal
mitnaxalim, mexablim	mitna<xalim•me> xablim	*mexab<lim• mitnaxa>lim
mešuxzar, mešupac	mešux<zar•mešu> pac	*me<šuxzar•me>šupac *me<šupac•me>šuxzar
paxman, meiman	pax<man•> meiman	*pax<man•mei>man *mei<man•pax>man

I will not consider Uniqueness any further.

3 Optimality and correspondence in brief

As will be shown in this paper, Hebrew blending is governed by well-formedness constraints, some of which are violable. Constraint violation is not chaotic, but rather follows strict principles. Within the framework of Optimality Theory (Prince & Smolensky 1993 and subsequent studies), a grammar consists of a set of constraints and two functions, GEN and EVAL. For every input form, GEN produces a set of output candidates which are fed into EVAL. EVAL is equipped with a finite set of constraints. The constraints are universal and are hierarchically ordered on language-specific grounds (though some sub-hierarchies are universal; see §5.2). All output candidates provided by GEN are evaluated by the constraint hierarchy in a parallel fashion. The candidate that survives as the surface output is the optimal candidate, as it minimally violates the constraint hierarchy; it is either the only candidate that does not violate any constraint or, when all candidates violate some constraint, it violates the lower-ranked constraint(s).

Consider the constraint hierarchy A ≫ B ≫ C and the output candidates below (A ≫ B is read as 'A is ranked higher than B' or 'A dominates B'):

(6)

	A	B	C
☞ a. cand1			*
b. cand2	*!		
c. cand3		*!	*
d. cand4			**!

A tableau of a form such as (6) demonstrates a ranking argument and an evaluation procedure. The constraints are listed horizontally in hierarchical order (left-to-right = high-to-low) and the candidates are listed vertically and are unordered. ☞ indicates the optimal candidate, the one that wins out as the surface form. An asterisk indicates a constraint violation and a blank cell means constraint satisfaction. The exclamation mark highlights a fatal violation, the one that excludes the candidate from the competition. Irrelevant cells (after fatal violation or when there are no more competitors) are shaded.

Violation of A, the undominated constraint, excludes cand2 from the competition; the fact that this candidate does not violate any other constraint is irrelevant. Violation of B excludes cand3 from the competition, leaving out two competitors. The selection of the optimal candidate among the surviving cand1 and cand4 is determined by the number of violations of C; since cand1 has fewer violations of C it is selected as the optimal candidate.

Universal constraints are divided into two types, on the basis of their point of reference. One type refers to the phonological markedness of surface forms. This type includes familiar constraints such as ONSET (*a syllable must have an onset*) and NOCODA (*a syllable must not have a coda*).

The other type refers to faithfulness relations between two forms. This latter type of constraints is the core of Correspondence Theory, recently developed in McCarthy & Prince (1995b) and further explored in McCarthy (1995) and other studies.

Correspondence constraints demand identity and correspondence between corresponding forms in any representational aspect, segmental and prosodic. Corresponding forms can be underlying and surface forms, two surface forms, and base and reduplicant. The two major faithfulness constraints in pre-correspondence frameworks, FILL and PARSE (Prince & Smolensky 1993), are now given in terms of correspondence: *every phonological element in the output has a correspondent in the input* penalises insertion of a phonological element (FILL) and *every phonological element in the input has a correspondent in the output* bans deletion (PARSE).

Each constraint can be stated independently for different types of correspondence relation. Thus, it is possible that within the same language the anti-deletion constraint would be undominated in the correspondence between two surface forms (i.e. deletion never occurs), but dominated in the correspondence between underlying and surface forms (i.e. deletion is possible). §4 below presents some of the major correspondence constraints.

4 The constraints

Since the base elements of the blend are full surface forms (see an alternative view with respect to some blends in §5.4), blending is a case of correspondence between surface forms (Benua 1995; McCarthy 1995). The output blend usually does not preserve all segmental material provided by each element of the base. This is due to some dominant constraints which limit the maximal size of the blend. These constraints will be considered in the ensuing subsections. First I briefly present some of the relevant correspondence constraints, all adopted from McCarthy & Prince (1995b).

All blends preserve the linear order of segments in each of their base elements; that is, metathesis is never found in blends. The constraint that militates against metathesis is LINEARITY, which states that *a blend is consistent with the precedence structure of each of its base elements, and vice versa.* (Notice that all constraints are supposed to be universal, but for clarity of exposition they refer directly to blends.) Recall from §2.2 that the order between the two elements of the base is not predetermined, and therefore any order between them would satisfy LINEARITY. LINEARITY is briefly mentioned in §4.4, where it is shown that it is undominated in the grammar of Hebrew blends; otherwise its role in blending is of little interest.

McCarthy & Prince (1995b) propose two anti-deletion and two anti-epenthesis constraints. The more general ones prohibit deletion and epenthesis anywhere: MAXIMALITY (MAX), which states that *every phonological element of the input has a correspondent in the output*, penalises deletion. DEPENDENCY (DEP), which states that *every phonological element of the output has a correspondent in the input*, bans epenthesis. These constraints replace PARSE and FILL, familiar from the pre-correspondence version of Optimality Theory. Similar to PARSE and FILL, MAX and DEP are actually families of constraints whose members can refer to particular phonological elements. The MAX and DEP members relevant to blending refer to syllables and segments: σMAX, SEGMAX, σDEP and SEGDEP. σMAX and σDEP are discussed in §4.2, and SEGMAX is considered in §5.1. SEGDEP is of little interest for the present discussion, and therefore it will not be considered here.

The more specific anti-epenthesis and anti-deletion constraints penalise any disturbance of contiguity in the input and output, which can be done by internal deletion and epenthesis. INPUT CONTIGUITY (I-CONTIG) says that *the portion of the input corresponds to a contiguous string in the output*, and is thus violated by internal deletion, xyz → xz, but not by deletion at the edge, xyz → xy. OUTPUT CONTIGUITY (O-CONTIG) says that *the portion of the output corresponds to a contiguous string in the input*, and is thus violated by internal epenthesis, xy → xzy, but not by epenthesis at the edge, xy → xyz. The fact that there is never epenthesis in blends means that O-CONTIG, as well as SEGDEP, is never violated. The inviolability of O-CONTIG is quite trivial, and I will not mention it any further. I-CONTIG is not violated by most blends, with the exception of a particular group of blends to which I will turn in §5.4. For the time being I treat I-CONTIG as an inviolable constraint.

Since I-CONTIG (internal deletion) is inviolable and SEGMAX (deletion in general) is not, deletion can occur only at the edges of the base elements. However, deletion in blends is not allowed in all edges: it occurs only at the internal edges of the base elements (the edges where the two elements meet). The segmental material that surfaces in the blend must include the segmental material at the external edges of the base elements, such that the left edge of the first element coincides with the left edge of the blend and the right edge of the second element coincides with the right edge of the blend, as in $[_B[_{E1}$šman<man•na>mux$_{E2}]_B]$ (B = blend and E = element of the base). This generalisation can be stated in terms of Generalised Alignment (McCarthy & Prince 1993b), which demands correspondence between the edges of the blend and the external edges of the base elements:[6]

(7) ALIGNMENT OF EDGES: Align Left (B_1, E_1) & Align Right (B_1, E_2)

To satisfy ALIGNMENT OF EDGES, it will suffice to preserve the first segment of the first element and the last of the second element. However, the amount of phonological material that surfaces varies, subject to further constraints to be discussed in the ensuing sections.

4.1 The DESIGNATED IDENTICAL SEGMENT constraint

The selection of the elements that constitute the base of a blend is determined mostly by semantic consideration, about which I have nothing to say (see Kubozono 1990). However, as most studies on blending have observed, a phonological consideration is often involved, since in many blends the two base elements share one or more identical segments. It seems that in Hebrew the shared segment must be a consonant (though this might be a preference rather than a must). Some examples are given below:

(8)	*blend*	*base elements*	*identical consonant(s)*
a.	demoktator	demokrat, diktator	d k t r
b.	mitnaxablim	mitnaxalim, mexablim	m x l
c.	maxazemer	maxaze, zemer	m z
d.	mixsovev	mixse, sovev	s

As observed in Bauer (1983, 1988), the identical segment functions as the 'switch point', the point in the blend where the first element ends and the second begins. When there are consonants shared by both elements, one is selected as the Designated Identical Segment (DIS). The material between the two occurrences of DIS, including one of its occurrences, is subtracted (incurring SEGMAX violation). The examples in (8) are repeated below, emphasising DIS (in bold) and the subtracted material (enclosed in angled brackets).[7]

(9) a.	demoktator	demo**k**<rat•di**k**>tator
b.	mitnaxablim	mitna<**x**alim•me>**x**ablim
c.	maxazemer	maxa<**z**e•>**z**emer
d.	mixsovev	mix<**s**e•>**s**ovev

The function of DIS can be expressed in terms of correspondence as follows:

(10) *The DESIGNATED IDENTICAL SEGMENT constraint* (DISC)
A blend must have one consonant that has correspondents in both elements of the base.

The correspondence relation between the segments of the base elements (E1 and E2) and those of the blend (B) is illustrated in (11) below (the lines are a graphic illustration of correspondence; they should not be confused with the association lines familiar from autosegmental phonology). The forms in (11a) respect DISC since there is a consonant in the blend that has correspondents in both elements of the base. The forms in (11b) violate DISC because each consonant in the blend has a correspondent in only one of the base elements.

(11) a. ☞ maxazemer–maxa<**ze**•>**z**emer

```
m  a  x  a [z] e                       E1
|  |  |  |  |
m  a  x  a [z] e  m  e  r              B
            |  |  |  |  |
           [z] e  m  e  r              E2
```

☞ demoktator–demo**k**<rat•di**k**>tator

```
d  e  m  o [k] r  a  t                 E1
|  |  |  |  |
d  e  m  o [k] t  a  t  o  r           B
            |  |  |  |  |  |
      d  i [k] t  a  t  o  r           E2
```

b. maxamer–maxa<ze•ze>mer

```
m  a  x  a  z  e                       E1
|  |  |  |
m  a  x  a  m  e  r                    B
            |  |  |
      z  e  m  e  r                    E2
```

demoktor–demok<rat•dikta>tor

```
d  e  m  o  k  r  a  t                 E1
|  |  |  |  |
d  e  m  o  k  t  o  r                 B
               |  |  |
   d  i k t a  t  o  r                 E2
```

As will be shown below, DISC plays a relatively prominent role in blending. I will return to another constraint on segmental correspondence in § 5.1. The ensuing sections are concerned with prosodic correspondence.

4.2 The template constraints

The imposition of a prosodic template in Hebrew is robust in verbs: verb stems must be disyllabic (Hebrew is quantity-insensitive, and therefore this restriction can be viewed as the imposition of a foot-size template; see Bat-El 1994a). This restriction has been weakened in the nominal system, which includes nouns with more or less than two syllables. The syllabic length of nominal blends is not as restricted as that of verbs, but it is much more limited than that of nouns.

There is no blend of less than two syllables. The minimal syllabic length of a blend (Blend$^{\sigma}$) is thus restricted by the MINIMAL WORD constraint (McCarthy & Prince 1986), which is actually derived from FOOT BINARITY (*feet must be binary*) and the prosodic hierarchy, which requires a prosodic word to contain at least one foot (McCarthy & Prince 1995a).

(12) MINIMAL WORD (MINWD): Blend$^{\sigma} \geqslant [\sigma\sigma]_F$

Hebrew verbs, with a handful of exceptional monosyllabic verbs, are not only minimally disyllabic but also maximally, while blends are only minimally disyllabic, where the maximal syllabic length can be larger than a foot. Nevertheless, the number of syllables in the blend is not arbitrarily chosen. Ideally, the syllabic length of the blend is identical to that of the element with the largest number of syllables. If, however, this is impossible due to some dominant constraint, the syllabic length of the blend can be longer than that of the element with the largest number of syllables, but never shorter. Thus, it seems that the syllabic length of the blend seeks to be faithful to the syllabic length of the longest base element.

The restrictions on the syllabic length of the blend can be viewed as correspondence between the number of syllables in the blend and the number of syllables in the longest element of the base (see McCarthy 1995 for prosodic correspondence). Viewing the syllabic template of the longest element as the 'base' template of the blend, a blend that has fewer syllables than the base template would violate σMAX (as if syllables were deleted), and a blend that has more syllables than the base template would violate σDEP (as if syllables were added).

(13) a. σMAX: Every syllable in both elements of the base must have a correspondent in the blend.
b. σDEP: Every syllable in the blend must have a correspondent in both elements of the base.

Although these two constraints mention both elements of the base, they indirectly limit the syllabic length of the blend according to that of the longest element. σMAX determines the minimal syllabic length of the blend (which must not be smaller than that of the longest element). By requiring every syllable in both elements of the base to have a correspondent in the blend, it actually does not allow the number of syllables in the blend to be smaller than that of each of the base elements. This constraint is violated when the blend has fewer syllables than the longest element, and it is obviously violated to a greater degree when the blend has fewer syllables than the shortest element as well. The fact that the syllabic length of a blend is never smaller than that of its longest base element suggests that σMAX is undominated in Hebrew blending (see (27a) below for a ranking argument).

σDEP determines the maximal syllabic length of the blend (which is preferably identical to the longest element). By requiring every syllable in the blend to have a correspondent in both elements of the base, it does not allow the blend to have more syllables than the longest element. At the moment that the blend has the same number of syllables as the longest element, this constraint is already violated, since there is at least one syllable in the blend that does not have a correspondent in the shortest element. Therefore, when there is an additional syllable in the blend, which does not also have a correspondent in the longest element, this constraint is violated to a greater degree. σDEP, which is often violated in Hebrew blending, penalises every syllable in the blend that does not have a correspondent in either element. It should be pointed out that these constraints do not require identity of the segmental content of the corresponding syllables, as they refer only to syllable nodes. The role of these constraints is illustrated in (14) below:

(14)

/σσσ, σσσσ/	σMAX	σDEP
☞ a. σ σ σ E1 σ σ σ [σ] B σ σ σ σ E2		* final syllable in B lacks a correspondent in E1
b. σ σ σ E1 σ σ σ B σ σ σ [σ] E2	*! final syllable in E2 lacks a correspondent in B	
c. σ σ σ E1 σ σ σ [σ σ] B σ σ σ σ E2		**! final syllable in B lacks correspondents in E1 and E2; penultimate syllable in B lacks a correspondent in E1

σDEP is a gradient constraint, where each syllable in the blend which lacks a correspondent in both elements counts as one violation. Therefore, a blend whose number of syllables is identical to that of the longest base element (14a) is better than one whose number of syllables exceeds that of the longest base element (14c).[8] σMAX is also a gradient constraint, but since it is undominated in Hebrew blending, and thus never violated, it is immaterial here how many marks it gets.

Since σMAX is undominated in Hebrew blending, and thus never violated, MINWD is active only in cases where both elements of the base are monosyllabic. In such cases a monosyllabic blend would satisfy both σMAX and σDEP. MINWD, crucially ranked above σDEP, forces the optimal output to be disyllabic, as there are no monosyllabic blends in Hebrew.

(15)

/σ, σ/	MINWD	σMAX	σDEP
☞ a. σ E σ B σ E	*!		
b. σ E σ σ B σ E			*

Consider the following candidates of the input *demokrat, diktator*, all of which respect MINWD and DISC. (A comma between the base elements indicates that their order is not specified in the input (see §2.2). The number of syllables in each element and blend is indicated below the relevant form.)

(16)

/demokrat, diktator/		σMAX	σDEP
☞ a. demok<rat•dik>tator 3σ 3σ	demoktator 4σ		*
b. demokra<t•dik>tator 3σ 3σ	demokratator 5σ		**!
c. dik<tator•demok>rat 3σ 3σ	dikrat 2σ	*!	

Candidate (c) violates σMAX since it has only two syllables, while its longest base element has three; therefore in each element of the base there is one syllable that does not have a correspondent in the blend. Candidate (b) has two syllables that do not have correspondents in both base elements, while (a) has only one syllable, therefore the latter fares better with respect to σDEP.

In quite a few cases DISC and σMAX alone determine the surface representation of the blend, and in particular the order of the elements. In the examples below, the candidates in (17b) respect DISC but violate σMAX, and those in (17c) respect σMAX but violate DISC. The optimal candidates (17a) are those which respect both constraints.

(17)

a. ✓	b. *	c. ✓	σMAX
✓	✓	*	DISC
☞ bre<xa•>xof	x<of•brex>a	xof<•bre>xa	
☞ pri<gurt•>guf	g<uf•prig>urt	guf<•pri>gurt	
☞ ric<pa•>paz	p<az•ricp>a	paz<•ric>pa	
☞ maš<ke•>kar	k<ar•mašk>e	kar<•maš>ke	
☞ mi<c•me>cuyan	me<cuyan•mi>c	mecu<yan•>mic	

Notice that (16) and (17) consider candidates of both possible orders of the elements of the base. As it turns out here and in the rest of the examples, the order is indirectly determined by the independently required constraints, rather than by a specific constraint that refers to order or by the lexical categories of the elements of the base.

4.3 Contribution constraints

Two relevant candidates not considered in (16) are **demokrator* and **diktatorat*. Like the optimal candidate, they satisfy DISC and σMAX, and have one σDEP violation (notice that the surface distinction between candidates (a) and (b) is in one segment only, *t vs. r* respectively).

(18)

/demokrat, diktator/		σMAX	DISC	σDEP
☞ a. demok<rat•dik>tator	demoktator			*
b. demokra<t•dikta>tor	demokrator			*
c. diktato<r•demok>rat	diktatorat			*

What is relevant here is whether both elements of the base contribute a foot to the blend (recall that feet in Hebrew are syllabic). While in (a) each element contributes a foot to the blend, in (b) and (c) one of the elements contributes a syllable only. FOOT CONTRIBUTION is thus the crucial constraint:

(19) FOOT CONTRIBUTION (FTCONTRIB)
Each element of the base must contribute a foot to the blend.

Every blend one of whose elements contributes less than a foot violates FTCONTRIB:

(20)

a. /demokrat, diktator/		σDEP	FTCONTRIB
☞ i. demok<rat•dik>tator Ft Ft	demoktator	*	
ii. demokra<t•dikta>tor Ft + σ σ	demokrator	*	*!
iii. diktato<r•demok>rat Ft + σ σ	diktatorat	*	*!
b. /nešika, šokolada/			
☞ i. neši<ka•šo>kolada Ft Ft + σ	nešikolada	*	
ii. ne<šika•>šokolada σ Ft + Ft	nešokolada	*	*!

When both elements of the base are monosyllabic all possible candidates equally violate FTCONTRIB. The problem arises with bases where only one of the elements is monosyllabic. Since violation of FTCONTRIB is inevitable in this case as well, contribution of one segment by the monosyllabic element would be considered as a violation of FTCONTRIB as much as contribution of one syllable; in both cases the monosyllabic element contributes less than a foot.

This is, however, not the case. The examples in (21) below show that it is essential to contribute at least one syllable, even at the cost of DISC violation (the last two forms are also excluded by the UNIQUENESS constraint mentioned at the end of §2.2):

(21) *optimal* | *non-optimal*

kmo<•ma>yonez	*k<mo•>mayonez/*km<o•m>ayonez
bugra<čov•>xof	*bugračo<v•>xo>f
tač<•tax>tonim	*t<ač•t>axtonim
kal<•ka>cefet	*k<al•k>acefet

The crucial constraint here is MINIMAL CONTRIBUTION:

(22) MINIMAL CONTRIBUTION (MINCONTRIB)
Each element must contribute at least one syllable to the blend.

Since Hebrew does not allow syllabic consonants, a syllable must consist of minimally a vowel.

MINCONTRIB entails MINWD; since there are two elements in the base and each element must contribute at least one syllable, the blend must be minimally disyllabic. I will thus ignore MINWD from now on.

The function of FTCONTRIB and MINCONTRIB is to facilitate the recoverability of the two elements of the base, and consequently of the semantic properties of the blend (which are extracted from the meaning of the base elements). By requiring each element to contribute a foot, and when this is impossible, at least a syllable, these constraints make sure that the two elements are phonologically represented in the blend to a degree that would hopefully allow recoverability.

4.4 Constraint hierarchy

The constraints proposed above are hierarchically ranked as follows (a comma indicates that there is no evidence for ranking):

(23) a. Undominated constraints:
LINEARITY, ALIGNMENT OF EDGES, MINCONTRIB, σMAX
b. Dominated constraints:
DISC ≫ σDEP ≫ FTCONTRIB

I begin with ranking arguments for the dominated constraints. Then I show that each one of the undominated constraints is ranked above the highest-ranked dominated constraint with which it interacts.

(24) σDEP ≫ FTCONTRIB

a. /mošav, kibuc/	DISC	σDEP	FTCONTRIB
☞ i. moš<av•ki>buc	*		**
ii. moša<v•ki>buc	*	*!	*
b. /šmanman, namux/			
☞ i. šman<**man•na**>**mux**			**
ii. šmanma<**n•**>**namux**		*!*	

In the absence of DIS, all candidates in (24a) equally violate DISC. Candidate (ii) consists of three syllables while each of the base elements consists of two syllables each. This amounts to a σDEP violation, since there is one syllable in the blend that does not have a correspondent in both elements. Obviously, a longer candidate, such as ****mošavkibuc***, will get two marks for σDEP, and thus will be even worse than (ii). A similar explanation goes for (24b), where the non-optimal candidate violates the higher-ranked constraint σDEP.[9]

(25) DISC≫σDEP

a. /kal, glida/	DISC	σDEP	FTCONTRIB
☞ i. kal<•**gl**>ida		**	*
ii. kal<•**gli**>da	*!	*	**
b. /nešika, šokolada/			
☞ i. neši<**ka•šo**>**ko**lada		**	
ii. neši<ka•šoko>lada	*!	*	

In (25) σDEP gets one mark in (ii) and two in (i); nevertheless (i) is the optimal candidate since it fares better with respect to DISC, the higher-ranked constraint.

From the ranking arguments above we can derive by transitivity DISC ≫ FTCONTRIB. This is supported by the tableau below, where the two candidates tie in σDEP, allowing DISC and FTCONTRIB to interact directly with each other (notice that (a) and (b) in (26) differ on the surface in one vowel only, *o vs. u*).

(26) DISC≫FTCONTRIB

/kokus, šokolada/	DISC	σDEP	FTCONTRIB
☞ a. ko<**kus•šo**>**ko**lada		**	*
b. koku<s•šoko>lada	*!	**	

The tableaux in (27) below briefly demonstrate the priority of the inviolable constraints. Since the ranking arguments are rather trivial, I will not discuss them in detail (notice the deletion of the final vowel in the non-optimal candidate in (27c), and the metathesis in the non-optimal candidate in (27d)).[10]

(27) a. σMax≫DISC

/tač, taxtonim/	σMax	DISC	σDep	FtContrib
☞ i. tač<•tax>tonim		*	**	*
ii. tax<tonim•>tač	*!		**	**

b. MinContrib≫DISC

/kmo, mayonez/	MinContrib	DISC	σDep	FtContrib
☞ i. kmo•<ma>yonez		*	**	*
ii. k<**mo**•>**mayonez**	*!		**	*

c. Alignment≫σDep

/nešika, šokolada/	Alignment	DISC	σDep	FtContrib
☞ i. neši<**ka**•šo>**kolada**			**	*
ii. neši<**ka**•šo>**kolad**	*!		*	

d. Linearity≫DISC

/kmo, mayonez/	Linearity	DISC	σDep	FtContrib
☞ i. kmo•<ma>yonez		*		*
ii. ko<**m**•>**mayonez**	*!		***	*

5 Residual constraints

The constraints proposed so far are not sufficient to account for all blends. In this section I discuss two constraints whose effect emerges in some of the blends: Segment Maximality, mentioned in §4, and Syllable Contact (Vennemann 1988).

5.1 Segment Maximality

Consider the following tableaux, where all candidates of a single base tie in all the constraints:[11]

(28)

a. /šmanman, namux/	DISC	σDep	FtContrib
☞ i. šman<**man**•na>**mux**			**
ii. na<**mux**•šman>**man**			**
b. /taxtonim, xitulim/			
☞ i. tax<tonim•xi>tulim			*
ii. xi<tulim•tax>tonim			*
c. /cfarde^{a}, xargol/			
☞ i. cfar<de^{a}•xar>gol			**
ii. xar<gol•cfar>de^{a}			**

For each input in (28), the two candidates equally satisfy or violate the constraints proposed so far, and therefore there must be another constraint which selects the optimal candidate. The relevant constraint is SEGMENT MAXIMALITY, which penalises the deletion of segments:

(29) SEGMENT MAXIMALITY (SEGMAX)
Every segment in the base elements has a correspondent in the blend.

SEGMAX is proposed in McCarthy & Prince (1993a, 1995b) as one of the constraints involved in reduplication (and input–output faithfulness in general). In the spirit of Steriade (1988), the similarity between partial and complete reduplication is captured by enforcing SEGMAX on the reduplicant, requiring that every element in the base has a correspondent on the reduplicant. SEGMAX is fully satisfied in complete reduplication, but violated in partial reduplication, due to the dominance of templatic constraints on the reduplicant.

The effect of SEGMAX in blending is very similar. As in partial reduplication, SEGMAX is violated in every blend that involves subtraction, but the fewer violations the better the candidate. SEGMAX violation is evaluated by the number of segments in the base elements that do not have correspondents in the blend. This amounts to the subtracted segments except the subtracted DIS since DIS in both base elements has a correspondent in the blend, though the same one.[12] The tableaux below are obtained from (28) above, with the addition of SEGMAX:

(30)

a. /šmanman, namux/	DISC	σDEP	FTCONTRIB	SEGMAX
☞ i. šman<**man**•na>**mux**			**	****
ii. na<**mux**•šman>**man**			**	*****!*
b. /taxtonim, xitulim/				
☞ i. tax<tonim•xi>tulim			*	******
ii. xi<tulim•tax>tonim			*	*******!
c. /cfarde^{a}, xargol/				
☞ i. cfar<de^{a}•xar>gol			**	****
ii. xar<gol•cfar>de^{a}			**	*****!*

As demonstrated below, SEGMAX is ranked below σDEP. There is no evidence for its ranking with respect to FTCONTRIB: when FTCONTRIB is satisfied, preservation of additional segments from the input to reduce the violations of SEGMAX would not affect FTCONTRIB; when FTCONTRIB is violated, preservation of an additional vowel from the input to eliminate the violation would also reduce the violation of SegMax.

(31) σDep ≫ SegMax

/mošav, kibuc/	DISC	σDep	FtContrib	SegMax
☞ a. moš<av•ki>buc	*		**	****
b. mošav<•ki>buc	*	*!	*	**
c. mošav•kibuc	*	*!*		

σDep minimises the syllabic length of the blend, while SegMax maximises the segmental length of the blend. Therefore, the priority of σDep over SegMax is the core property of blending, as it permits the massive subtraction.

5.2 The Syllable Contact constraints

There are several disyllabic blends which are formed from two monosyllabic elements. In such cases there is no subtraction (see the reasoning below). The question is then what determines the order of the elements in the blend, considering that the notion of head is irrelevant to blends (see §2.2, and notice in (32) below that *salkal* is $[NA]_N$ while *ramkol* is $[AN]_N$).

Consider the blends below and their non-optimal counterparts, where the elements are in the reverse order:

(32)

	optimal	*non-optimal*	*base elements*	
a.	xaydák	*dakxay	xáy	dák
	'bacterium'		'alive, he lives'	'thin'
b.	sálkal	*kalsal	sál	kál
	'baby car-seat'		'basket'	'easy, light'
c.	rámkol	*kolram	rám	kól
	'loudspeaker'		'loud'	'voice'
d.	xaybár	*barxay	xáy	bár
	'wildlife safari'		'alive, he lives'	'wild'
e.	xayzár	*zarxay	xáy	zár
	'extraterrestrial alien'		'alive, he lives'	'foreign'

The constraint that selects the optimal candidates in (32) is Syllable Contact, proposed in Vennemann (1988), and further discussed in Clements (1990) and others (see also Kaye *et al.* 1985 for an account within Government Phonology).

(33) Syllable Contact (SyllCont)

The onset of a syllable must be less sonorous than the last segment in the immediately preceding syllable, and the greater the slope in sonority the better.

Observation of the optimal and non-optimal clusters in (32) reveals that in (a) the non-optimal cluster violates SyllCont, as the onset is more sonorous than the preceding coda. In the rest of the forms SyllCont is respected by both clusters, but the sonority distance in the non-optimal clusters is smaller than that in the optimal ones.

I assume the following conventional sonority scale; a more or less detailed scale can be required for other languages.[13]

(34) vowels > glides > liquids[14] > nasals > fricatives > stops
 5 4 3 2 1 0

Violation of SyllCont is evaluated by subtracting the sonority degree of the onset from that of the preceding segment, and the result is subtracted from the highest sonority degree, in this case 5.[15] For example, *n.d* has three marks, $5-(2-0)$, and *y.g* has one mark, $5-(4-0)$. The best syllable contact is found in a vowel–stop sequence, where SyllCont is not violated, $5-(5-0)$ (this follows independently from the universal ranking *Onset/λ mentioned in note 13, and the constraint NoCoda). When the coda is less sonorous than the onset the number of SyllCont violations is greater than 5. For example, *f.y* has eight marks, $5-(1-4)$. (35) below compares the SyllCont violations of the optimal and non-optimal candidates in (32):

(35)

	SyllCont violation
☞ a. i. y.d	5–(4–0) = 1
ii. k.x	5–(0–1) = 6
☞ b. i. l.k	5–(3–0) = 2
ii. l.s	5–(3–1) = 3
☞ c. i. m.k	5–(2–0) = 3
ii. l.r	5–(3–3) = 5
☞ d. i. y.b	5–(4–0) = 1
ii. r.x	5–(3–1) = 3
☞ e. i. y.z	5–(4–1) = 2
ii. r.x	5–(3–1) = 3

SyllCont emerges also in blends that undergo subtraction, as in (36) below, where the candidates tie in all constraints except SyllCont.[16]

(36)

a. /šxora, blondinit/	DISC	σDep	FtContrib	SegMax	SyllCont
☞ i. šxor<a•blon>dinit r.d	*	*	*	*****	** 5–(3–0)
ii. šxo<ra•blo>ndinit n.d	*	*	*	*****	***! 5–(2–0)
iii. blondin<it•šxo>ra n.r	*	*	*	*****	***!*** 5–(2–3)
b. /mošav, kibuc/					
☞ i. moš<av•ki>buc š.b	*		**	****	**** 5–(1–0)
ii. ki<buc•mo>šav b.š	*		**	****	*****!* 5–(0–1)

The tableaux below demonstrate that SYLLCONT is ranked below σDEP (and thus below DISC):

(37) σDEP ≫ SYLLCONT

/mošav, kibuc/		DISC	σDEP	FTCONTRIB	SEGMAX	SYLLCONT	
☞ a. moš<av•ki>buc	š.b	*		**	****	****	5–(1–0)
b. kibu<c•mo>šav	u.š	*	*!	*	***	*	5–(5–1)

There is no evidence for the ranking of SYLLCONT with respect to FTCONTRIB. Eliminating a consonant from the cluster to better satisfy SYLLCONT would not affect FTCONTRIB; *mošbuc* and **mobuc* equally violate FTCONTRIB. Other strategies, such as eliminating or preserving more syllables, would be ruled out by the dominant constraints σMAX and σDEP.

The ranking of SYLLCONT and SEGMAX seems to be contradictory. (38a) below argues for SYLLCONT ≫ SEGMAX, while (38b) argues for SEGMAX ≫ SYLLCONT:

(38) a. SYLLCONT ≫ SEGMAX

/tapuz, mandarina/		DISC	SYLLCONT		SEGMAX
☞ i. tapuz<•mandar>ina	u.z	*	*	5–(5–1)	******
ii. tapuz<•manda>rina	z.r	*	**!*****	5–(1–3)	*****

b. SEGMAX ≫ SYLLCONT

/šmanman, namux/		DISC	SEGMAX	SYLLCONT	
☞ i. šman<**man**•na>**mux**	n.m		****	*****	5–(2–2)
ii. na<**mux**•šman>**man**	a.m		*****!*	**	5–(5–2)

The crucial observation in (38) is that SYLLCONT dominates SEGMAX when, in one of the candidates, which turns out to be the non-optimal one, the coda is less sonorous than the following onset (38a). However, when in both candidates the final segment in the syllable is less sonorous than the following onset, SEGMAX dominates SYLLCONT (38b). That is, violation of the first part of the constraint in (33), 'the onset of a syllable must be less sonorous than the last segment in the immediately preceding syllable', is more fatal than violation of the second, 'the greater the slope in sonority the better'.

The discrepancy in (38) can be thus resolved by viewing SYLLCONT as a family of constraints, as suggested in Prince & Smolensky (1993) for sonority, and in Itô *et al.* (1993) for resonant voicing. The two members of the SYLLCONT family are the following:

(39) a. σCONT

The onset of a syllable must not be of greater sonority than the last segment in the immediately preceding syllable.

b. σContSlope

The greater the slope in sonority between the onset and the last segment in the immediately preceding syllable the better.

The two constraints are universally ranked σCont ≫ σContSlope, where other constraints can intervene. σContSlope is a gradient constraint since it evaluates the different degrees of sonority distance.

Regarding SyllCont as a family of constraints resolves the ranking paradox in (38) above, as SegMax is placed between the two constraints, below σCont and above σContSlope. Violation of σCont in (40a, b) below eliminates (a.iii) and (b.ii) from the competition. In (40c) there is no violation of σCont, and therefore SegMax is the critical constraint. σContSlope emerges in cases such as (32b–e) above, where all candidates respect σCont (see also candidates (i) and (ii) in (36a)).[17,18]

(40) σCont ≫ SegMax ≫ σContSlope

a. /tapuz, mandarina/		σCont	SegMax	σContSlope	
☞ i. tapuz<•mandar>ina	u.z		******	*	5–(5–1)
ii. tapu<z•manda>rina	u.r		******	**!*	5–(5–3)
iii. tapuz<•manda>rina	z.r	*!	*****	*******	5–(1–3)
b. /sukarya, ʔugiya/					
☞ i. su<**k**arya•ʔu>**g**iya	i.y		******	****	5–(5–4)
ii. ʔu<**g**iya•su>**k**arya	r.y	*!	*****	******	5–(3–4)
c. /šmanman, namux/					
☞ i. šman<**m**an•na>**m**ux	n.m		****	*****	5–(2–2)
ii. na<**m**ux•šman>**m**an	a.m		*****!*	**	5–(5–2)

The ranking SegMax ≫ σContSlope explains why there is no subtraction in blends whose base consists of monosyllabic elements. Subtraction of *y* in *xaydak* would indeed reduce the violation of σContSlope, since the syllable contact in **xadak* (*a.d*) is better than in *xaydak* (*y.d*). However, **xadak* violates the higher-ranked constraint SegMax, and therefore *xaydak* is the optimal candidate.

There is one counterexample to the ranking σCont ≫ SegMax. This ranking would select **xoračov* as the optimal output of *bugračov*, *xof*, but the surface form is *bugraxof*, which can be obtained from the reverse ranking:

(41)

/bugračov, xof/	σDep	FtContrib	SegMax	σCont
☞ a. bugra<čov•>xof	**	*	***	* g.r
b. xo<f•bug>račov	**	*	****!	

As suggested by one of the anonymous reviewers, it is possible that FtContrib consists of two constraints, one which requires the first element to contribute a foot (FtContribE1), and the other which requires the second element to contribute a foot (FtContribE2). The two constraints are ranked FtContribE1 ≫ FtContribE2, and FtContribE1 crucially outranks σCont. With this hierarchy **xo < f•bug > račov* is ruled out by the higher-ranked FtContribE1, and therefore the fact that *bugra < čov• > xof* violates σCont and **xo < f•bug > račov* does not is not relevant in the absence of better candidates.

(42)

/bugračov, xof/	FtContribE1	σCont	FtContribE2	SegMax
☞ a. bugra<čov•>xof		* g.r	*	***
b. xo<f•bug>račov	*!			****

This split of FtContrib also accounts for the selection of the optimal verbal blend in (43) below:

(43)

/mištaxcen, mitxacef/	σDep	Ft ContribE1	σCont	Ft ContribE2	SegMax
☞ a. mištax<cen•mitxa>cef				*	*******
b. mišta<xcen•mit>xacef	*!				******
c. mišt<axcen•mit>xacef		*!			*******
d. mi<txacef•miš>taxcen		*!			********
e. mitxa<cef•mištax>cen			*! t.x	*	********

In this case, however, the selection of the optimal candidate could be successfully achieved with a single FtContrib constraint. σDep rules out (b) and SegMax rules out (d) and (e). The candidates (a) and (c) would then tie in all constraints mentioned in the tableau, but *Complex (*no more than one C or V may associate to any syllable position node*) would then emerge and select (a) as the optimal candidate.

The only empirical problem with splitting FtContrib is the free variation between *midra < x•re > xov* and *mid < raxa• > rexov* (see §5.3 below). This free variation suggests that FtContribE1 and FtContribE2 are not in a dominance relation.

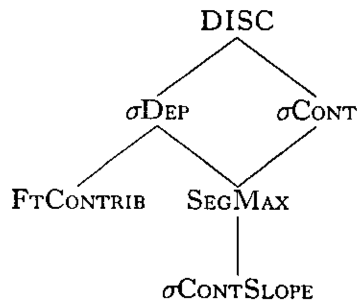
The tableau in (44) below demonstrates that σCont is dominated by DISC. Its ranking with respect to FtContrib and σDep cannot be determined from the available data.

(44) DISC ≫ σCont

/kanyon, yoter/		DISC	σCont
☞ a. kan<yon•>yoter	n.y		*
b. kan<yon•y>oter	a.n	*!	

In (45) I provide the hierarchy of the violable constraints.

(45)



There is no evidence for the ranking of FtContrib with respect to SegMax, σCont and σContSlope, and of σCont with respect to σDep.

If we assume that FtContrib indeed consists of two constraints and *bugraxof* is not just a counterexample, then the constraint hierarchy would be as follows:[19]

(46) DISC ≫ σDep ≫ FtContribE1 ≫ σCont, FtContribE2 ≫ SegMax ≫ σContSlope

5.3 Free variation

The inventory of Hebrew blends considered in this paper includes two cases of free variation:

(47) a. midraxov midra<**xa**•re>**xov** ~
midrexov mid<**raxa**•>**rexov**
b. ʔafaršezif ʔafar<sek•>**šezif** ~
šezifarsek šezi<**f**•ʔa>**farsek**

The free variation in (a) can be found within the same speaker, while that in (b) is found among different speakers (where *ʔafaršezif* seems to be more common).

The reason for free variation is that both forms equally satisfy or violate the same constraints, as they are ranked in (45) (DISC is respected by all candidates):

(48)

a. /midraxa•rexov/	σDep	σCont	FtContrib	SegMax	σContSlope
☞ i. midra<**xa**•re>**xov** d.r	*	*	*	***	******** 5–(0–3)
☞ ii. mid<**raxa**•>**rexov** d.r	*	*	*	***	******** 5–(0–3)
b. /ʔafarsek•šezif/					
☞ i. ʔafar<sek•>**šezif** r.š	**			**	*** 5–(3–1)
☞ ii. šezi<**f**•ʔa>**farsek** r.s	**			**	*** 5–(3–1)

As noted by a reviewer, the framework of Optimality Theory allows free variation to result only from the crucial absence of dominance between two constraints (see Adam 1995 for such a case in Modern Hebrew spirantisation). If this is indeed the only source of free variation, it must be assumed that some lower-ranked constraints, whose effect has not emerged so far, are crucially not ranked with respect to each other. For example, *PEAK/λ (*λ must not be parsed as a syllable peak*; Prince & Smolensky 1993), is a constraint family which includes, among others, *PEAK/*e* and *PEAK/*a*. The crucial absence of dominance between these two constraints would allow free variation; in (48a) the vowels are {i, **a**, o} in (i) and {i, **e**, o} in (ii), and in (48b) the vowels are {**a**, a, e, i} in (i) and {**e**, i, a, e} in (ii).

There is, however, a hypothetical example where free variation may result from a tie in all constraints. Consider base elements such as *pay* and *far*. The two candidates, *farpay* and *payfar*, violate σCONT to the same degree, as the distance between *r* and *p* on the sonority scale is identical to that between *y* and *f*. If the two candidates are not in free variation we could say that *y* (or *r*) is a better word-final consonant (probably with reference to the constraint FINALC (McCarthy 1993) and the sonority scale). If, however, the two candidates are in free variation we cannot say that the constraint that prefers final *r* is not ranked with respect to the constraint that prefers final *y*, because these constraints are very likely to be ranked on the basis of the sonority scale, which shows that sonority distance between *r* and *y* is crucial in other aspects of the grammar. Since I do not have sufficient data to elaborate on the theoretical implication of free variation, I leave this issue open for further discussion.

It should be pointed out, however, that the free variation *ʔafar <sek•>šezif*~*šezi<f•ʔa>farsek* (47b) supports the argument presented in §2, that the order of the elements in the base is not fixed, nor is it determined by non-phonological considerations. It also suggests that DISC does not distinguish between a similar DIS (*ʔafar<sek•>šezif*) and an identical DIS (*šezi<f•ʔa>farsek*), otherwise the latter would have been the only optimal candidate (see note 7). Notice that in (48a) FTCONTRIBE1 and FTCONTRIBE2 must not be in a dominance relation, otherwise candidate (i) would have been the only optimal candidate.

5.4 Vowel deletion and adjustment to a foot-size template

There are a few blends that undergo vowel deletion, sometimes in addition to subtraction. These blends, except one (see (51) below), are well-established in the lexicon, i.e. they are listed in conventional dictionaries, such as Even-Shoshan (1982). Before discussing the implication of vowel deletion regarding I-CONTIG (see §4), I would like to explore its prosodic and segmental conditioning. Consider the blends and their non-optimal counterparts below:[20]

(49)	*1st V deleted*	*2nd V deleted*	*no V deleted*	*base elements*	
a.	☞šmartáf 'baby-sitter'	šamrtaf	šamartaf	šamár 'to guard'	táf 'infant'
b.	rmazor	☞ramzór 'traffic light'	ramazor	ramáz 'to hint'	ʔór 'light'
c.	☞kcardáš 'a combine'	kacrdaš	kacardaš	kacár 'to harvest'	dáš 'to thresh'
d.	xmešir	☞xamšír 'limerick'	xamešir	xamé<š> 'five'	šír 'song'
e.	ʔrapi^{a}x	☞ʔarpí^{a}x 'smog'	ʔarapi^{a}x	ʔara<fél> 'fog'	pí^{a}x 'soot'
f.	☞zrakór 'projector'	☞zarkór	zarakor	zarák 'to throw'	ʔór 'light'

In (f), *zarkor* is the dictionary form while *zrakor* is more common in spoken Hebrew (Ravid 1990). The blend *šaldag* from *šala+dag* is not included in (49) because it is not clear whether the *a* at the end of the first element disappears due to vowel deletion or subtraction.

Two questions arise regarding the forms in (49). First, why is a vowel deleted, and second, which vowel is deleted? The answer to the first question is that these blends are reduced to the size of a syllabic foot. The imposition of a syllabic foot in Modern Hebrew, expressed by the constraint STEM = FOOT, is obligatory in verbs (Bat-El 1994a), but can also be found in quite a few nouns. The examples in (49) conform to the prosodic shape of nominal templates (*miškalim*), and this is consistent with the fact that they are well-established in the lexicon. In this respect, they contrast with many of the longer nominal blends presented in this paper (and many other nouns in the language), which are more recent innovations.

All the blends in (49) are trisyllabic without vowel deletion (see the third column), and thus deletion of one vowel only is required to fit them into a syllabic foot. The question is then, which vowel is deleted? The vowel in the final syllable is never deleted, to avoid violation of MINCONTRIB (22), which requires each element of the base to contribute at least one syllable (notice that the second element in all the blends in (49) is monosyllabic). In addition, deletion of a vowel in the final syllable would incur violation of the Sonority Sequencing Generalisation (SSG), and also yield a complex coda, which is rather rare in Hebrew (see another reason below).

The selection of the vowel to be deleted (from the two vowels of the first element) is based on phonological consideration. The clusters in (49) are considered below (a dot between consonants indicates syllable boundary; a cluster without a dot constitutes a complex onset):

(50)

	well-formed	*ill-formed*		*well-formed*	*ill-formed*
a.	šm, r.t	m.rt	d.	m.š	xm
b.	m.z	rm	e.	r.p	ʔr
c.	kc, r.d	c.rd	f.	r.k/zr	

The ill-formed clusters in (a–c) are ruled out by the SSG, which must be positioned at the top of the constraint hierarchy, as it is never violated in Hebrew.[21] The ill-formed cluster in (d) does not exist in Hebrew for historical reasons: a syllable-initial *x* may result from a historical pharyngeal, which is always followed by a vowel when in onset position, or a spirantised *k*, which does not appear as the first element in a complex onset (though it may in a low register). The ill-formed cluster in (e) can be ruled out by the SSG, as there is evidence that a glottal stop in Hebrew is a sonorant (e.g. it alternates with *y*). In addition, for historical reasons, a glottal stop never appears in a complex onset (or coda). The free variation between *zarkor* and *zrakor* in (f) may suggest that *COMPLEX, which penalises complex onsets, is not ranked with respect to σCONTSLOPE (or NOCODA (*syllables do not have codas*), since violation of NOCODA increases the violation of σCONTSLOPE). The blend *cfar<de*^{a}*•xar>gol* (see (28) and (30)) suggests that *COMPLEX is ranked below SEGMAX, otherwise *xar<gol•cfar>de*^{a} would have been the optimal candidate. We can thus revise the lower portion of the hierarchy in (45) and (46) as follows: SEGMAX ≫ σCONTSLOPE, *COMPLEX.[22]

There are two blends where vowel deletion has been extended to reduce the number of syllables, although the output is larger than a foot (the first one is not a well-established blend):

(51)

1st V deleted	*2nd V deleted*	*no V deleted*	*base elements*	
☞srigamíš	sargamiš	sarigamiš	sarí<**g**>	**g**amíš
'flexible knitted fabric'			'knitted fabric'	'flexible'
skarazit	☞sukrazít	sukarazit	suká<**r**>	**r**azít
	'saccharin'		'sugar'	'you (FEM SG) lost weight'

Notice that the optimal as well as the non-optimal candidates in (51) include clusters that do not violate SSG.

Vowel deletion in (51), as well as in (49), is similar to vowel deletion elsewhere in the language. Vowel deletion can be found in the base of suffixed forms and in the first element of compounds, as exemplified below:

(52) a. *suffixed forms*

zanáv-ot	→ znavót	'tail (SG/PL)'
xivér-im	→ xivrím	'pale (SG/PL)'
pitarón-ot	→ pitronót	'solution (SG/PL)'
me-xanéx-im	→ mexanxím	'educator (SG/PL)'

b. *compounds*

davár	séter	→ dvàr séter	'secret'
'thing'	'hiding place'		
zanáv	sús	→ znàv sús	'ponytail'
'tail'	'horse'		

The relevant characteristics of vowel deletion in Hebrew nouns are the following: (i) it affects the vowel in the ultimate or penultimate syllable of the non-final element in a morphological construction; (ii) the deleted vowel can be either *a* or *e* (i.e. [−high, −round]). These characteristics are also found in vowel deletion in blends: the first one rules out candidates where the deleted vowel is not in the first element; the second selects the optimal form from the candidates in the first and second columns in (51), the one where *a* is deleted.

Vowel deletion is an irregular phenomenon in Modern Hebrew, as there are cases where it does not occur. In *gamál–gmalím* 'camel (SG/PL)' the first *a* is deleted, while in *gamád–gamadím* 'dwarf (SG/PL)' it is preserved.[23] Moreover, the compound *znav sus* 'ponytail' (52b) appears as *zanav sus* in spoken Hebrew, where vowel deletion is suppressed. The same irregularities can be found in blends. The *a* in *kaduregel* and *ʔatarok* is not deleted (**kduregel* and **ʔatrok*), nor the second *e* in *televidyo* (**telvidyo*). Moreover, *maxazemer* and *maxzemer* seem to be in free variation, as is typical of an irregular phenomenon.

Although vowel deletion is not unusual in Hebrew morphophonology, it is certainly problematic within the grammar of blends. The blends which exhibit vowel deletion are the only ones that violate I-CONTIG, which penalises for internal deletion (see §4). Notice in the tableau below that in blends without vowel deletion I-CONTIG outranks σDEP (for clarity, the position of the deleted vowel is marked with ∅).

(53) I-CONTIG ≫ σDEP

a. /nešika, šokolada/	I-CONTIG	DISC	σDEP	FTCONTRIB
☞ i. neši<**ka**•šo>kolada			**	
ii. neši<**ka**•šo>kol∅da	*!		*	
b. /kadur, regel/				
☞ i. kadu<**r**•>regel			**	
ii. k∅du<**r**•>regel	*!		*	*

In the (ii) candidates a vowel has been omitted, and consequently these candidates fare better with respect to σDEP (which limits the maximal size of the blend, preferably to the size of the longest element). This, however, incurs violation of I-CONTIG; since I-CONTIG outranks σDEP these candidates are non-optimal (the complex onset in (53b.ii) is possible in Hebrew; cf. *kadoš–kdoša* 'holly (MASC/FEM)').

I-CONTIG is not the only constraint that is unexpectedly violated by the blends in (49). The elements *ramaz* and *ʔor* in *ramzor* (49b) share an identical consonant, and therefore we would expect to get the blend **ʔo<r•>ramaz*, which respects DISC. Similarly, we would expect **ʔo<r•za>rak* in (49f), where DISC is respected. In addition, *ʔarpi^{a}x* (49e) violates σMAX, which is undominated otherwise.

As suggested by an anonymous reviewer, the unexpected constraint violations exhibited by the forms in (49) and (51) can be eliminated if we assume that the elements which exhibit vowel deletion are actually bound morphemes which appear as such in the lexicon. This idea is quite reasonable, since the irregularity of vowel deletion in Hebrew requires specification of bound stems; to distinguish *gamál–gmalím* from *gamád–gamadím* it is necessary to provide for the former two stems in the lexicon: *gmal*, which is selected by suffixes, and *gamal*.

I do not believe, however, that vowel deletion in blends can be viewed as selection of a bound morpheme from the lexicon, because this would require us to posit a unique bound morpheme for quite a few blends. A bound morpheme usually serves as a base for more than one form; for example, *gmal-* is the base of *gmal-im* 'camels' as well as of *gmal-a* 'camel (FEM SG)' and *gmal-xa* 'your camel'. In (51), *srig* in *srigamiš* is indeed identical to the bound morphemes in *srig-im* 'knitted fabric (PL)', but *sukar* alternates with *sukr* only in the blend *sukrazit* (cf. *sukar perot* 'fructose', *sukar-i* 'sugary'); there is no other surface form where the string *sukr* appears as a bound morpheme. As for the blends in (49), the strings *ramz* in *ramzor* (b) and *zark* in *zarkor* (f) appear as bound morphemes in *ramz-a* 'she hinted' and *zark-a* 'she threw', respectively. However, there is no bound morpheme *xamš* identical to the eroded first element in *xamšir* (d) (cf. *xamiš-im* 'fifty'). Other strings deviate from an existing bound form in the vocalic pattern: *šmar* in *šmartaf* (a) *vs.* *šmir* in *šmir-a* 'guarding', *kcar* in *kcardaš* (c) *vs.* *kcir* in *kcir-a* 'harvesting' and *zrak* in *zrakor* (f) *vs.* *zrik* in *zrik-a* 'throwing'. The eroded element *ʔar* in *ʔarpi^{a}x* (e) clearly does not appear as a bound morpheme anywhere in the language.

It seems that the blends in (49) fit better into a grammar similar to that of denominative verbs (see also discussion in Ravid 1990). As shown in Bat-El (1994a), denominative verbs are formed by adjusting the base into a disyllabic foot and overwriting the base vowels with a verbal vocalic pattern (e.g. *kaftor* 'button' → *kifter* 'to button', *telefon* 'phone' → *tilfen* 'to phone'). Since the inventory of nominal vocalic patterns is much more permissive than that of verbs, nominal blends tend to preserve the vocalic pattern of the base, in case such a pattern exists in other nouns (see Bat-El 1994a: §2.2 for a similar, though marginal, case in verbs). In (54) below I show that the vocalic patterns found in the blends in (49) characterise other nouns in the language:[24]

		blends	*other nouns*
(54)	a. {a,a}	šmartaf 'baby-sitter'	šravrav 'plumber'
		kcardaš 'a combine'	

b. {a,o}	ramzor 'traffic light'	kardom 'axe'		
	zrakor 'projector'			
	zarkor 'projector'			
c. {a,i}	xamšir 'limerick'	xamsin 'hot weather'		
	ʔarpi[a]x 'smog'			

Sukrazit in (51), whose *k.r* cluster fatally violates σCONT (in addition to I-CONTIG), also looks like other nouns in the language. Recall from note 10 that *-it* is a suffix, therefore *sukrazit* looks like the suffixed form *dugmanit* 'model (FEM SG)'. The blend *srigamiš* in (51), however, is a bit more peculiar; its final segments *iš* do not constitute a suffix in the language, but its vocalic pattern exists only in suffixed forms, as in the noun *gimnaz-išt* 'gymnast (MASC SG)' (stem and suffix are loans) and the adjective *mišpaxt-it* 'pertaining to a family (FEM SG)'. Notice that **srigmiš* would have been prosodically better than *srigamiš* since it is disyllabic, but there is no {i,i} nominal pattern, and also only one vowel can be deleted. This follows the tendency, mentioned in note 18, to form a blend which is phonologically similar to other words in the language (though, as observed in notes 9 and 10, the eroded element should not be phonologically similar to an affix).

Another example that does not obey the grammar of blends is drawn from verbal blends. As noted earlier, verbs in Hebrew have a limited variety of vocalic patterns. Unlike nouns, there is no verb in the language which does not adopt one of the possible patterns (otherwise it would be opaque for conjugation; see Bat-El 1989: 16). The verbal blend *kaxten* 'exchange!' is derived from the base elements *kax* 'take!' and *ten* 'give!'. Notice that when the elements are in the reverse order, **tenkax*, there is a lower degree of σCONTSLOPE violation, since *n.k* is a better heterosyllabic cluster than *x.t*. However, the vocalic pattern in Hebrew verbs must be selected from a limited inventory of patterns (each associated with a particular binyan), and the preferred pattern is that of binyan *PiʔeI*, whose vocalic patterns are {i,e} for Past and {a,e} for Imperative. The latter pattern is exactly the one in *kaxten*, while {e,a} of **tenkax* is not an available Imperative pattern.

I thus suggest that the grammar of the blends considered in this section does not entirely overlap with that of the other blends. Rather, it intersects with the grammar of other blends, as well as with other systems of word formation in the language. In (49) STEM = FOOT, which provides the prosodic shape to verb stems and quite a few noun stems, dominates at least DISC and I-CONTIG. Another undominated constraint from the grammar of verbs (and quite a few nouns) is VPATTERN, which requires correspondence between the vocalic pattern of the blend and that of another surface form of the same lexical category. The blends in (51) suggest that VPATTERN outranks STEM = FOOT.

Notice also that the proposal that one of the elements of these blends is a bound morpheme would require a different grammar for blends. This grammar would involve correspondence between underlying form and surface form, while the grammar of most blends involves correspondence between surface forms. A thorough comparative study of the various types of Hebrew word formation, in particular that of the blends discussed in this section, may reveal a core–periphery structure along the lines of the proposal made by Itô & Mester (1995) for Japanese and Paradis & Lebel (1994) for Quebec French. The blends discussed in this section are much closer to the core grammar of Hebrew than other blends. This is consistent with the fact that these blends are well-established in the lexicon in the sense that they are listed in the dictionary.

6 A note on English blends

In this section I look briefly at the analysis of English blending proposed in Kubozono (1990), and suggest that further consideration may reveal that the non-phonological constraints proposed by Kubozono may well be redundant.

Kubozono claims, following Quirk *et al.* (1985), that English blends have a semantic head which is always at the right edge. Thus, *mo <tor•ho>tel* is 'a kind of hotel' and not 'a kind of vehicle' (Kubozono 1990: 3), and *br<eakfast•l>unch* is 'a special kind of *lunch* which has some of the features of breakfast... if the meal had been primarily conceived as a kind of *breakfast*, we might have had instead (*)'*lunkfast*' (Quirk *et al.* 1985: 1583).[25]

Kubozono views the Right Hand Rule (Williams 1981) as a constraint responsible for the order of the elements. He does not mention, however, what determines the order of the elements in exocentric blends. The same question could, in fact, be asked with respect to exocentric compounds (see Zwicky 1985 and Anderson 1992), but in blends it is much more crucial due to the relatively large number of exocentric blends. I have not studied the details of English blending, but in these two examples the non-optimal candidates can be explained by other considerations. In **lun <ch•brea>kfast* or **lunch<•break>fast* σCONT is fatally violated (*nk.f* and *č.f* respectively), while in *br<eakfast•l>unch* it is not (*n.č*). Similarly, while both *mó<tor•ho>tél* and **ho<tél•mó>tor* respect DISC, in the latter, as noted by Elizabeth Ritter (personal communication), the stressed syllables of both elements is deleted. Since the position of main stress in a blend is determined by its position in its elements (see note 3), deletion of the two stressed syllables would result in an unstressed form. The position of stress in blends is determined by the undominated constraint HEADMAX (McCarthy 1995), which requires that *the head of the blend has a correspondent that is also a head in one of the base elements.* A similar situation arises in Hebrew, where *pomé<la•ʔeško>lít* and **ʔeško<lít•pomé>la* tie on all the constraints, but the latter fatally violates HEADMAX since both stressed syllables are truncated.[26] I thus suggest that the notion of semantic head should be reconsidered with regard to English blending, mainly because of the vast number of exocentric blends, and also because the study of Hebrew blends presented in this paper provides strong positive evidence for the irrelevance of a semantic head (see, in particular, §2).

Kubozono distinguishes between the semantic and the phonological head. While the position of the semantic head is language-specific, that of the phonological head is universally fixed at the right edge (Kubozono 1990: 17). The function of the phonological head is to determine the syllabic length of the blend such that 'the right-hand source word and the resultant blend form consist, in most instances, of the same number of syllables' (Kubozono 1990: 12).

Kubozono's Length Constraint (hereafter LENGTH) has the same function as σDEP (13b). However, while LENGTH refers to the syllabic length of the righthand element, σDEP indirectly refers to the longest element, regardless of its position in the case. One way to accommodate the distinction between the two languages is to assume that both constraints are universally available, but their ranking is different: Hebrew ranks them σDEP ≫ LENGTH while English has LENGTH ≫ σDEP. However, further research is required before extending the power of grammar to such a degree.[27] For example, it is possible that in English, unlike in Hebrew, σCONT outranks σDEP, and therefore ***brunch*** is better than **breaklunch*, where *k.l* seriously violates σCONT. In addition, σMAX, which is undominated in Hebrew, is a dominated constraint in English, since a blend in English can be shorter than the longest element in the base (this is true even if we count moras, which is probably the relevant unit for the prosodic constraints in English and other quantity-sensitive languages).

Notice also the following English blends (from Bauer 1988) and their non-optimal counterparts:

(55)	*optimal*	*non-optimal*
	☞gla**s**<s•a**s**>phalt	a<**s**phalt•gla>**ss**
	☞wa<**r**•o>**r**gasm	o<**r**gasm•wa>**r**
	☞sla<**n**g•la>**n**guage	la<**n**guage•sla>**ng**
	☞gue<**ss**•e>**s**timate	e<**s**timate•gue>**ss**
	☞swe<**ll**•e>**l**egant	e<**l**egant•swe>**ll**
	☞tri<**t**e•cri>**t**ical	cri<**t**ical•>**t**rite

All the forms in (55) respect DISC. The optimal blends also satisfy σMAX, as well as Kubozono's LENGTH. However, the non-optimal blends respect LENGTH but violate σMAX. At least two of the blends, (*gue<ss•e>stimate* and *gla<ss•a>sphalt*), are exocentric, and therefore the order of the elements could not be determined by semantic factors (the Right Hand Rule). It thus appears that σMAX, rather than LENGTH, is the crucial constraint for the blends in (55).

Other examples seem to be contradictory with respect to these constraints. LENGTH is violated in *para<chute•bal>loon* and *testi<fy•>lie*, where σMAX is respected, while in *mi<serable•fli>msy* and *br<eak-*

fast•l>unch σMAX is violated while LENGTH is respected (in *mi<serable•fli>msy* DISC is also violated). While the violations exhibited by *br<eakfast•l>unch* can be explained by σCONT (see above), I cannot explain at this point why *mi<serable•fli>msy* is preferred over **flim<sy•mi>serable*.

In general, the similarities between Hebrew and English blending seem to be much greater than the differences. I believe that further study would reveal that in both languages (and probably in others, as suggested by Kubozono's (1990) comparison between English and Japanese) the grammar of blends is governed by the same constraints. The distinction between the languages is hopefully limited to the constraint hierarchy, and to independent differences such as syllable structure.

7 Conclusion: the grammar of blends is not peculiar

One goal of this paper is to show that blending, which is usually considered as an 'extragrammatical' phenomenon, should not be ignored by linguistic theory. I have demonstrated that, as any grammar of a natural language, the grammar of blends consists of hierarchically ordered constraints. Indeed, there are a few exceptions which have to do with principles outside the constraint hierarchy, and even a group of blends that partly falls outside the grammar of blends (§5.4). However, we have to bear in mind that blending is part of derivational morphology, a component of the grammar which is known for a certain degree of idiosyncrasy.

In pretheoretical terms, blending seems to be different from other types of word formation due to two characteristics: the absence of order between the elements of the base, and subtraction. The fact that the elements of the base are unordered may seem unusual in morphology. However, such a situation obtains in syntax in a variety of contexts, including ordering of constituents in coordinate structures and ordering of adverbial PPs. Subtraction, as well, can be found elsewhere in morphology. The most common case of subtraction is found in partial reduplication, though the term 'subtraction' is not generally used for this phenomenon. More familiar under this title is the morphological subtraction (truncation) in English *nomin<ate>-ee* (Aronoff 1976), where the subtracted material is a morphological unit. There are also cases of phonological subtraction. For example, *kolof-li* 'cut once'–*kol<of>-li* 'cut repeatedly' in Alabama, where the subtracted material is a prosodic unit (Broadwell 1987; Martin 1988), and *cipora–cipi* and *mordexay–mordi* in Hebrew hypocoristics, where the residual element is a prosodic unit (see McCarthy & Prince 1990 for prosodic circumscription). While in these cases the subtracted material is a morphological or phonological unit (or the residue of a unit), in blending it does not form a constituent. However, this distinction is not crucial within a theoretical framework which does not employ rules, since it is not necessary to define directly the subtracted element.

I have formulated most of the constraints active in blending in terms of correspondence between the base elements and the output blend. σMax and σDep force the syllabic length of the blend to be faithful to the syllabic length of its longest base element, and as such they reflect a type of 'base-dependent template', familiar also from the theory of transfer (Clements 1985; Hammond 1988). SegMax is the familiar anti-deletion constraint; its massive violation in blending is forced by the dominance of σDep and DISC. FtContrib and MinContrib make sure that the two base elements will be represented in the output to the same degree, and as such they aim to facilitate semantic recoverability of both elements. DISC, which actually eliminates identical segments in the output, has a similar effect to the Obligatory Contour Principle, and whatever principle is responsible for haplology (which also reflects the relation between identity and subtraction).

The study of blends presented in this paper also contributes to our understanding of Prosodic Morphology and Optimality Theory. The fact that prosodic and other phonological constraints have the power to determine even the order of the elements in the base suggests that the impact of phonology in word formation is even greater than was previously thought. Finally, I attribute the view that blending is not restricted by grammatical constraints (see § 1) to the absence of an appropriate theory of grammar. It has been shown that Optimality Theory, which engages ranked and violable constraints, can account for blending, and thus promote it from its extragrammatical status to a more central position in linguistic research.

Appendix A

It is important to draw a distinction between blends and combining forms. An example of a combining form in English (see Warren 1990 for discussion and more examples) is *workaholic*, where *holic* is a segmental string (not a morphological unit) extracted from *alcoholic*, along with part of the meaning 'a person addicted to' (leaving out 'alcohol'). The point is that the morphological structure of *alcoholic* is not *alco-holic* and the meaning 'a person addicted to alcohol' cannot be divided into two units associated with two morphological units.

A combining form is a type of word formation that lies between a blend and an affixed form (though a current combining form was not necessarily a blend in the past nor will it necessarily become an affixed form in the future). In combining forms the same portion of one of the elements appears in several forms. In English *workaholic* and *spendaholic* both contain (*a*)*holic*, taken from the base word *alcoholic*. In Hebrew, *susiyada* 'horse riding competition' (*sus* 'horse'), *ʔafifoniyada* 'kite flying competition' (*ʔafifon* 'kite') and *ʔofaniyada* 'bike riding competition' (*ʔofanaᵗm* 'bike', where -*aᵗm* is a dual suffix) all contain *iyada*, taken from the base word *ʔolimpiyada* 'Olympic games' (cf. the parallel semantic group in English: *bikeathon*, *pedalathon*, *swimathon*, all based on *marathon*).

The crucial point is that a combining form consists of a fixed segmental string taken from a base word plus a full element, while a blend consists of portions (which may include the entire element) of two elements that have identical status. It is thus not surprising that combining forms do not conform to the grammar of blending. For example, *susiyada* violates σMAX, which is inviolable in Hebrew blending. If it was a blend we should expect to find ***susimpiada*** (*sus<•ol>impiyada*) or **ʔolimpiyasus* (*ʔolympiya<da•>sus*). Similarly, *afifoniyada* violates DISC (not forced by the constraints ranked higher than DISC). If it was a blend we would expect **ʔafipiyada* (*ʔafi<fon•ʔolim>piyada*) or **ʔafifiyada* (*ʔafif<on•ʔolimp>iyada*).

Finally, it should be noted that blending is more similar to clipping, where the major distinction between the two word formation types is in the position of the alignment constraints in the hierarchy.

Appendix B

This appendix provides an alphabetically ordered list of the blends considered in the study (not all are mentioned in the paper). The list includes the glosses of the blends and their base elements, the position of stress in the blends and their base elements, and the status of the blend in the Hebrew lexicon: BN = brand name, BN$^{<}$ = a brand name that has become a general term, D = a blend that appears in the dictionary, and N = a new (not a brand name) blend (which does not appear in the dictionary). Verb forms are given in the 3rd person past singular, unless otherwise indicated.

blend		*base elements*	
ʔafaršezíf 'nectarine' (N)	ʔafar<sek•>šezif	ʔafarsék 'peach'	šezíf 'plum'
ʔagalúl 'a playpen-shaped stroller' (N)	ʔaga<la•>lul	ʔagalá 'stroller'	lúl 'playpen'
ʔarpí^{a}x 'smog' (D)	ʔar(a)<fel•>pi^{a}x	ʔaraféI 'fog'	pí^{a}x 'soot'
ʔatarók 'rock concert site' (N)	ʔata<r•>rok	ʔatár 'site'	rók 'rock'
ʔiguládim 'a round shaped chocolate' (BN)	ʔigu<l•šoko>ladim	ʔigúl 'circle'	šokoládim 'chocolates'
ʔofifoním 'butterfly and airplane shaped chicken nuggets' (BN)	ʔo<f•ʔa>fifonim	ʔóf 'chicken'	ʔafifoním 'kites'
brexóf 'swimming pool on the beach' (N)	bre<xa•>xof	brexá 'swimming pool'	xóf 'beach'
búgraxof 'the name of a restaurant at Bugrachov beach' (N)	bugra<čov•>xof	búgračov 'a name of a street'	xóf 'beach'
cfargól 'an army pin shaped like a frog or a grasshopper' (N)	cfar<de^{a}•xar>gol	cfardé^{a} 'frog'	xargól 'grasshopper'
daxpór 'bulldozer' (D)	da<xaf•la>xpor	daxáf 'to push'	laxpór 'to dig (INF)'
demoktátor 'a democrat who behaves like a dictator' (N)	demok<rat•dik>tator	demokrát 'democrat'	diktátor 'diktator'

galgalác 'traffic report radio station' (N)	gal<gal•>galac	galgál 'wheel'	galác 'a name of a radio station'
kadurégel 'football' (D)	kadu<r•>regel	kadúr 'ball'	régel 'foot'
kadursál 'volleyball' (D)	kadur•sal	kadúr 'ball'	sál 'basket'
kaduryád 'basketball' (D)	kadur•yad	kadúr 'ball'	yád 'hand'
kalcéfet 'easy-to-make whipped cream' (BN)	kal<•ka>cefet	kál 'easy, light'	kacéfet 'whipped cream'
kalída 'low fat ice cream' (BN)	kal<•gl>ida	kál 'easy, light'	glída 'ice cream'
kálkar 'polystyrene' (N)	kal•kar	kál 'easy, light'	kár 'cold'
kalorína 'low fat margarine' (BN)	kalo<rya•marga>rina	kalórya 'calory'	margarína 'margarine'
kankál 'a litre-plus soft drink bottle' (N)	kan<kan•>kal	kankán 'jar'	kál 'easy, light'
kanyotér 'a name of a shopping mall' (N)	kan<yon•>yoter	kanyón 'shopping mall'	yotér 'more'
karnáf 'rhinoceros'	ker(e)n•(ʔ)af	kéren 'horn'	ʔáf 'nose'
karxóm 'a container to retard heat transfer' (N)	kar•xom	kár 'cold'	xóm 'heat'
kaxtén 'exchange!' (N)	kax•ten	káx 'take!'	tén 'give!'
kcardáš 'a combine' (D)	k(a)car•daš	kacár 'to harvest'	dáš 'to thresh'
kmoyonéz 'mayonnaise substitute' (BN)	kmo<•ma>yonez	kmó 'alike'	mayonéz 'mayonnaise'
kokoláda 'chocolate with coconut' (BN)	ko<kus•šo>kolada	kókus 'coconut'	šokoláda 'chocolate'
maškár 'cold drink' (BN)	maš<ke•>kar	mašké 'drink'	kár 'cold'
maxanófeš 'holiday camp' (N)	maxa<ne•>nofeš	maxané 'camp'	nófeš 'holiday'
maxazémer 'musical show' (D)	maxa<ze•>zemer	maxazé 'play'	zémer 'song'
mešuxpac 'reconstructed and renovated' (N)	mešux<zar•mešu>pac	mešuxzár 'reconstructed'	mešupác 'renovated'
micuyán 'juice' (BN)	mi<c•me>cuyan	míc 'juice'	mecuyán 'excellent'
midraxóv midrexóv 'promenade, mall' (N)	midra<xa•re>xov mid<raxa•>rexov	midraxá 'pavement'	rexóv 'street'
migdalór 'lighthouse' (D)	migdal•(ʔ)or	migdál 'tower'	ʔór 'light'
misadág 'fish restaurant' (N)	misa<da•>dag	misadá 'restaurant'	dág 'fish'
mištaxcéf 'to be boastful and insolent (PRT)' (N)	mištax<cen•mitxa>cef	mištaxcén 'to boast (PRT)'	mitxacéf 'to be insolent (PRT)'

mitnaxablím 'settlers who behave like terrorists' (N)	mitna<xalim•me>xablim	mitnaxalím 'settlers'	mexablím 'terrorists'
mixsovév 'screw-top' (N)	mix<se•>sovev	mixsé 'lid'	sovév 'to turn (PRT)'
mošbúc 'cooperative and collective settlement' (N)	moš<av•ki>buc	mošáv 'cooperative settlement'	kibúc 'collective settlement'
nešikoláda 'a type of chocolate' (BN)	neši<ka•šo>kolada	nešiká 'kiss'	šokoláda 'chocolate'
paxmeimán 'hydrocarbon' (D)	pax<man•>meiman	paxmán 'carbon'	meimán 'hydrogen'
pélefon 'cellular phone' (N)	pe<le•te>lefon	péle 'miracle'	télefon 'a phone'
pomelít 'a hybrid fruit of pomelo and grapefruit' (N)	pome<la•ʔeško>lit	poméla 'pomelo'	ʔeškolít 'grapefruit'
prigúf 'low fat fruit yogurt' (BN)	pri<gurt•>guf	prígurt 'fruit yogurt'	gúf 'body'
prígurt 'fruit yogurt' (BN<)	pri<•yu>gurt	prí 'fruit'	yúgurt 'yogurt'
rakével 'cable-car' (D)	rake<vet•xe>vel	rakévet 'train'	xével 'rope'
rámkol 'loudspeaker' (D)	ram•kol	rám 'loud'	kól 'voice'
ramzór 'traffic light' (D)	ram(a)z•(ʔ) or	ramáz 'to hint'	ʔór 'light'
rašamkól 'taperecorder' (D)	rašam•kol	rašám 'to register'	kól 'voice'
ricpáz 'floor cleaning detergent' (BN<)	ric<pa•>paz	ricpá 'floor'	páz 'shining'
sálkal 'baby car-seat' (N)	sal•kal	sál 'basket'	kál 'easy, light'
srigamíš 'flexible knitted fabric'(BN)	s(a)ri<g•>gamiš	saríg 'knitted fabric'	gamíš 'flexible'
sugiyá 'sweetie' (N)	su<karya•ʔu>giya	sukaryá 'candy'	ʔugiyá 'cookie'
sukrazít 'saccharin' (BN<, D)	suk(a)<r•>razit	sukár 'SUGAR'	razít 'YOU (FEM SG) lost weight'
šaldág 'kingfisher' (D)	šal<a•>dag	šalá 'to fish out'	dág 'fish'
šezifarsék 'nectarine' (N)	šezi<f•ʔa>farsek	šezíf 'plum'	ʔafarsék 'peach'
šišabát 'weekend' (N)	ši<ši•>šabat	šiší 'Friday'	šabát 'Saturday'
šmanmúx 'dumpy' (N)	šman<man•na>mux	šmanmán 'plump'	namúx 'short'
šmartáf 'babysitter' (D)	š(a)mar•taf	šamár 'to guard'	táf 'infant'
šxordínit 'blond-dyed black (FEM SG)'(N)	šxor<a•blon>dinit	šxorá 'black (FEM SG)'	blondínit 'blond (FEM SG)'
tačtoním 'underwear' (BN)	tač<•tax>tonim	táč 'to touch'	taxtoním 'underpants'
tapugán 'fried potato' (BN)	tapu<^{a}x•metu>gan	tapú^{a}x 'potato'	metugán 'fried'

tapuzína	tapuz<•mandar>ina	tapúz	mandarína
'a hybrid fruit of orange and mandarin' (N)		'orange'	'mandarin'
taxtulím	tax<tonim•xi>tulim	taxtoním	xitulím
'pull-ups' (BN)		'underpants'	'diapers'
televídyo	tele<vizya•>vidyo	televízya	vídyo
'pay-per-view' (N)		'television'	'video'
tguváyna	tgu<va•gu>vayna	tguvá	guváyna
'toll-free customer service' (N)		'response'	'collect call'
totolyonér	toto<•mi>lyoner	tóto	milyonér
'one who won the football lottery' (N)		'football lottery'	'millionaire'
xamšír	xam(e)<š•>šir	xaméš	šír
'limerick' (D)		'five'	'song'
xaybár	xay•bar	xáy	bár
'wildlife safari' (N)		'alive, he lives'	'wild'
xaydák	xay•dak	xáy	dák
'bacterium' (D)		'alive, he lives'	'thin'
xayzár	xay•zar	xáy	zár
'extraterrestrial alien' (N)		'alive, he lives'	'foreign'
yaʔéz	ya<ʔel•>ʔez	yaʔél	ʔéz
'a hybrid of mountain goat and goat' (N)		'mountain goat'	'goat'
yonéc	yo<na•>nec	yoná	néc
'a hybrid bird of dove and hawk (dawk)' (N)		'hawk'	'dove'
zrakór, zarkór	zar(a)k•(ʔ)or	zarák	ʔór
'projector' (D)		'to throw'	'light'

NOTES

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[1] Bat-El's (1994b) study of Hebrew acronyms clearly demonstrates that the grammar of acronyms involves constraints and principles independently motivated in linguistic theory.

[2] Elizabeth Ritter (personal communication) points out that one may suggest that compounds in Hebrew are left-headed and blends are right-headed. Thus, in both compounds and blends the definite article is attached to the left of the non-head, and the plural suffix to the right of the head. However, as shown in §2.2 below, this view cannot be adopted, because the meaning of the right element and its lexical category often do not appear in the output blend, that is, X•Y is not always Y (and sometimes not even X; see also note 4).

[3] (i) *c* is an alveolar affricate. (ii) Unless otherwise specified, verb forms are in the 3rd person masculine past singular. (iii) Main stress in blends falls on the rightmost stressed syllable that surfaces (one exception: *búgraxof*, from *búgračov* and *xóf*). Therefore it is never the case that the stressed syllable in both elements is subtracted (see also §6). In disyllabic blends formed from two monosyllabic elements, main stress seems to be unpredictable; cf. *sálkal*, *rámkol* and *kálkar* vs. *xaydák*, *xaybár*, *xayzár* and *karxóm*.

[4] The data in (3) and (4) may suggest that, as in compounds, when the lexical category of the output is X, the base must include an X. There are, however, a few (exocentric) noun blends which do not include a noun in their base; for example, *xaydák* 'bacterium' from *xáy* 'alive, he lived' + *dák* 'thin', *kálkar* 'polystyrene' from *kál* 'easy, light' + *kár* 'cold', and *daxpór* 'bulldozer' from *daxáf* 'to push' + *laxpór* 'to dig (INF)'. It is possible that the nominal property of these forms is derived from the syllabic structure (two syllables) and the vocalic pattern {a,a} which characterise quite a few nouns in Hebrew (see §5.4).

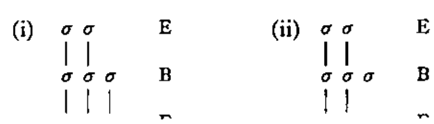
[5] It might be worthwhile to study the status of UNIQUENESS outside the grammar of blending, where its function, as in blending, is to avoid semantically related homonyms. In Swahili, for example, the nasal plural prefix is deleted before fricatives, and therefore the plural form is identical to the input stem. If we assume that UNIQUENESS may refer not only to the phonological form but also to the lexical category and the features associated with it (gender, number, etc.), then the Swahili case does not constitute a UNIQUENESS violation. A hypothetical case which would violate this constraint would be deletion of a nominal affix attached to a nominal base, where both the base and the output have the same value for gender and number; for instance, *m*+X, where X means 'chair (MASC SG)', surfaces as X (after the phonological deletion of *m*) which means 'stool (MASC SG)'.

[6] The study of alignment presented in McCarthy & Prince (1993b) does not mention a conjunctive statement as in (7), but such a statement is actually implicit in ALIGN (σ, PrWd), for example, which requires that every syllable is a PrWd (as in Chinese). The reading of this statement is Align Left (σ_i, $PrWd_i$) & Align Right (σ_i, $PrWd_i$). Similarly, the requirement of Hebrew verb stems to consist of exactly one foot, which is usually expressed by STEM = FOOT, can be stated in terms of alignment of Align Left ($Stem_i$, Ft_i) & Align Right ($Stem_i$, Ft_i). I adopt here the more restrictive two-argument alignment statement proposed in Itô & Mester (1994). However, a study of both blending and clipping may require to split ALIGNMENT OF EDGES, since in clipping Align Left (B_i, E_1) is undominated while Align Right (B_i, E_2) is always violated (and there is probably an additional alignment constraint which is active in clipping, but does not emerge in blending).

[7] (i) In some cases DIS is not two identical consonants, but rather two similar ones, as in the following examples: *su<karya•ʔu>giya* (*k/g*: voice), *ʔafar<sek•> šezif* (*s/š*: place in sibilants), *tapu<x•metu>gan* (*x/g*: continuant and voice), *ʔar(a)<fel•>piᵃx* (*f/p*: continuant) (see §5.4 for the parenthesised vowel in the last form). There are too few examples of this sort to determine which features can be allowed to have distinct values in DIS, whether there is preference among the features, and how many are allowed (we might want to limit it to one feature, in which case there is no DIS in the third example). The free variation *ʔafar<sek•>šezif–šezi<f•ʔa>farsek* discussed in §5.3 may indicate that an identical DIS is not preferred over a similar one.

(ii) There is often ambiguity regarding the demarcation of the subtracted material. The blend *mixsovev*, for example, could be either *mix<se•>sovev* or *mixs<e•s>ovev*. I chose to mark the edges of the subtracted material at syllable boundaries when possible, since cases where the DIS is similar show preference for syllable boundary, as in *ʔafar<sek•>šezif* (**ʔafars<ek•š>ezif*) and *su<karya•ʔu>giya* (**suk<arya•ʔug>iya*); when this is not available then the nucleus–coda boundary is preferred, as in *tapu<x•metu>gan* (**tapux<•me-tug>an*). See Kubozono (1990) for reference to syllabic structure at the switch point in English and Japanese, as well as note 27.

[8] σDEP gets one mark when one syllable in a blend lacks a correspondent in both elements (ii) or only in one (i):



It is not necessary to give (ii) two marks, one for each base element, since, given the fixed syllable count of the base elements, such a candidate will never compete with a candidate in which a syllable in the blend lacks a correspondent in one element only.

[9] There are two counterexamples to the ranking σDEP ≫ FTCONTRIB. In the tableaux below the reverse ranking gives the surface form:

(i)

a. /ʔafarsek, šezif/	DISC	FTCONTRIB	σDEP
☞ i. ʔafar<sek•>šezif			**
ii. ʔafar<sek•še>zif		*!	*
b. /toto, milyoner/			
☞ i. toto<•mi>lyoner	*		**
ii. to<to•mi>lyoner	*	*!	*
iii. toto<•milyo>ner	*	*!	*

The problem in (a) could be solved with a preference scale for similar DIS (see note 7). In this scale, distinction in sibilant voicing would be worse than distinction in sibilant place of articulation. However, there are not sufficient forms with similar DIS to establish such a scale.

The explanation for (b) could have to do with transparency. In candidate (iii) the second element contributes segments that form a suffix (cf. *milyón* 'million'–*milyonér* 'millionaire' and *máfya* 'Mafia'–*mafyonér* 'member of a Mafia'). Therefore the core of the second element of the base does not have any coherent manifestation in the blend. The same explanation can be given for candidate (ii), where *to*, the segmental material contributed by the first element, is similar to the prefix in nouns such as *to-sef-et* 'addition' (cf. *hosif* 'to add'), *to-šav* 'resident' (cf. *yašav* 'to sit'). This example, and those in note 10 below, strongly suggest that there is a tendency to keep the eroded element phonologically distinct from affixes existing in the language. The ranking σDEP ≫ FTCONTRIB can thus be maintained, but not without the admission of some general principle whose function would be to prevent the eroded element being misinterpreted as an affix.

[10] There are cases where a DISC violation is not enforced by any of the dominant constraints (so far identified). From the base *pri*, *yogurt* we get pri<•yo>gurt rather than *yogu<rt•p>ri. Similarly, from the base *tapuªx*, *metugan* we get tapu<ªx•metu>gan rather than *me<tugan•>tapuªx (see note 11 for the short diphthong). The explanation is, as in note 9, that the candidates *yoguri and *metapuªx look like affixed forms; *-i* is both an adjectival and a 1st person singular possessive suffix, and *me-* is the participle prefix (where participles function as either nouns or verbs). The problem is that this consideration does not block the appearance of *pomelit*, from pome<la•ʔeško>lit, which could be interpreted as a suffixed form *pomel-it*, since *-it* is a suffix in Hebrew. First, the reverse order of the elements gives *ʔeško<lít•pomé>la, where the stressed syllable in both is truncated (as suggested in §6, such a case should be prevented). Moreover, there is an important difference between *-i/me-* and *-it*. Unlike *-i* and *me-*, the suffix *-it* lacks a specific semantic content, since it is used as a derivational suffix deriving nouns of various idiosyncratic semantic properties (in addition to its function as an inflectional feminine suffix). Therefore, the appearance of *it* at the end of the blend may obscure the identity of the base elements (i.e. speaker may interpret *pomelit* as derived from *pomela*+*-it*), but the semantic interpretation of the suffixed form is quite similar to that of the blend: instead of interpreting *pomlit* as 'a hybrid of *pomela* and *ʔeškolit*' (blend) speakers may interpret it as 'a type of *pomela*' (suffixed form), which is not accurate, but also not wrong. (An additional restriction that may rule out *yogu<rt•p>ri is that the complex onset *pr* cannot be split, i.e. it is treated as a single segment.)

[11] A short diphthong (indicated by superscript *a*), as in (28d), appears before historical pharyngeal consonants in word-final syllables. In Modern Hebrew *ħ* has merged with *x* and ʕ with ʔ, and therefore the phonological environment of

the diphthong is opaque. Moreover, ʔ does not surface in coda position, and thus historical $V^aʕ$ surfaces as V^a. The fate of the back consonants in Modern Hebrew deserves a paper of its own, and therefore I provide here just a speculative analysis. I assume that there are two constraints: $V^aX\#$, which requires a diphthong in certain contexts (X) in word-final position, and $*V^a$, which does not allow diphthongs. These constraints are ranked $V^aX\# \gg *V^a$. The tableau below shows that when both elements of the base have a final diphthong, only the rightmost one would surface in the blend. Similarly, if only one element has a diphthong, it will surface only if it is in the second element, i.e. at the right edge of the blend.

(i)

$/V^aX...V^aX\#/$	$V^aX\#$	$*V^a$
☞ a. $VX...V^aX\#$		*
b. $V^aX...VX\#$	*!	*
c. $V^aX...V^aX\#$		**!
d. $VX...VX\#$	*!	

These constraints obviously need to be considered with respect to segmental or featural faithfulness constraints.

[12] Consequently, blends which respect DISC violate UNIFORMITY, which states that *no element in the blend has multiple correspondents in the base* (McCarthy & Prince 1995b). In addition, a candidate which respects DISC has one fewer mark for SEGMAX violation than a candidate that does not. For example *kan*<*kan•*>*kal* respects DISC and has two marks of SEGMAX violation (DIS is not counted), while **kal*<*•kan*>*kan* does not respect DISC and has three marks for SEGMAX. However, DISC and SEGMAX are clearly independently required.

[13] Following the approach to segmental markedness in Prince & Smolensky (1993), this scale can be translated into two universal sub-hierarchies: *CODA/stop ≫ *CODA/fricative ≫ *CODA/nasal ≫ *CODA/liquid ≫ *CODA/glide and *ONSET/glide ≫ *ONSET/liquid ≫ *ONSET/nasal ≫ *ONSET/fricative ≫ *ONSET/stop. The tableaux below illustrate how we get the syllable-contact effect:

(i)

a.	*CODA/nasal	*ONSET/fric	*CODA/liquid	*ONSET/stop
☞ i. r.d			*	*
ii. n.d	*!			*
b.	*CODA/stop	*ONSET/fric	*CODA/glide	*ONSET/stop
☞ i. y.d			*	*
ii. k.x	*!	*!		
c.	*CODA/liquid	*ONSET/fric	*CODA/glide	*ONSET/stop
☞ i. y.b			*	*
ii. r.x	*!	*!		

[14] Within the liquids, *l* is more sonorous than *r*, as Hebrew *r* is a uvular approximant which often alternates with a uvular fricative. Therefore, given the base *kal, kar*, the blend *kalkar* 'polystyrene' is the optimal form, rather than **karkal*.

[15] The constant 5 is added to ensure that the calculation results in a positive number. This is necessary only for purposes of exposition in the tableau, where a negative number could not be represented by violation marks.

[16] In blends that denote 'ball games' SYLLCONT has more violations in the surface forms than in other possible candidates; e.g. *kadursal* (*r.s*) 'basketball' *vs.* **salkadur* (*l.k*) and *kaduryad* (*r.y*) 'volleyball' *vs.* **yadkadur* (*d.k*). Notice also that the surface form of the latter should have been **ya*<*d•ka*>*dur*. I suspect that either these blends are derived from compounds (which are left-headed), or they are all formed to match *kaduregel* 'football', where the first element is *kadur* 'ball'. In the dictionary of Even-Shoshan (1982) the ball games are written as

compounds (with a hyphen between the elements) under the entry for 'ball', and as blends (without a hyphen) under their individual entries (on the same page).

[17] Although σCONT (39a) dominates SEGMAX we get *toto<•mi>lyoner* rather than **toto<•mil>yoner* (as discussed in note 9, this blend has other problems). It seems that the ending *-oner* must be preceded by a consonant cluster, as in *buxtoner* 'a rich person', *protekcyoner* 'someone who succeeded due to personal connections', *milyoner* 'millionaire', *mafyoner* 'member of the Mafia' and *širyoner* 'member of the armed forces'. In cases where there is no cluster in the base the front glide is inserted, as in *kriza–krizyoner*. Recall from §4 that metathesis is not an available option in blending, since LINEARITY is undominated, and therefore **totolyoner* is ruled out.

[18] Other candidates that lose against the optimal candidate in (40a) are **tapuz <•man>darina*, which has more violations of σDEP, and **ta<puz•ma> ndarina*, which violates FTCONTRIB. However, there is one candidate, **manda <rina•>tapuz*, which should apparently be the optimal candidate: it ties with *tapuz<•mandar>ina* in all constraints except SEGMAX, where it has fewer violations. A possible semantic explanation is that the blend with the final sequence *ina* (not a suffix) is preferred in order to preserve the semantic relation between the blend *tapuzína* 'a hybrid fruit of orange and mandarin' and two other fruit names of the same family, *mandarína* 'mandarin' and *klemantína* 'tangerine'. A similar tendency is found in the blend *karxóm* 'a container to retard heat transfer', which violates σCONTSLOPE to the same extend as **xomkar* (*r.x* vs. *m.k* respectively). However, the optimal blend *karxóm* is phonologically similar to *karxón* 'iceberg'. Both *karxón* and *karxóm* include the semantic notion of 'coldness'; the former via the base *kérax* 'ice' and the latter via the base element *kar* 'cold'. These forms, and those discussed in note 16, reflect the tendency to preserve phonological similarity between words of the same semantic field.

[19] The hierarchy in (46) does away with explanations which fall outside the constraint hierarchy. The 'similarity' of the final syllables of both elements in *bugra<čov•>xof* is probably relevant here. The same is true for *kal<•ka>cefet*, which is obtained with the available constraint hierarchy (see §4.3). However, the notion of 'similarity' is not easy to define, especially with respect to syllables, in order to include it within a formal constraint (see also on similar DIS in note 7). Notice that in many cases DIS is followed by the same vowel in both elements, which means that the core syllable is identical, not just the consonant (e.g. *gal<gal•>galac, misa<da•>dag, maxa<ze•>zemer*). In other cases, however, there is identity only in DIS (e.g. *maš<ke•>kar, mix<se•>sovev, neši<ka•šo>kolada*). Further study of blends in other languages may lead to the conclusion that DISC is a family of constraints based on a scale such as DISC/core σ ≫ DISC/consonant ≫ DISC/vowel.

As for *mištaxcef*, its morphological and prosodic structures mimic those of its base elements. It is a verb in the participle, like its base elements, and therefore it consists of two syllables plus the prefix *mi-*, and the vocalic pattern {a,e}. The syllables, as in the base elements, are CVC. This is expected in verbal blends, given the fact that verbs in Hebrew are highly restricted by segmental and prosodic constraints.

[20] The status of the glottal stop is not entirely clear. In (49b, f) it seems as if it does not appear in the base elements. This is not surprising, since a glottal stop in Hebrew often alternates with zero, and a glottal stop in word-initial position may well be a phonetic effect. However, in (48b) the presence of a glottal stop in the base is essential, otherwise candidate (ii) would have been the only optimal candidate since it would have fewer SEGMAX violations. This behaviour of the glottal stop is not peculiar to blends. In the formation of denominative verbs (Bat-El 1994a) a glottal stop is ignored in some cases (*ʔalaxson* 'diagonal'–*lixsen* 'to turn aside') but not in others (*ʔabstrakti* 'abstract'–*ʔibstrekt* 'to make abstract'). For the purpose of the present study I assume that 'disappearance' of a glottal stop is cost-free.

[21] The SSG in Hebrew requires a sonority rise or plateau from the syllable peak to

the margins. The only violation of SSG, familiar from English and other languages, is encountered with sibilant fricatives, as in *zkenim* 'old (MASC PL)', *stira* 'slap' and *štixim* 'carpets'. In a low register other fricatives are possible before a stop, as in *ftax*, for the more common form *ptax* 'open!'.

[22] In *rašam•kol* no vowel is deleted because deletion of either vowel would result in SSG violation: *rš* when the first vowel is deleted, and *šm.k* or *š.mk* when the second is. There are two alternative forms in this case: the standard form, according to dictionaries, is *rešamkol*, where the vowel in the first syllable is deleted, and *e* (the epenthetic vowel in Hebrew) is inserted to break up the impermissible cluster. The non-standard form (cited in Ravid 1978: 32) is *rašamkol*, where no vowel is deleted. The analysis provided above predicts the latter form, since deletion of either vowel of the first element would result in an impermissible cluster, and, as noted in §4, blends do not use the option of epenthesis. The deletion in the first form is similar to deletion in suffixed forms and compounds (see examples in (52) below). This free variation may suggest that there is a confusion between a blend and a compound with respect to this form (although there are no $[VN]_N$ compounds in Hebrew). Further evidence for this confusion is drawn from the plural form. Although dictionaries specify that the plural suffix in this form is attached at the right edge (*rešamkolim*), as in blends (see §2.1), Nir (1993: 88) reports that speakers often prefer to attach the plural suffix at the edge of the first element (*rešam-ey kol* or *rašam-ey kol*), as in compounds.

[23] This is due to the loss of length distinction in Modern Hebrew (in both consonants and vowels). In Tiberian Hebrew, only vowels in an open syllable are subject to deletion, which obviously excludes vowels which are followed by a geminate. The form of *gamad* in Tiberian Hebrew is *gammaad*, where the first vowel is in a closed syllable and therefore it is not deleted when a suffix is added. The form of *gamal* in Tiberian Hebrew is *gaamaal*, where the first vowel is in an open syllable and therefore deleted when a suffix is added.

[24] There is one nominal blend where the vocalic pattern of the base is overwritten by another vocalic pattern, as is the case in verbs. In *karnáf* 'rhinoceros', from *kéren* 'horn' and *ʔáf* 'nose', the {e,a} pattern left after deletion of the second vowel in the first element is overwritten by {a,a}. Alternatively, the bound stem *karn-*, which appears in *karn-áim* 'horns', is selected as the base element. Ravid (1990) attributes the former strategy to other blends as well. She assumes that the first base element of *ramzór* is the noun *rémez* 'hint' rather then the verb *ramaz* 'to hint (3SG MASC PAST)', because the past tense form of verbs never takes part in Hebrew nominal derivation. However, it was shown in §2.2 that base elements of blends are not restricted to particular categories, and therefore it is not surprising that any form of verb can participate as a base element. We can even assume that the base of *daxpór* 'bulldozer' is not *daxaf* 'to push (3SG MASC PAST)' and *xafar* 'to dig (3SG MASC PAST)', which anyway poses a problem for Ravid, but rather *daxaf* 'to push (3SG MASC PAST)' and *laxpor* 'to dig (INF)', which does not require vowel adjustment nor undoing of the spirantisation of the *f*.

[25] Native speakers I consulted do not share the view of Quirk *et al.* The general intuition is that *brunch* has some properties of *breakfast* (mainly the type of food) and some of *lunch* (mostly the time it is eaten).

[26] It is possible that there are two constraints which require the blend to preserve the stressed syllables in the base elements: one which refers to the stressed syllable of the first element, and another which refers to the stressed syllable of the second element. In Hebrew the latter outranks the former. However, the effect of these constraints does not seem to arise in the corpus considered here.

[27] It should be taken into consideration that Kubozono is concerned mostly with blends which do not contain a DIS, while most of the blends presented here do contain a DIS. This is also the reason why I disregard Kubozono's discussion on the switch point (according to which the switch point in English is at the onset–rhyme boundary). In many of the blends presented here, the DIS determines the switch point.

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