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DEFINITENESS IN THE HEBREW NOUN PHRASE

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Contents

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1. Introduction

This paper provides an analysis of Modern Hebrew noun phrases, concentrating on the manifestation of (morpho-syntactic) definiteness. Hebrew demonstrates a system of *polydefinites*: when a noun phrase is definite, most of its constituents (the noun, adjectives, demonstratives and ordinal numbers) must be explicitly marked as such, by means of the definite article, 'ha-'. Hebrew nouns (and adjectives) have two forms, traditionally referred to as *absolute* and *construct* states. The former is used in any context; the latter is used only in compounds, where it must be complemented by a noun phrase. Construct state nominals do not combine with the definite article. Instead, the definiteness of the compound is inherited from the noun phrase complement. This complement is compulsory, and must immediately follow the construct state nominal. The analysis we suggest accounts for all these phenomena. Construct state nouns participate in genitive relations, and we show how the two major ways of forming such constructions in Hebrew – namely, with construct state nouns and with the genitive prepositions – are assigned similar structures. The analysis relies on two assumptions, that we justify using a wide range of arguments: that the definite article is an *affix*, which combines with nominals in the lexicon and hence is inaccessible to syntactic processes; and that the Hebrew noun phrase is headed by a noun, and not by a functional category which can be realized as an article.

Most analyses of Modern Hebrew consider the definite article, implicitly or explicitly, to have approximately the same syntactic and semantic contribution as English 'the'. In particular, the construction of definite nominals is considered a syntactic process. Ornan (1964) takes the article to be a full-fledged word. Ritter (1988) views it as a clitic; the account of definiteness is different in Ritter (1991), but the status of the definite article is not explicitly changed. Siloni (1991) criticizes the clitic analysis and suggests one by which the noun incorporates with the article after being moved. Others (Shlonsky 1990; Siloni 1994) take the article to be a major participant in syntactic processes. In contrast to this view, we claim in this paper that ha- is best regarded as an *affix* rather than as a full-fledged word or even as a clitic. In particular, its combination with heads takes place in the lexicon, so it is inaccessible to syntactic processes. This view is aligned with that of Borer (1994), although the argumentation and the consequences differ.

As the terms *word, clitic* and *affix* seem to have different definitions in different theories, and the borderline between syntax and morphology tends to be vague, we must be clear in using them. We pursue in this paper a linear approach to grammar, along the lines of Di Sciullo and Williams (1987) and Anderson (1992): we assume that morphology is separate from syntax, and furthermore that morphological processes take place before syntactic ones. We thus presuppose a view according to which, if an element is a *word*, or a *clitic*, then its combination with other elements takes place in the *syntax* and yields *phrases*; if an element is an *affix*, its combination with other elements takes place in the *lexicon* and yields *words*. Clitics, after Anderson (1992), are syntactic words which lack the prosodic properties to be words at the prosodic level, and are consequently post-syntactically attached to adjacent words. That is, we assume that words are the atomic elements for syntax, and that the operations that words can undergo take place in the lexicon. Then, after all the morphological processes have taken place, syntactic rules combine words into phrases. In the case of the Hebrew definite article, we show that it should be lexically attached to its host, rather than be subjected to syntactic rules.

Following Abney (1987), analyses carried out in Chomskian frameworks view noun phrases as DPs, headed by the functional category D. The DP hypothesis has been applied to a variety of languages and is incorporated into most existing accounts of Hebrew. We discuss several criteria for headedness and show that the definite article cannot head the Hebrew noun phrase. Therefore, we retain the view that the head of noun phrases in Hebrew is the noun.

In the light of the affixal view of the article, we stipulate a simple rule that determines its combinatorial properties: it attaches to words, not to phrases; it attaches only to nominals, and to all kinds of nominals; and it only combines with indefinite words. We first account for the fact that construct state nominals must have an immediate complement. We then explain why the article does not combine with such nominals. We justify a treatment of possessives as complements, and finally present a complete, unified analysis for Hebrew noun phrases headed by both absolute and construct state nouns.

The analyses presented in this paper are conveyed in the context of Head-Driven Phrase Structure Grammar (HPSG) (Pollard and Sag 1994). One of the main advantages of using HPSG is that the theory lends itself very naturally to computational implementation. Indeed, the analyses described herein were tested and their predictions verified. The use of HPSG, in which unconstrained movements are ruled out and empty (phonologically null) categories are discouraged, provides means for elegant, concise analyses to be made.

The paper is organized as follows: section 2 describes the data that are relevant for understanding the problem. A brief review of noun phrases in Hebrew is given in section 2.1, followed by a more focused look at noun-noun constructs (2.2), adjective-noun constructs (2.3) and possessives (2.4). Then, we show in section 3 that an affix view of the definite article is consistent with the accepted criteria for wordhood. First, we show that ha- should not be considered a word, based on phonological (3.1), morphological (3.2) syntactic (3.3) and semantic (3.4) grounds.

We then apply (3.5) several tests for distinguishing between clitics and affixes, showing that they support the suggested view. Section 4 discusses arguments for determining whether the head of the noun phrase is the noun or a (possibly empty) determiner. We survey some existing approaches to definiteness in Hebrew, pointing at their drawbacks (4.1). We list some criteria for headedness (4.2), and conclude that there is no theory independent reason to assume that the Hebrew noun phrase is a DP. We then sketch some approaches to the same problem in a variety of languages, taken within the HPSG paradigm (4.3). Our HPSG analysis is presented in section 5. We conclude with suggestions for further research.

A note on transcript. We use in this paper a transcription of Hebrew (Ornan 1994), known as *Phonemic Script*, that was accepted as a standard (number ISO-DIS 259-3). The definite article attaches, in the Hebrew script, to the word immediately following it, but in the Phonemic Script it forms a separate unit. We have chosen to be consistent with the standard in the examples below, but we intend to show that the article actually should be viewed as a part of the word it attaches to.

In the glosses, gender, number and person are indicated by ‘f’ (feminine), ‘m’ (masculine), ‘pl’ (plural), ‘sg’ (singular) and ‘3rd’ (third person). Construct state is indicated as ‘*c*’.

2. The Hebrew definite article

2.1. **The structure of Hebrew noun phrases.** Hebrew nouns are specified for *gender, number* and *person*[1]. While Hebrew is a relatively free constituent order language, the order of the elements in a noun phrase is sometimes fixed. In particular, quantifiers (including determiners, cardinal numbers and the definite article) are pre-head; all the other adjuncts and complements are post-head. The possible complements and modifiers are listed below by their default order in a noun phrase.

Determiners: such as koll (all/every), robb (most-of), kamma (some) etc.
Cardinal numbers: such as loa (three).
Definite article: see below.
Nominal complement: Hebrew allows an elaborate system of nominal compounds. Those headed by nouns are described in section 2.2.

[1] Only pronouns are specified for person, other nouns are inherently third person.

Adjectives: Hebrew adjectives are marked for number, gender and definiteness, on which they must agree with the head noun.

Ordinal numbers: such as $eni (second) are likewise marked.

Demonstratives: such as ze (this-m), zo (this-f), 'elle (these) or 'ellu (those).

Possessives: including possessive pronouns such as $elli (mine) as well as phrases ($ell dan – Dan's), are discussed in section 2.4.

Subcategorized complements: of derived (deverbal) and 'picture'-like nouns.

Prepositional phrases: The rules that govern the combination of prepositional phrases with head nouns in Hebrew are very similar to those in English.

Relative clauses: are not covered in this work.

An example involving some of these elements is:

(1)	koll	$e$$	ha-	smalot	ha-	yapot	ha-	'elle	$elli	mi-	'rhb
	all	six	the	dresses	the	nice	the	these	mine	from	US

'all these six nice dresses of mine from the US'

Relevant to the case in hand is the fact that many, though not all, of the complements and modifiers, can be explicitly or implicitly definite. Hebrew marks *definiteness* in a way that differs much from, say, English or German (but resembles other Semitic languages, notably Arabic, and also some Balkan and Scandinavian languages, as will be noted below). There is only one definite article in Hebrew, ha-, it does not inflect and it attaches (pre-nominally) to *words*, not to phrases. It can combine with various kinds of nominals: common nouns, proper nouns, adjectives, ordinal numbers, cardinal numbers and demonstratives. Moreover, definite noun phrases in Hebrew are *polydefinite*: most of the elements of the phrase are required to be explicitly definite, and there is a strict requirement that these elements *agree* on definiteness for the phrase to be grammatical. Hebrew arguably has *indefinite* articles[2] ('exxad, 'axxat, 'xadim), but their use is optional and not common. It is therefore useful to view bare nominals (with no attached definite article) by default as indefinite. The data are summarized[3] in (2). The basic (in)definite noun phrase in

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[2] This analysis is due to Ornan (1964) and is challenged by Rosén (1977, p. 155). For a detailed discussion see Givón (1981).

[3] Some phrases, such as ha- sepr gadol or ha-sepr $eni, are grammatical *sentences* but not noun phrases. We mark such phrases as ungrammatical below to indicate that they are unacceptable as noun phrases.

Hebrew is demonstrated in (2.a). In (2.b) the noun is modified by an adjective, and (2.c) shows that agreement on definiteness is required. The same pattern recurs for ordinals (2.d-e) and demonstratives (2.f-g).

(2)
a: sepr ('exxad) / ha- sepr
book (one) / the book
'a book / the book'
b: sepr gadol ('exxad) / ha- sepr ha- gadol
book big (one) / the book the big
'a big book / the big book'
c: *sepr ha- gadol / *ha- sepr gadol
book the big / the book big
d: sepr $eni / ha- sepr ha- $eni
book second / the book the second
'a second book / the second book'
e: *sepr ha- $eni / *ha- sepr $eni
book the second / the book second
f: sepr ze / ha- sepr ha- ze
book this / the book the this
'this book / this book'
g: *sepr ha- ze / *ha- sepr ze
book the this / the book this

2.2. **Noun–noun constructs.** Hebrew nominals come in two forms: the *absolute* form is used in any context; the other form, known as *construct* or '*nismak*' form, is used only in the context of noun–noun constructs. For many nominals, especially among singular masculine and plural feminine, the two forms are identical; for many others the construct form is phonologically reduced.[4] Construct forms exist for all common nouns and adjectives and for cardinals up to ten. Some examples follow:

	absolute:	sepr	sparim	loa	alo	gadol	gdola
(3)	construct:	sepr	siprei	lot	lo	gdol	gdolat
		book	books	three-m	three-f	big-m	big-f

This section covers noun constructs only; adjectival constructs are discussed in section 2.3.

[4]While the morphological rules relating absolute and construct forms are too complex to discuss here, they are relatively easy to formalize.

A noun–noun construct is a phrase consisting of a construct-state noun followed by a noun phrase. We refer to the first element of this construction as the *head* and to the second – as the *complement*. The phrase inherits all the morpho-syntactic features of the head, with the exception of *definiteness*, which is inherited from the noun phrase complement (Borer 1984, pp. 41-68). Semantically, the relation between the head and the complement is usually that of possessed-possessor, but various other relations are possible (see Levi (1976) for a detailed survey). Consider the following examples (c denotes the construct-form):

(4) *a:*

pirxei	gann	yapim	parxu
flowers-pl-c	garden-sg	beautiful-pl	flourished-pl-past

'beautiful garden flowers flourished'

b:

pirxei	ha-	gann	ha-	yapim
flowers-pl-c	the	garden-sg	the	beautiful-pl

parxu
flourished-pl-past

'the beautiful garden flowers flourished'

The properties of the noun phrases in both of these cases can be determined by the verb, since the subject and the main verb must agree on number and gender in Hebrew. Thus it is clear that the head of the noun phrase in both cases is pirxei rather than gann. The fact that the adjective yapim is in plural indicates that it modifies the head pirxei, rather than gann, as adjectives must agree with the head they modify on number, gender and definiteness. However, this head is not definite in any of the examples; rather, it is the complement ha- gann that is definite in (4.b), but indefinite in (4.a), in agreement with the definiteness of the adjective. Hence definiteness is inherited from the complement, rather than the head.

Another technique for checking the definiteness of a noun phrase in Hebrew involves the direct object (accusative) marker, 'et, that is glossed as 'ACC'. Having the characteristics of a preposition, 'et introduces only definite noun phrases. Hence:

(5)

qaniti	'et	pirxei	ha-	gann
I-bought	ACC	flowers-c	the	garden

'I bought the garden flowers'

qaniti	pirxei	gann
I-bought	flowers-c	garden

'I bought garden flowers'

*qaniti	'et	pirxei	gann
I-bought	ACC	flowers-*c*	garden

The process of compounding is recursive, as the resulting phrase is a legitimate noun phrase for combining with some other construct form. When more than two nouns are combined, the resulting phrase's definiteness is determined by the last (rightmost) noun phrase, the one in absolute form, while the head features are percolated from the first (leftmost) noun, which is of course in construct:

(6)	yaldei	mnahhel	taxnot	ha-	rakkebt
	children-m-pl-*c*	manager-m-sg-*c*	stations-f-pl-*c*	the	train-f-sg
	roqdim				
	are dancing-m-pl				

'the train stations manager's children are dancing'

It is important to note that nominals in construct-form can *only* occur in the context of N-N constructs: a construct-noun with no immediate noun phrase succeeding it is ungrammatical. Furthermore, there are no cases of movement, or extraction, from the complement's position:

(7)	*ha-	m$orer,	$e-	qaniti	'et	siprei
	the	poet	that	I-bought	ACC	book-*c*

(putatively) 'the poet whose books I bought'

This phenomenon is by no means unique to construct state nominals: as will be shown in section 5.2, it holds for prepositions and quantifiers as well.

It is well-established (Rosén 1977, Sec. 6.5) that two different kinds of noun-noun compounds must be distinguished: adopting the terminology of Borer (1988), they will be referred to as *compounds* vs. *constructs*. Both are nominal compounds, headed by a construct-state noun. However, there are important differences, listed below:

- The complement of a construct head can be any noun phrase; compounds allow only single-worded, unmodified nouns as their complement.
- None of the elements of a compound can be replaced by a pronoun.
- The meaning of constructs is compositional (Levi 1976); compounds are semantically opaque.

- If the head of a compound is a derived noun, the complement is the understood object, whereas the complement of a construct might be the understood subject (see also Siloni (1994)).

A natural consequence of the above observations is that compounds are better viewed as *words*, while constructs are syntactically phrases. Borer (1988) uses this observation to derive a non-linear theory of word formation: as she views constructs as phonological words, she concludes that they must be formed in a level of representation different than where compounds are formed. We don't take a stand on this issue: we view compounds as words, hence account for them in the lexicon; and constructs as phrases, hence account for them in the grammar. The phonological properties of constructs can be easily obtained when one recalls that construct state nominals don't have an independent stress. For more data, refer to Siloni (1994, chapter 2).

Relevant to the present discussion, however, is the fact that N–N compounds are construed definite word-internally.[5] That is, the same process of definiteness is applied to both compounds and constructs:

(8) ro'$ &ir / ro'$ ha- &ir
head-*c* city / head-*c* the city
'a mayor / the mayor'
beit sepr / beit ha- sepr
house-*c* book / house-*c* the book
'a school / the school'

2.3. **Adjective–noun constructs.** Noun–noun constructs, discussed in the previous section, have received much consideration in the literature. However, a similar phenomenon, namely adjective-headed constructs, is much less known (but see a brief discussion in Hazout (1991, pp. 123-130)). In such phrases, the adjective must be in the construct form, and it must be immediately complemented by a noun. The resulting phrase is an adjectival phrase (ADJP). Consider the data in (9).

(9) yalda gdolat &einaym
girl-f-sg big-f-sg-*c* eyes-pl
'a big-eyed girl'

[5]In colloquial Hebrew a tendency towards word-initial definiteness in idiomatic compounds is sometimes present.

yladot gdolot/∗gdolat/∗gdolei &einaym
girls-f-pl big-f-pl-*c*/big-f-sg-*c*/big-m-pl-*c* eyes-pl
'big-eyed girls'

ha- yalda gdolat ha- &einaym
the girl big-f-sg-*c* the eyes-pl
'the big-eyed girl'

∗ha- yalda gdolat &einaym
the girl big-f-sg-*c* eyes-pl

∗yalda gdolat ha- &einaym
girl big-f-sg-*c* the eyes-pl

These data suggest an analysis that is very much similar to the one accounting for noun–noun constructs. In particular, they show that the head features of the phrase are inherited from the first (leftmost) element: first and foremost, the category is that of the first element, i.e., an ADJP. The agreement features (gender and number) of the phrase are inherited from the head; however, the definiteness is inherited from the nominal complement.

In spite of the above, there still is one important, rather puzzling difference between nouns and adjectives in construct form. While the former can combine with *any* noun phrase, the latter require *words* as their complements. The data in (10) illustrate this point.

(10) *a:* yaldei ha- &olam
children-*c* the world
'the world's children'

b: gdolat ha- &einaym
big-f-*c* the eyes
'the big eyed'

a: yaldei ha- &olam ha- gadol
children-*c* the world the big
'[the big world]'s children'

b: ∗gdolat ha- &einaym ha- yruqqot
big-f-*c* the eyes the green-pl

a: yaldei koll ha- &olam
children-*c* all the world
'[all the world]'s children'

b: ∗gdolat koll ha- &einaym
big-f-*c* all the eyes

a: yaldei ha- &olam ha- lii
children-*c* the world the third
'[the third world]'s children'
b: *gdolat ha- &einaym ha- $niyot
big-f-*c* the eyes the second
a: yaldei ha- &olam ha- ze
children-*c* the world the this
'[this world]'s children'
b: *gdolat ha- &einaym ha- 'elle
big-f-*c* the eyes the these

The data given in (9), while typical of the phenomenon, are a little misleading. There exist two different classes of phrases headed by a construct state adjective. For the sake of completeness we describe the other class herein, although we will only be concerned with the former in this work. Consider the following example:

(11) wtiq saxqanei ha- te'atron ha- l'umi
old-*c* actors-*c* the theater the national
'the oldest of the national theater actors'

Several differences between example (11) and the previous examples must be observed: first and foremost, the phrase in (11) is a noun phrase, not an ADJP. The semantic relation between the head and the complement is different: yruqqat &einaym, literally "green-*c* eyes", means "green-eyed". In general, the semantic relation between the head H and the complement C is "the property of having an H kind of C". This is not the case in (11), where the resulting phrase is taken as denoting an entity, a member of the set denoted by the complement noun phrase: it is the particular member, having the superlative degree of the property denoted by the adjective. The following examples all fall into the same class:

(12) gdol ha- 'iyim ha- qanariyim
large-*c* the islands the Canary
'the largest of the Canary Islands'
zqan xabrei ha- knest
old-*c* members-*c* the parliament
'the oldest parliament member'
'axronat ha- maggi&ot l- qaw ha- gmar
last-f-*c* the arriving-f-pl to line-*c* the finish

'the last one to arrive to the finish line'

Notice that the complements of the (construct state adjective) heads in these examples are all definite; in fact, indefinite complements render the phrase ungrammatical. Furthermore, the complement must be in plural, and the head must agree with it on gender. This is reasonable, given that the complement must denote a set of entities, of which one is selected by the head.[6]

This phenomenon is less surprising when one recalls that *every* adjective in Hebrew can (elliptically) serve as a noun. Thus adjectives such as yruqqa (green) are perfectly grammatical noun phrases, as in (13):

(13) hayu harbe xulcot; qaniti yruqqa w- $tei kxullot
there-were many shirts I-bought green and two blue-pl
'there were many shirts; I bought a green one and two blue ones'

We do not cover such nominalizations in this work, and hence supress an analysis of the latter construct-state adjectives phenomena. In the sequel, only the ADJP phrases are dealt with.

2.4. **Possessives.** Possessives, or genitive constructions, are described in detail by, e.g., Borer (1984), Hazout (1991, chapter II) and others; we list some basic data below. There are two major ways to construct a possessive relation in Hebrew: either with or without the genitive preposition $ell (of):

(14) (ha-) sparim $ell dan
(the) books of Dan
'the/some books of Dan'
siprei dan
books-*c* Dan
'Dan's books'

In the former, known as *free genitives* (FGs), the head noun is said to be in the absolute state; in the latter, referred to as *constructs* (CSs), it is in the construct state. Furthermore, in FGs the definiteness of the

[6]While there are clearly two different classes of phrases headed by a construct state adjective, some phrases can fall into both categories. If the complement is definite and denotes a set of entities, but consists of one word only, and the head agrees with it in gender, the resulting phrase is ambiguous. For example, gdolat ha- &einaym (big-f-*c* the eyes-f-pl) can mean either 'the big-eyed' or 'the biggest of the eyes'.

possessor is independent of that of the head; in CSs, the definiteness of the head is inherited from the possessor. This indicates an important difference between the two constructions: while the FGs *four* different combinations of definiteness (both the head and the modifier can each be definite or indefinite), CSs allows only *two*: either both are definite, or both are not.

When the possessor is a pronoun, it attaches as a clitic – either to the preposition $ell, or to the head noun, which again must be in construct state:

(15) ha- sparim $ellahen
the books of+3rd-pl-f
'their (3rd person, plural, feminine) books'
sipreihen
books-*c*+3rd-pl-f
'their (3rd person, plural, feminine) books'

Notice that the latter form is inherently definite, whereas when the former is constructed without the definite article it is indefinite:

(16) qara'ti sparim $ellahen
I-read books of+3rd-pl-f
'I read books of/by them (3rd person, plural, feminine)'
qara'ti 'et sipreihen
I-read ACC books-*c*+3rd-pl-f
'I read their (3rd person, plural, feminine) books'

Finally, Hebrew exhibits cases of clitic doubling: the possessor is realized both as a clitic on the head noun and as an argument of the prepositions $ell, either full-fledged or as an affix:

(17) sipreihen $ell ha- mxabrot
books-*c*+3rd-pl-f of the authors-f
'the (feminine) authors' books'
sipreihen $ellahen
books-*c*+3rd-pl-f of+3rd-pl-f
'their (3rd person, plural, feminine) books'

In both cases, the clitic must agree with the possessor on gender, number and person.

2.5. **Cardinals.** Cardinal numbers, just like nouns and adjectives, have absolute and construct forms in Hebrew. However, their use is peculiar: the absolute form is used to quantify an indefinite noun, the construct form – for definite ones:

(18) qaniti loa sparim
I-bought three books
'I bought three books'
qaniti 'et lot ha- sparim
I-bought ACC three-*c* the books
'I bought the three books'

The other two possibilities (i.e., construct cardinal with an indefinite noun phrase or absolute cardinal with a definite noun phrase) are ungrammatical.

As is the case with the construct state nouns and adjectives, extraction of the noun phrase that the construct state cardinal quantify is impossible:

(19) hayu harbe xulcot; qaniti alo
there-were many shirts I-bought three
'there were many shirts; I bought three of them'
*hayu harbe xulcot; qaniti 'et lot
there-were three shirts I-bought ACC three-*c*
(putatively) 'there were three shirts; I bought the three of them'

Notice that such a construction *is* possible, when a (cliticized) pronoun replaces the 'missing' noun:

(20) hayu alo xulcot; qaniti 'et lotan
there-were three shirts I-bought ACC three-*c*+3rd-f-pl
'there were three shirts; I bought the three of them'

2.6. **Some problematic data.** We listed in the above discussion several examples, emphasizing the fact that in Hebrew, the definite article attaches to *words*, rather than to *phrases*. However, there are some deviations from this general pattern, and we list representative examples[7] in this section.

[7] I am grateful to Edit Doron for pointing out most of those data to me.

Nouns can be modified by adjectival phrases (ADJPs) that are realized post-nominally in Hebrew. An ADJP is a phrase, headed by an adjective (ADJ), possibly modified by pre- or post-head degree modifiers such as yoter (more), paxot (less), dei (rather), l-maday (rather) etc. While some of these modifiers can occur both before and after the head, others are stricter, as the following data show.

(21)

&einaym	yruqqot	yoter	/	&einaym	yoter	yruqqot
eyes	green	more	/	eyes	more	green

'greener eyes'

&einaym	yruqqot	l-maday	/	*&einaym	l-maday	yruqqot
eyes	green	rather	/	eyes	rather	green

'rather green eyes'

*&einaym	yruqqot	dei	/	&einaym	dei	yruqqot
eyes	green	rather	/	eyes	rather	green

'rather green eyes'

As noted above, Hebrew requires strict agreement of definiteness between the head noun and its modifying adjective. While the definite article is usually attached to words, in ADJPs with pre-head modifiers it can sometimes attach to the modifier, and hence, seemingly, to the entire (adjectival) phrase:

(22)

ha-	simfonia	ha-	bilti	gmura
the	symphony	the	un-	finished

'the unfinished symphony'

(23)

ha-	harr	ha-	yoter	gaboh
the	mountain	the	more	high

'the higher mountain'

While bilti gmura (un-finished) can be viewed as one word, this is certainly not the case in (23). However, it must be noted that constructions such as (23) are sub-standard. The standard way to construe them would be:

(24)

ha-	harr	ha-	gaboh	yoter
the	mountain	the	high	more

'the higher mountain'

This is true even for degree modifiers that are pre-head only: the preference, at least in the written language, would be to use an equivalent post-head modifier when the adjective is definite.

It is interesting to note that phenomena of attaching the definite article to the (leftmost) edge of a phrase, rather than to the head, become more common in colloquial, sub-standard Hebrew. Thus, one can hear:

(25) taxzir li 'et ha- loa $qalim $e- nattati lka
return to-me ACC the three shekels that I-gave to-you
'give me back the three shekels I gave you'

instead of lot ha-$qalim; or even:

(26) ha- sapeq &itona'y ha- ze
the doubt reporter the this
'this pseudo-reporter'

We do not account for these examples here, but suggest an explanation in section 5.7.

3. What's in a word?

While an agreed upon definition for the terms *affix*, *clitic* or *word* is still unavailable, the following quotations from Spencer (1991) seem to be uncontroversial:

> [p. 21] "Inflectional operations leave untouched the syntactic category of the base, but they add... meaning... and also grammatical function... The two most widespread and important types of grammatical function served by inflection are agreement and government."

> [p. 350] "Clitics are elements which share certain properties of fully fledged words, but which lack the independence usually associated with words. In particular, they can't stand alone, but have to be attached phonologically to a *host*... Typically, clitics are function words... They are generally assumed to be incapable of bearing stress or accent."

The main claim of this section is that the Hebrew definite article should be viewed as an affix. We start with a set of criteria that are accepted tests for distinguishing words from bound morphemes. Once the dependent status of the definite article in Hebrew is established, we discuss its affixal properties in section 3.5.

In a very influential paper, Zwicky (1977) lists six criteria for distinguishing between affixes and words:

Accent: Morphemes that do not bear an independent accent are affixes.
Binding: Bound morphemes are affixes.
Sandhi: Internal phonological rules apply only within words, never across word boundaries.
Rule immunity: Proper parts of words do not undergo rules of deletion under identity.
Construction with affixes: A morpheme in construction with an affix is either a base or an affix.
Ordering: Alternative orders of morphemes within a word are associated with differences in meaning.

These criteria, which are pre-theoretical in nature, are elaborated upon in Zwicky (1985a), where several tests for distinguishing clitics from independent words are listed. The tests are suggested to be taken as "symptoms" of a linguistic state of affairs, rather than as necessary and sufficient conditions for it. Still, when a certain element complies with many of the tests, it is most likely to be in this particular state of affairs. As we show below, ha- passes most of the tests for clitic-hood, and – just as importantly – fails hardly any of them (some are inapplicable to the case in study). We list the criteria below, applying each of them to the Hebrew definite article.

3.1. **Phonological tests.**

Sandhi: Internal sandhi rules apply only within words, external sandhi rules apply only between phonological words and not within them.

The three letters 'b', 'k', 'p' are pronounced either as [b,k,p] or as [v,x,f], respectively, depending on the context. It is useful to assume, following Ornan (1972), that these are only three phonemes, /b/, /k/, /p/, that have two allophones each (though this view is still controversial; see, e.g., Rosén (1977, sec. 3.5), as well as citations in Ornan (1972)). Indeed, the pronunciation rules, detailed by Ornan (1972), are simple. In particular, the hard (stop) allophone is used at the beginning of a word; and the soft (fricative) one – following a vowel (as long as there is no gemination). Thus: plaga (division) is pronounced [plaga], but haplaga (sailing) is pronounced [haflaga]. However, the definite article does not correspond well to this rule: /ha- plaga/ (the division) is pronounced [haplaga].

While this might constitute a counter argument, it is not necessarily so: apparently, the pronunciation rules are different in the context of affixes (Ornan 1972).

The definite article itself, which is pronounced [ha], changes to [he] when combined with certain nominals (roughly, those whose first syllable is 'ha' or '&a'). Thus, /ha- harrim/ (the mountains) is pronounced [heharim]. This is a word-internal rule: in general, guttural sounds fail to geminate in Hebrew; as a compensation, in contexts that require gemination of a guttural sound, the preceding vowel is changed. If one assumes that attaching ha- to a word in Hebrew requires gemination of the initial sound of this word, the two phenomena described above are immediately obtained. Of course, such an assumption can only be made if ha- is taken to be an affix.

A puzzling phenomenon has to do with prepositions, which precede their objects in Hebrew. When a prepositional object starts with a definite nominal, and the preposition is 'b-' (in), 'k-' (as) or 'l-' (to), the [h] of the definite article drops:

(27) ba- sepr / la- sepr / ka- sepr
in-the book / to-the book / as-the book

The same happens – in the spoken language only – with the accusative marker 'et: 'et ha- sepr, "the book (ACC)", becomes [tasefer]. This phenomenon is not present when the preposition combines with a noun phrase that happens to start with [ha]. These facts are hard to explain: it seems as if the article combines with the preposition, and only then with the nominal. A possible explanation would be to assume that these prepositions are also bound morphemes in Hebrew, either clitics or affixes. While we believe that such an explanation is plausible, we haven't investigated its consequences yet.

Finally, there is at least one case in which the attachment of the definite article affects the phonology of the word it attaches to: the noun 'erc (country), pronounced ['erets], becomes [ha'arets] in the context of ha-.

To summarize, while in general it seems that the combination of the definite article does not affect the phonology of the hosts, certain word-internal processes can be observed. This criterion, therefore, does not supply a clear argument neither for nor against the clitic status.

Prosodic phonology: If an element counts as belonging to a phonological word for the purpose of accent, tone or length assignment, then it should be a clitic.

Tone and length are not phonemic in Hebrew. As for accent, the attachment of ha- to a nominal has no affect on it. Since Hebrew words are accented on either the final or the penultimate syllable, this criterion seems not to be applicable.

Accent: Clitics are accentually dependent, that is, an element which does not bear an accent of its own is probably a clitic.

Phonologically, ha- does not bear an independent stress. It can, however, be stressed in one particular context: to denote some superlative degree, as in:

(28)	qaniti	'et	HA-	sepr	l-	diqduq	&ibri
	I-bought	ACC	THE	book	for	grammar	Hebrew

'I bought the best Hebrew grammar book'

Examples of stress on usually un-accented elements can be found, in contrastive contexts, in other bound morphemes in Hebrew, such as prepositions and conjunctions.

3.2. **Tests using similarities between clitics and affixes.**

Binding: Bound elements are clitics; if an element is bound, and especially if it cannot occur in complete isolation, it should be a clitic.

This is indeed the case with ha-. Never, under no circumstances, can it stand in isolation.

Construction: If the distribution of an element is correctly stated in terms of its ability to combine with single words, it will be a clitic. Certainly, if an item combined syntactically only with single words, we should hesitate to classify it as a word.

Note that the construction criterion is 'one-way': it can only support a clitic analysis. As is clear from the examples in (2), the definite article usually combines with single words. The examples in section 2.6 might suggest that this is not always so, and hence the support of this criterion is limited.

Ordering: An element that is strictly ordered with respect to adjacent morphemes is almost surely a clitic.

No other morphemes are attached to nominals as *prefixes* (unless one considers prepositions to be bound morphemes). Thus this test (and similarly, the *closure* test) is inapplicable.

Distribution: Clear cases of clitics typically have distributions describable by single principles.

As we show below, it is easy to stipulate a single principle for the distribution of ha-: it combines with nominals that are inherently indefinite. The only exception is that the rules governing its combination with proper names are complex.

Complexity: Words are frequently morphologically complex; clitics are usually not.

Clearly, ha- behaves like a clitic in this respect.

3.3. **Syntactic tests.**

Deletion: Proper parts of words are not subject to deletion under identity; whole words may undergo such deletions.

The natural environment to apply this test is that of conjunction. When two definite nominals are conjoined, the definite article can not be deleted; such a deletion will result in a different reading:

(29) ha- sepr w- ha- maxbert
the book and the notebook
'the book and the notebook'
ha- sepr w- maxbert
the book and notebook
'the book and a notebook'

Similarly, when a definite nominal is conjoined with (the same) indefinite nominal, no occurrences of the nominal can be deleted.

Replacement: Proper parts of words are not subject to replacement by a pro-form under identity.

In colloquial Hebrew, the nominal part of a definite noun phrase can be replaced by a (third person) pronoun:

(30) ra'iti 'et ha- hu'/ze
I-saw ACC the he/this
'I saw that one'

Such constructions, however, are ruled out in standard Hebrew.

Movement: Proper parts of words are not subject to movement rules: they cannot serve as gaps in gap-filler relations.

This complies well with the case of definite nominals: whenever the nominal moves, it moves with the attached article.

To these tests we add the peculiarity of the adjunct–noun construct phenomena, listed in (9) (section 2.3). What these data demonstrate is that the complement of a construct state adjective can be a noun, but not a noun phrase: this noun cannot be modified by adjectives, quantifiers, ordinals or demonstratives. It is interesting to note that regardless of whether 'exxad is considered to be an indefinite article or just a cardinal number, it cannot modify the complement of a construct-state adjective:

(31) ra'iti xatul yroqq &einaym
I-saw cat green-*c* eyes
'I saw a green-eyed cat'
*ra'iti xatul yroqq &ayn 'axxat
I-saw cat green-*c* eye one/a
(putatively) 'I saw a cat with one green eye'

However, the modifier noun *can* be preceded by the definite article, as can be seen from the examples in (9). This observation supports our claim that definite nouns are not phrases in Hebrew.

3.4. **The semantics of ha-.** The usual semantic contribution of definiteness is determination: a definite noun phrase denotes a unique entity. *Compositional* approaches to semantics combine the meaning of the definite article with that of the noun phrase to yield a unique reading of the definite noun phrase. If ha- were a word, this should have been the case for Hebrew, too. However, in Modern Hebrew *definiteness* and *determination* are not parallel: there are many contexts in which definite and indefinite noun phrases have identical meanings; there are also cases of determination that are not carried out through the use of the definite article. Any attempt to combine, compositionally, the semantic effect of ha- with the meaning of an indefinite nominal would lead to severe difficulties.

To demonstrate the differences between definiteness and determination, consider the following examples:

Demonstratives: Hebrew nouns can be modified by demonstratives such as ze (this-m), zo (this-f), 'elle (these) or 'ellu (those). Semantically, such a modification results in a determination of the entity denoted by the noun. Syntactically, ha- *can* be added to the noun, in which case it must modify the demonstrative as well. However, it is not obligatory for this process to be encoded by the incorporation of the definite article.[8] In other words, ha- is used in this context

[8]This is reminiscent of Rumanian, where demonstratives can be marked for definiteness if they succeed the noun, which must be definite; or can occur pre-nominally with

solely as an agreement marker, with no semantic contribution of its own:

(32) sepr ze nimkar hei@eb
book this is-sold well
'this book sells well'
ha- sepr ha- ze nimkar hei@eb
the book the this is-sold well
'this book sells well'

Generic nouns: In many contexts, when denoting abstract entities, Hebrew nouns can be both definite and indefinite, with no change of meaning:

(33) (ha-) &i$$un mazziq la-bri'ut
(the) smoking harms to-the-health
'smoking is hazardous for the health'
(ha-) $oxd y&awwer &einei xkamim
(the) bribe will-blind eyes-*c* wise
'a bribe blinds the eyes of the wise'
(ha-) pety ya'min l-koll dabar
(the) fool will-believe to-every thing
'a simple man believes anything'

Ordinals: When ordinals are used to modify nouns that are already independently determined, they may or may not be preceded by the definite article:

(34) ra'iti $nei xtulim, (ha-) 'exxad $axor, (ha-) $eni
I-saw two cats (the) one black (the) second
laban
white
'I saw two cats, one black, the other white'

These examples indicate that the definite article in Hebrew does not always have a determining function; rather, it serves in several contexts simply as an agreement marker. Determination can be achieved by alternative mechanisms, not necessarily related to definiteness. Any compositional semantics approach to definite noun phrases in Hebrew would have to associate some semantic function with the definite article, if it is to be taken as a word, and would thus face severe difficulties in explaining

no definiteness marker, in which case the head noun is indefinite, too (Mallinson 1986, p. 248). A more complex situation of double determination is present in many of the Scandinavian languages (Börjars 1994). See a more detailed discussion in section 3.5.

the above data. It seems that a better approach would be to consider the definite article as marking the nominals it attaches to simply as 'definite'. Definiteness would then be an agreement feature, such as 'number', carrying no specific meaning.

It is beyond the scope of this paper to suggest a complete semantic analysis for definiteness in Hebrew. We simply indicate that since there is no simple one-to-one relation between determination and definiteness, and since clearly definite noun phrases can in some contexts denote exactly what their indefinite counterparts do, the definite article does not necessarily carry a semantic contribution of its own. Therefore, regarding a definite noun as a phrase would be problematic for any attempt to provide compositional meaning to phrases. Incidentally, the same claim is made with respect to *Biblical* Hebrew by Barr (1989), albeit with arguments that no longer hold for Modern Hebrew.

3.5. **Clitics vs. affixes.** Once the non-word status of the Hebrew definite article is established, we show that it is actually an affix, rather than a clitic. We start by applying to it the criteria listed in Zwicky and Pullum (1983), distinguishing clitics from inflectional affixes. Again, the criteria are not quantitative; they are stated in terms of "tendencies":

- Clitics exhibit low selectivity – affixes are more selective.
  As shown above, ha- can combine with all kinds of nominals, including nouns, adjectives, numerals and demonstratives. While this might seem a rather low degree of selectivity, note that these elements all form a natural class. For example, all of them can be used (elliptically) to denote an entity. Furthermore, note that ha- *never* attaches to, say, prepositions or adverbs.[9] It also does not combine with quantifiers, which occur pre-nominally in Hebrew. Thus, we might say that the article is quite selective in the hosts it attaches to.
- Arbitrary gaps in the set of combinations are more characteristic of affixed words than of clitic groups.
  As far as we can see, there are no such gaps in the case of ha-: it combines with *all*[10] nouns and adjectives, for example.

[9]The definite article might attach to verbs, though. This is possible only when the verb is in present tense, in which case it serves as a noun in Hebrew.

[10]The definite article does not combine with construct state nominals, but this is not an *arbitrary* gap, as we show in section 5.6.

- Morpho-phonological idiosyncrasies are more characteristic of affixed words than of clitic groups.

  As shown above, such cases are present in the combination of ha- with nominals; they usually affect the article, but rarely also the nominal.
- Semantic idiosyncrasies are more characteristic of affixed words than of clitic groups.

  As section 3.4 reveals, such cases occur with definite nominals.

As can be seen, these criteria do not unanimously suggest either view. However, this is often the case; in particular, as Miller (1992) notes, due to the possibility of regular inflectional systems, the phonologically and morphologically oriented criteria can only provide arguments in favor of a lexically attached affixal status, not against it. That is, the fact that there are no arbitrary gaps, or no morpho-phonological idiosyncrasies, does not imply anything. To allow a more direct argumentation in favor of a clitic status, Miller (1992) suggests the following criterion: if an item must be repeated on each conjunct in a coordinate structure, then it must be an affix and cannot be a clitic; if it must fail to be repeated, it must be a clitic and cannot be an affix. If repetition is optional, no evidence can be drawn.

This test is easy to apply to the case of ha-. First, note that coordination of elements to which ha- attaches is possible in Hebrew:

(35)

qaniti	sepr	w-	maxbert
I-bought	book	and	notebook

'I bought a book and a notebook'

&einaym	gdolot	w-	yruqqot
eyes	big	and	green

'big green eyes'

When the elements are definite, ha- cannot have wide scope over the coordination, but rather must be repeated for each of the conjuncts:

(36)

qaniti	'et	ha-	sepr	w-	ha-	maxbert
I-bought	ACC	the	book	and	the	notebook

'I bought the book and the notebook'

ha-	&einaym	ha-	gdolot	w-	ha-	yruqqot
the	eyes	the	big	and	the	green

'the big green eyes'

An omission of one of the occurrences of ha- results either in ungrammaticality or in a different reading, in which the article has a narrower scope:

(37) qaniti 'et ha- sepr w- maxbert
I-bought ACC the book and notebook
'I bought the book and a notebook'
*ha- &einaym ha- gdolot w- yruqqot
the eyes the big and green

Miller (1993) suggests three more criteria. Assuming the lexicalist hypothesis, namely that affixes are lexically attached to their stems, it immediately follows that if lexical phonological rules can apply to the unit formed by the element in question and the host it attaches to, then the element is an affix. In other words, if the realization of the element depends on the morphological structure of the host, it must be an affix. We have shown such dependencies in section 3.1. The second criterion has to do with processual realization of the morphological element and hence is inapplicable to the case of ha-. The third criterion deals with haplology: if only one occurrence of the element is present where one would expect two (because of syntactic structure), then the element is an affix. We could not find any such evidence in the case of definite nominals in Hebrew, so that this criterion does not contribute to either view.

The coordination criterion is one among many applied by Börjars (1992) to determine the status of morphological definiteness markings (DEFs) in Scandinavian and Balkan languages. Some of the criteria draw a clear line between these two groups of languages: DEF is an affix in the Scandinavian languages (Swedish, Norwegian, Danish, Faroese and Icelandic), a clitic in the languages of the Balkan (Albanian, Rumanian, Macedonian and Bulgarian). However, as Börjars (1992) notes, the coordination criterion seems to have different predictions: DEF is not duplicated on conjuncts in any of the languages investigated. While this might have reduced the relevance of the coordination test, it might also serve as an indication that DEF in the Balkan languages is actually an affix. Indeed, this claim exactly is made by Halpern (1992): comparing the definite article of the Balkan languages with other second-position clitics, it is shown that an affix view of DEF in these languages is favorable. Thus, the relevance of the coordination criterion is retained.

In the light of the problems involved in classifying bound morphemes into two distinct classes, namely clitics and affixes, Börjars and Vincent (1993) propose assigning priorities to the criteria discussed above. They show that the results of applying many of the criteria discussed in the literature can be captured in terms of only two parameters, to which they refer as *HOST* and *host*. Both parameters are used to define the position of bound morphemes. *HOST* refers to the unit in terms of which the element is defined; the definitional criterion for having a *HOST* is that the position of the element can be defined in terms of some category larger than the element to which it is phonologically attached. Then, *host* is used for the unit with which the element phonologically combines.

Not all bound morphemes are specified for both parameters. Elements that are traditionally considered clitics will have values for both *HOST* and *host*; the value for the latter can be very general. For example, the possessive *'s* in English is positioned with respect to a phrasal unit, a noun phrase, and hence will have *NP* as the value of its *host*. Since it can attach to any words within the noun phrase, it will have the general value '*X*' for *host*. The plural suffix *-s* in English, on the other hand, is undefined for *HOST*; it has *N* as the value for *host*, since its position is determined by the words to which it attaches, and these words are always nouns. Finally, if a certain element is undefined for both parameters, it is a non-bound word.

The parameters defined by Börjars and Vincent (1993) are applied by Börjars (1994) to the case of definiteness markers and determiners in Swedish, a case that is generalized to a comparative study of definiteness morphemes in Scandinavian and Balkan languages. The conclusions of this study show a clear distinction between these two groups of languages. While both of them can express definiteness by means of bound morphemes, Börjars (1994) shows that in the Scandinavian languages the definiteness marker is unspecified for *HOST*, while its value for *host* is *N*; whereas in the Balkan languages, the definiteness marker has *NP* as the value of *HOST*, while the *host* can be anything. In other words, the definite marker is an affix in Scandinavian languages, a clitic in the languages of the Balkan.

Application of the same criteria to the case of Hebrew ha- is simple: as the data discussed above show, there is no way to determine the position of the definite article in terms of a unit larger than a word. Thus, ha- is undefined for *HOST*. On the other hand, the article combines (phonologically) only with nominals (though not will all nominals); thus, its value for *host* is *nominal*. Indeed, the exact value for this parameter must be refined (as will be done in section 5.3); but the fact that ha- is undefined for *HOST* is consistent with an affixal view of the article.

To summarize, clitics are entities that show some of the characteristics of words, and some of affixes. Therefore there are different kinds of clitics, covering the spectrum between words and affixes. It should be clear from the tests applied in this section that the definite article in Hebrew is much closer to an inflectional affix than to a stand-alone word. In any case, it combines with its hosts as a result of a lexical, not a syntactic, process.

4. What is the head of the Hebrew noun phrase?

This section discusses arguments for determining whether the head of the noun phrase is the noun or a (possibly empty) determiner. We present existing approaches to Hebrew noun phrases in 4.1, discuss criteria suggested for determining headedness in 4.2 and sketch some approaches taken within the HPSG paradigm to the same problem in a variety of languages (4.3).

4.1. **Existing approaches to definiteness in Hebrew.** One of the first formal descriptions of Modern Hebrew noun phrases is Ornan (1964), relevant parts of which are reproduced as Ornan (1965). This is the first proposal of a transformational grammar for the language, and the rules describing the structure of noun phrases explicitly treat the definite article (as well as the indefinite articles) as units that combine with nouns by syntactic processes. The ontological status of the articles is not addressed explicitly, but it is clear that they are taken to be independent syntactic elements. In a detailed account of noun phrases, Borer (1984) is the first to apply the "Extended Standard Theory" to Hebrew. Again, the status of the definite article (which is referred to as a *determiner*) is not directly addressed, but it is treated as an independent unit, and in any case, it is involved in syntactic structures as a member of a larger class of determiners.

Following Abney (1987), several authors propose a determiner phrase (DP) view of noun phrases in Hebrew. The DP hypothesis is first applied to Hebrew by Ritter (1988). The definite article is viewed as a clitic, attached prenominally to the head in non-CS phrases, and postnominally to the genitive phrase in CSs. The assumption the ha- is a clitic is not firmly supported. As noted by Siloni (1991), this analysis predicts the possibility of two definite articles to occur with the genitive noun phrase, one its own and the other – the head's; it also predicts that the head's article will attach to the immediate genitive noun phrase, whereas in fact in series two or more nested CSs, it is the last one that is marked for definiteness. Finally, it does not explain why the definite article has to cliticize onto the genitive. Siloni (1991) concludes that the impossibility of attaching the definite article to the head of CSs cannot simply be reduced to an obligatory cliticization.

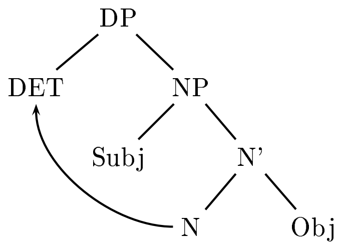
Some of these problems are addressed by Ritter (1991), where a new analysis is suggested, with a different account for definiteness in CSs. In particular, the article is no longer viewed as a clitic. Ritter (1991) uses construct state noun phrases, headed by derived (deverbal) nouns, as an evidence for DPs. She indicates that in such constructions, only one order of the arguments, namely noun–subject–object, is possible:

(38) *a:* 'ahbat dan 'et 'i$to
love-*c* Dan ACC his-wife
'Dan's love of his wife'
b: 'kilat dan 'et ha- tappux
eating-*c* Dan ACC the apple
'Dan's eating of the apple'

She then observes that in such constructions, the subject can bind an anaphoric object, but the object cannot bind an anaphoric subject:

(39) *a:* 'ahbat dan 'et &acmo
love-*c* Dan ACC himself
'Dan's love of himself'
b: $*$'ahbat &acmo 'et dan
love-*c* himself ACC Dan

On the basis of the standard binding theory, Ritter (1991) concludes that the subject c-commands the object, but not vice versa. To arrive at such a derivation, the lexical head – the noun – must move. According to the *head-movement constraint*, heads can only move to the positions of heads that govern them, and hence the landing site for the raised noun would be the head of the entire construction; the obtained structure is the following:



Ritter (1991) further claims that construct-state noun phrases are DPs, headed by a phonologically null determiner she calls D_{gen}. As both D_{gen} and ha- are DETs, they appear in complementary distribution. This is an explanation for the fact that ha- never attaches to construct-state heads. The definiteness feature of CS DPs is inherited from the head D_{gen}, after the head of the construction has moved to its position and undergone a SPEC-head agreement with the genitive. In free genitives, DET is realized as ha-; the analysis is slightly more complicated, as compatibility with the binding theory necessitates yet another functional category, NUM.

Several arguments against this analysis have to be made. First and foremost, it is based on partial data. Relying on word order as an explanatory mechanism is difficult in a language with relatively free constituent order such as Hebrew; the claim that "In a CS containing a derived nominal that takes two arguments, the word order is noun-subject-object" (Ritter 1991, page 38), repeated later (*op. cit.*, page 43) for free genitives, is embarrassingly wrong. Indeed, (39.b) is ungrammatical; but the *reason* it is ungrammatical has nothing to do with the order. It is because &acmo (himself) is the understood object of 'ahbat (love), which leaves dan (Dan) the role of the subject. Of course, the subject cannot be introduced by the accusative marker; but it can be construed as a genitive:

(40) 'ahbat &acmo $ell dan
love-*c* himself of Dan
'Dan's self-love'

'kilat ha- tappux $ell dan
eating-*c* the apple of Dan
'Dan's eating of the apple'

A few examples of obvious N-O-S noun phrases are listed in (41). In all these examples, the subject is construed as genitive and the object immediately follows the noun. Notice that in none of them can the preposition

$ell (of) be substituted by &al-ydei (by), so these are clearly not cases of nominalized passives. In cases where the object is not accusative and a preposition is needed, the head noun cannot be construed as a construct state, but the order is retained.

(41)

'ahbat	ha-	'adam	$ell	dan		
love-*c*	the	man	of	Dan		

'Dan's love of mankind'

nibbuy	toc'ot	ha-	bxirot	$ell	ha-	&itona'y
prediction-*c*	results-*c*	the	elections	of	the	journalist

'The journalist's prediction of the elections results'

ha-	hitmakkrut	l-	sammim	$ell	dan
the	addiction-*c*	to	drugs	of	Dan

'Dan's drug addiction'

Furthermore, the conclusion that the subject must asymmetrically c-command the object is a direct implication of the GB binding theory. The head movement constraint is not only theory internal; it cannot even be formulated in a theory such as HPSG in which the concept of movement does not exist.

There are a few more problems with this analysis. First, it is unclear where determiners other than ha- and D_{gen} fit into this framework, as their natural position would have been heads of DPs, but this position is already occupied by the functional DET. Second, it says nothing about the combination of ha- with nominals other than nouns; if definite nouns are DPs, headed by the article, what are definite adjectives? How can definiteness agreement in the noun phrase be accounted for? Finally, this analysis completely ignores the similar phenomenon of adjectival constructs, and a unified account seems to be difficult to obtain.

The same arguments, by and large, are used by Siloni (1991) to reach a similar conclusion: regarding ha-, she suggests that "either the article cliticizes onto the noun, or the noun undergoes head-to-head movement and incorporates with the article." She concludes the latter possibility, which results in a very similar analysis for construct-state noun phrases. Again, the data presented leave much to be desired. In particular, Siloni (1991) points to the similarities between noun phrases – with derived nouns as heads – and sentences, with respect to word order. She claims that in clauses with a post-verbal subject, the subject must immediately follow the verb, and the object cannot precede it:

(42) *a:* 'etmol haras ha- caba' 'et ha- &ir
yesterday destroyed the army ACC the city
'yesterday the army destroyed the city'
b: ∗'etmol haras 'et ha- &ir ha- caba'
yesterday destroyed ACC the city the army

This is clearly wrong; (42.b) is grammatical. In fact, in many cases, especially when the object is a pronoun, a verb-object-subject order is even preferred:

(43) 'etmol haras 'otah ha- caba'
yesterday destroyed it-ACC the army
'yesterday the army destroyed it'
?'etmol haras ha- caba' 'otah
yesterday destroyed the army it-ACC
'yesterday the army destroyed it'

To explain the fact that heads in construct state cannot be rendered definite explicitly, Siloni (1991) suggests an instance of a more general constraint, namely that a lexical article cannot co-occur with Agr in D (Abney 1987); since the head of a construct state is in a D position, the definite article can not be realized. This explanation is insufficient for several reasons. First, it does not explain why the definite article cannot occur with other nominals in construct state, such as adjectives or cardinals – certainly, these are not moved to a D position. A generalization of these similar phenomena is missing. Furthermore, if one believes that *in*definite articles exist in Hebrew, such an analysis would predict the ungrammaticality of a construct state noun phrase with an indefinite article; but the following is certainly grammatical:

(44) kalbei rxob 'xadim
dogs-*c* street ones
'some street dogs'

In a recent work, Borer (1994) criticizes the analyses described above, and suggests that definiteness is indeed a feature of nouns, which is said to be base generated on the head nouns. This analysis is similar to the one suggested herein. However, the view of noun phrases as DPs is maintained; and the analysis still requires phonologically null (empty) categories and obligatory movements. While the major observation is similar, the arguments used to justify it and the consequences of adopting it are much different here.

To summarize, existing analyses of the definite article in Hebrew tend to view it as a head, and its combination with nominals as a syntactic process. Existing DP analyses are based on partial (and sometimes wrong) data and on theory internal arguments. As shown above, such a view is problematic and results in wrong predictions and missing generalizations. The fuller data presented in this paper, combined with the different theoretical framework, yield a much simpler analysis.

4.2. **Criteria for headedness.** The notion of 'head' appears to be one of the most controversial in the linguistic literature (Fraser, Corbett, and McGlashan 1993). There does not seem to be an agreed-upon definition, but there exist sets of criteria for determining the head in particular constructions. Zwicky (1985b) lists seven criteria, and Hudson (1987), in a follow-up, downplays the importance of one of them and adds two more. The debate seems to be most problematic when the issue of determiner-noun combinations is considered, and different views as to what constituent heads such constructions are still maintained. Applying some of these criteria below, we show that when Hebrew noun phrases are concerned, the definite article cannot be viewed as their head.

Zwicky (1985b) lists the following criteria for headedness:

The semantic argument: In a combination $X + Y$, X is the semantic head if $X + Y$ describes a kind of the thing described by X. A long discussion of this informal notion is given in (Hudson 1987), arriving at contradicting results. Hudson (1987) decides to avoid using this criterion; given that semantic theories vary at least as much as syntactic ones do, and the notions of functor and argument are far from being universally accepted, this seems not to be a very reliable criterion. Accepting the straightforward interpretation of this informal test, however, would certainly imply that the noun heads noun phrases (in any language).

The subcategorisand: The constituent which is subcategorized with respect to its ability to occur with a particular set of sister constituents. Hebrew nouns do not subcategorize for determiners, and it might be said that determiners subcategorize for nouns. But the definite article is certainly not an ordinary determiner in this respect, as it subcategorizes for completely different categories than the others.

The morphosyntactic locus: The constituent on which inflectional features will be marked if the language has the appropriate morphology. Obviously, the morphosyntactic locus of Hebrew noun phrases is the noun, on which information such as number and gender is located. No determiner shows such information explicitly (although it might be said that some of them have inherent number features, see below).

The governor: The constituent that determines the morphosyntactic form of some sister. Many determiners govern their sisters: 'koll' (every) selects singular, indefinite count nouns; 'koll' (all) and 'robb' (most) select definite, plural count or mass nouns; 'harbe' (many/-much) and 'm&a@' (few/little) select indefinite, plural count or mass nouns; absolute state cardinals such as 'loa' (three) select plural indefinite nouns; and construct-state cardinals such as 'lot' (three) select plural definite forms. On the other hand, ha- does not fall into this category as it does not impose any restriction on the form of the nominal it attaches to (except for it being indefinite, of course).

The determinant of concord: The constituent that determines concord features, realized inflectionally, on the sister. As Hebrew determiners do not inflect, this criterion is inapplicable to the case in hand.

The distributional equivalent: The constituent that belongs to a category with roughly the same distribution as the construct as a whole. This is clearly the noun in Hebrew noun phrases, as bare nouns have almost identical distribution to that of noun phrases.

The obligatory constituent: The one that has to be present in non-elliptic constructions, ones that can be interpreted out of context. While the noun can be omitted in some contexts where a determiner (such as 'harbe' (many/much), 'm&a@' (few/little), an absolute state cardinal etc.) is present, these are all instances of ellipsis. The noun cannot be omitted when the only determiner present is the definite article. We conclude that the noun is obligatory in Hebrew noun phrases.

If the definite article were to head Hebrew noun phrases, then we would have expected it to have the following features: to subcategorize for nouns; to be the morphosyntactic locus of the construction, to govern the form of the noun, to determine its concord features, to be distributionally equivalent to the noun phrase and to be the obligatory part of it. As things stand, ha- has *none* of these properties. On the other hand, the nouns in such constructions have many of them. We therefore conclude that by

Zwicky's criteria ha- cannot head the Hebrew noun phrase. As for the other determiners, we leave the question open for further research.

4.3. **Noun phrases in HPSG.** HPSG's standard analysis for English, presented in Pollard and Sag (1994, section 9.4), views articles as subcategorized complements of nouns. The article combines with the noun through the *specifier-head* schema: the noun is the head of the construction, and since HPSG requires that phrases be saturated, that is, have empty subject, specifier and complement slots, a bare noun (with no article) is rendered ungrammatical. While this might be appropriate for English, it certainly isn't for Hebrew – as the data in (2) above show, bare nouns function perfectly fine as complete noun phrases.

The question whether the noun or the article heads the German noun phrase is discussed by Netter (1994), who prefers to apply the DP hypothesis to German. Netter (1994) lists several considerations in favor of each of the alternatives. In German, all the morphosyntactic features that must be transferred to the maximal projection of a nominal phrase (for agreement or government purposes) are manifested equally well both on the article and on the noun. In Hebrew, on the other hand, such information as number and gender is expressed on the noun only.[11] Determinerless noun phrases require, in German, disjunctive subcategorization frames for nouns; this is not the case in Hebrew, where articles are always optional. On the other hand, such phrases necessitate empty categories in a DP analysis, both in German and in Hebrew. Finally, the declension phenomenon that causes Netter (1994) to favor a DP analysis does not occur in Hebrew. To summarize, none of the arguments for prefering a DP analysis for German noun phrases is valid for Hebrew.

A different approach is taken by Kolliakou (1996), accounting for definiteness in Modern Greek in the framework of HPSG. Similarly to Modern Hebrew, Greek has a system of polydefinites, but *monadic* definites are allowed, too. The definite article is viewed as an adjunct, that selects the nominals it attaches to through a MOD feature in its lexical entry, and marks them as definite. There's a minor problem with this approach: when the article is combined with an adjective, it marks the adjective as definite – but not the value of the MOD feature of the adjective. As a

[11] Some determiners select only singular or only plural noun phrases, but no determiner inflects for number. Cardinal numbers inflect for gender, but no other determiner does.

result, definite adjectives select indefinite heads. To overcome this problem, Kolliakou (1996) suggests that the definiteness marker of adjectives should be left unspecified in the lexicon, and an ad-hoc *uniqueness principle* would take care of definiteness agreement in every instance of a head-adjunct structure in which the adjunct is an adjective.

Since Hebrew depicts *only* phenomena of polydefinites, a more suitable account – along the same lines – would have been to treat ha- as a *marker*, rather than an adjective, and have it select indefinite nominals and mark them as definite. This solution is problematic in two respects: HPSG does not account for agreement processes in the grammar; all other agreement constraints are listed in the lexicon. Moreover, the uniqueness principle applies only to one certain ID schema, namely the head-adjunct one; we believe that principles must be as general as possible. A better generalization for the Hebrew data can be obtained in a different way.

The application of the DP hypothesis to Serbo-Croatian, a language that lacks articles, is discussed in detail by Zlatić (1997). It is shown that determiners in Serbo-Croatian (as well as in other Slavic languages) behave like adjectives, and an NP view of noun phrases is much more natural for these languages. A list of advantages for noun headed noun phrases over DPs (in general, and in English in particular) is given by Payne (1993). To summarize, none of the arguments used in the HPSG literature in favor of a DP view of noun phrases seem to apply to Hebrew. We therefore assume in the following that the Hebrew noun phrase is headed by the noun.

5. An analysis of noun phrases in Hebrew

We suggest in this section an HPSG analysis of noun phrases in Hebrew, accounting for the data presented in section 2. Following a brief introduction to HPSG in section 5.1, we divert into a short discussion of prosodic considerations, showing that the fact that a construct-state nominal must have an immediate, compulsory complement is a result of such nominals being phonologically weak (5.2). In section 5.3 we present a lexical rule for relating definite and indefinite forms, thus realizing the claim that the definite article is an affix; definiteness agreement in the noun phrase is accounted for in section 5.4. We discuss the two major forms of constructing genitive relations in section 5.5 and show how free genitives are analyzed. Constructs are described in section 5.6, including the relation between absolute and construct forms and the structure of CS. CS noun phrases are acquired a structure that resembles FG noun phrases on one hand and construct-state adjectival phrases on the other hand. Finally (5.7), we suggest a potential solution for the problematic data of section 2.6.

5.1. **The framework.** HPSG is formulated as a set of constraints on *typed feature structures*; these are used to represent *signs* (both words and phrases). For example, a *noun* is a word whose HEAD feature has the type *noun*. Figure 1 depicts the lexical entry[12] of the common noun sepr (book), where '$\langle \dots \rangle$' denotes a list. The feature DEP will be explained in section 5.2, and DEF – in section 5.3. The value of COMPS is discussed in section 5.5.[13]

$$\begin{bmatrix} \textbf{word} & \\ phon: & \mathsf{sepr} \\ s:l:c: & \begin{bmatrix} \textbf{cat} & \\ head: & \begin{bmatrix} \textbf{noun} \\ def: - \end{bmatrix} \\ subj: & \langle\rangle \\ comps: & \langle \mathrm{PP[of]}, \mathrm{PP[of]} \rangle \\ spr: & \langle\rangle \end{bmatrix} \\ dep: & \langle\rangle \end{bmatrix}$$

FIGURE 1. The lexical entry of the noun sepr (book)

HPSG "rules" are organized as a set of *principles* that set constraints on the properties of well-formed phrases, along with a set of *ID schemata* that license certain phrase structures. The schemata are independent of the categories of the involved phrases; they state general conditions for the construction of larger phrases out of smaller ones, according to the function of the sub-phrases. In Pollard and Sag (1994) six schemata are listed, including the following:

Subject-Head schema: Most importantly, this schema licenses the combination of a subject with a predicate to form a sentence. The properties of the subject are taken from the SUBJect feature of the head daughter.

[12]As the semantics of definiteness is not addressed in this paper, the values of the CONTent feature are systematically suppressed in the depiction of feature structures.

[13]The notation '*s:l:c*' stands for the path SYNSEM:LOC:CAT.

Head-Complement schema: The rest of the complements, other than the subject, are combined with the head by the head-complement schema. Once again, the appropriate complements are determined by the head and are specified as the elements in the list COMPS.

Head-Marker schema: Markers are used to guarantee that a certain element combines only once with a certain head. A typical example is quantifiers modifying nouns.

Head-Adjunct schema: Adjuncts can be combined with the heads they modify over and over again. In HPSG adjuncts select their heads – it is the adjunct that determines the features of the head it might be attached to, through the value of the feature MOD.

In a revised version of the theory (Pollard and Sag 1994, section 9.4), a further distinction is made between subjects and specifiers. A new valence feature, SPR, is added to SUBJ and COMPS, listing specifiers in the lexical entries of heads. Correspondingly, a new schema is added:

Head-specifier schema: Specifiers select the head they specify through the SPEC feature, just like markers; unlike markers, specifiers are reciprocally selected by heads, as they appear on the SPR list.

5.2. **Prosodic dependency.** Among the criteria suggested for distinguishing complements from adjuncts, one of the most useful is *obligatoriness*: complements are obligatory, adjuncts are optional. Another useful criterion is semantic: complements are arguments of the head, adjuncts are not. However, there are cases when these two criteria are contradicting. Hebrew is a language in which the obligatoriness condition for subcategorized complements is not strict: they can be moved, and even omitted, in certain contexts. For example, verb phrases can occur without the objects, and in some contexts sentences are grammatical even without a subject.

On the other hand, some elements obligatorily require a complement. As shown in section 2.2, this is the case with construct-state nominals, that strictly require an immediate noun phrase following them. The same also holds for two other types of elements: prepositions (including the genitive one, $ell (of)) and some quantifiers (such as koll (all) and robb (most of)). In spite of the differences among these elements, there are some striking similarities: they can never occur without a complement, which can not be extracted, or 'moved'. However, while a compulsory complement of some element cannot be replaced by a 'trace', it can always be replaced by a personal pronoun, which is always realized as a clitic, attached to the element under discussion (Borer 1984, chapter 2). The following examples clarify this point:

(45) siprei ha- m$or_rim / sipreihem
books-*c* the poets / books+3rd-pl-m
'the poets' books / their books'
lot ha- m$or_rim / lotam
three-*c* the poets / three+3rd-pl-m
'the three poets / the three of them'
$ell ha- m$or_rim / $ellahem
of the poets / of+3rd-pl-m
'of the poets / of them'
'et ha- m$or_rim / 'otam
ACC the poets / ACC+3rd-pl-m
'the poets (ACC) / them (ACC)'
bimqom ha- m$or_rim / bimqomam
instead-of the poets / instead-of+3rd-pl-m
'instead of the poets / instead of them'
koll ha- m$or_rim / kullam
all the poets / all+3rd-pl-m
'all the poets / all of them'

The phenomena delineated above can probably be attributed to two different kinds of constituency in Hebrew: using the terminology of Curry (1961) (quoted by Dowty (1989)), *phenogrammatical* considerations form constituents that might not be *tectogrammatical* phrases. What is common to the elements that require an immediate, obligatory complement is that they are all phonologically weak. Borer (1988) claims that construct noun phrases in Hebrew are phonological words: their heads, construct nouns, are shown to be phonologically reduced, as a result of their lack of independent stress. This same phonological reduction process applies to construct adjectives and cardinals, too.

Indeed, the relations between these elements and their complements vary: the complement is an object in the case of prepositions, a subject or a specifier in the case of construct state nouns, a head in the case of construct state cardinals etc. This state of affairs, however, is simpler than in other languages in which phenogrammatical and tectogrammatical structures do not coincide (e.g., Serbo-Croatian (Penn 1997)): in Hebrew, phenogrammatical structures are always phrases in the tectogrammatical sense. Therefore, there is no need in postulating two parallel sets of rules to encode both kinds of constituents. It is, nevertheless, necessary to encode the differences in status: to ensure that the dependent element combines with its obligatory complement before any other modifications to it take place, and to disable extraction processes, the relation between the elements listed above and their obligatory complements must be explicitly marked.

As we believe that the kind of constituency exhibited by prosodically weak elements and their complements is not tectogrammatical, we refrain from using a designated valence feature to encode such a relation. Taking advantage of the observation that these constituents correlate well with phrases in Hebrew, we account for them in the following way: we add a feature, called DEPendency, to the lexical entries of *words*. The value of this feature can either be an empty list, or a list of one element, in which case the element must be reentrant with some element in the value of some valence list the word subcategorizes for (in other words, DEP points to some element on the ARG_S value of the word). As prosodically dependent words always depend on subcategorized complements in Hebrew, the obligatory complement is bound to be a member of the ARG_S of those words.

In addition, we introduce the *prosodic dependency* principle:

(46) *In a headed phrase, in which one of the daughters is a word, either the* DEP *of this daughter is empty, or it is reentrant with (the* SYNSEM *value of) some other daughter.*

Since the DEP feature is appropriate only for words, the principle only affects phrases in which (at least) one sub-phrase is a word. It achieves the desired behavior: words that are specified as prosodically dependent must first combine with the obligatory complement they depend on; only then can the obtained phrases combine with other modifiers.

As for the combination of prosodically dependent words with *pronouns*, the data above indicate that this combination must be a morphological process – obviously, there are morpho-phonological alterations involved, and the pronominal clitics might be viewed as inflectional affixes of the prosodically weak elements in question. We suppress a detailed discussion of these processes here.

5.3. **Definiteness as a lexical process.** We seek in this section a generalization for the definiteness phenomena described in section 2 above. In particular, an immediate question presents itself: of all the elements in a Hebrew noun phrase, which are the ones that can be definite, or in other words, which are the elements that must agree on definiteness with the head noun? Surely, the criteria cannot be semantic: if they were, it would have been impossible to explain why ha- can attach to the (inherently determined) demonstratives; or why possessive constructions with the preposition $ell allow all the four combinations of definiteness, whereas those without $ell, which are semantically equivalent, only allow two combinations. A related question, one that has received much consideration in recent linguistic research, has to do with construct state nominals; namely, why can't the head of a construct be rendered definite directly?

The answer has to do with the nature of the definite article, and in particular with the following properties:

- ha- attaches to words, not to phrases;
- it attaches only to nominals, and to all kinds of nominals;
- it only combines with indefinite words.

It is crucial for this analysis that the process of adding the definite article take place in the lexicon; in particular, it takes place *before* other cliticization processes, such as personal pronoun cliticization, apply.

By *nominals* we mean nouns (e.g., sepr), adjectives (e.g., gadol), ordinals (e.g., $eni), cardinals (e.g., loa) and demonstratives (e.g., ze). A preliminary segment of the type hierarchy that captures this definition is given in figure 2.

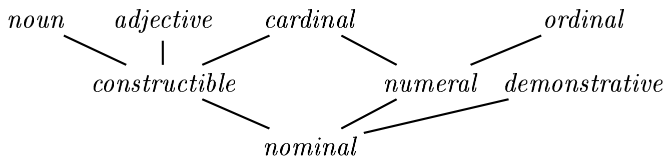


FIGURE 2. The *nominal* sub-hierarchy

An additional (boolean) feature, DEFiniteness, is required for encoding the value of definiteness in nominals. As definiteness agreement in Hebrew is not a semantic process, we add this feature to the CATegory of nominals (rather than to their CONTent). Since definiteness is a feature of phrases, inherited from the lexical head, DEF is a head feature, appropriate for all *nominals*. Viewing definiteness as a lexical process, we introduce the *Definite Lexical Rule* (DLR). Two assumptions are implicit in this rule: (1) that it is triggered by subsumption, not unification (see Hinrichs and Nakazawa (1996) for a discussion and other examples of this concept); (2) that when a value at the end of a path is modified, all paths that are reentrant with it are modified as well.

The DLR operates on all nominal words, provided that the value of their DEFiniteness feature is '−'. In all categories its effect on the phonology is determined by the same phonological rules; we use the function *definite* to abstract over them. It changes the value of the path SYNSEM|LOC|CAT|HEAD|DEF from '−' to '+'. *Adjuncts* specify the heads they select as the value of the MOD feature in their lexical entries. Like any other nominal, they have a DEFiniteness feature, whose value is shared with the value of the path MOD|LOC|CAT|HEAD|DEF. When the DLR operates on adjuncts, it results in a specification of a '+' value for both paths. Thus it is guaranteed that definite adjectives, for example, are not only specified as definite but also select definite heads. The DLR is depicted (using the notation of Meurers (1995)) in figure 3; its effect when applied to a few nominals is exemplified in figures 4 and 5. A discussion of construct-state nominals and their definiteness specification is deferred to section 5.6.

$$\begin{bmatrix} \textbf{word} & \\ phon: & \boxed{1} \\ s:l:c: & \begin{bmatrix} \textbf{cat} & \\ head: & \begin{bmatrix} \textbf{nominal} \\ def: - \end{bmatrix} \end{bmatrix} \end{bmatrix} \mapsto \begin{bmatrix} \textbf{word} & \\ phon: & definite(\boxed{1}) \\ s:l:c:head:def: + & \end{bmatrix}$$

FIGURE 3. The Definite Lexical Rule

5.4. **Definiteness agreement.** Once the process of adding the definite article is taking place in the lexicon, the head-adjunct schema can remain intact (that is, no additional principles such as the uniqueness principle are needed). Moreover, the agreement in definiteness between a nominal and its adjuncts is stated in the lexical entry of the adjuncts, just like agreement on number and gender is. However, there is a minor difference between the two agreement processes: since agreement on definiteness

$$\left[\begin{array}{ll}\textbf{word} & \\ phon: & \mathsf{sepr} \\ s:l:c: & \left[\begin{array}{ll}\textbf{cat} & \\ head: & \left[\begin{array}{l}\textbf{noun}\\ def: -\end{array}\right]\end{array}\right]\end{array}\right] \xrightarrow{DLR} \left[\begin{array}{ll}\textbf{word} & \\ phon: & \mathsf{ha\text{-}\ sepr} \\ s:l:c: & \left[\begin{array}{ll}\textbf{cat} & \\ head: & \left[\begin{array}{l}\textbf{noun}\\ def: +\end{array}\right]\end{array}\right]\end{array}\right]$$

FIGURE 4. The effect of the Definite Lexical Rule on nouns

$$\left[\begin{array}{ll}\textbf{word} & \\ phon: & \mathsf{gadol} \\ s:l:c:head: & \left[\begin{array}{ll}\textbf{adj} & \\ def: & \boxed{3}- \\ mod: & \left[\begin{array}{ll}\textbf{synsem} & \\ loc:cat:head: & \left[\begin{array}{l}\textbf{nominal}\\ def: \boxed{3}\end{array}\right]\end{array}\right]\end{array}\right]\end{array}\right] \xrightarrow{DLR}$$

$$\left[\begin{array}{ll}\textbf{word} & \\ phon: & \mathsf{ha\text{-}\ gadol} \\ s:l:c:head: & \left[\begin{array}{ll}\textbf{adj} & \\ def: & \boxed{3}+ \\ mod: & \left[\begin{array}{ll}\textbf{synsem} & \\ loc:cat:head: & \left[\begin{array}{l}\textbf{nominal}\\ def: \boxed{3}\end{array}\right]\end{array}\right]\end{array}\right]\end{array}\right]$$

FIGURE 5. The effect of the Definite Lexical Rule on adjectives

is not a semantic process in Hebrew, the DEF feature is not part of the CONTent of nominals (unlike number and gender). But since modifiers have access to the categories of the heads they modify (it is part of the value of their MOD feature), adjectives (as well as other noun adjuncts) can select definite or indefinite nouns to modify, according to their own definiteness value.

Figure 6 depicts the structure of the noun phrase ha- sepr ha- gadol (the big book). Notice that adjectives (whether definite or indefinite) can modify nouns as well as noun phrases – they do not impose any constraints on the values of the valence features of the nominals they modify.

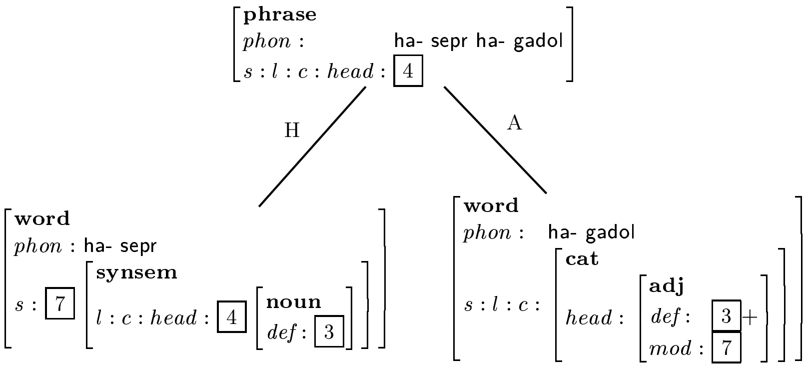


FIGURE 6. Definiteness agreement in the noun phrase

5.5. **Possessives.** Before getting on to describing the effects of the lexical view of definiteness on construct state nominals, the different ways of construing possessives in Hebrew must be discussed. Recall from section 2.4 that possessives can have two different forms: $ell (of) phrases (referred to as *free* genitives, FGs), or complements of a construct state noun (CSs); when the possessor is pronominal it is cliticized to $ell or to the construct, respectively. A third, hybrid form is a clitic doubled construction. Naturally, an analysis in which all these constructions are treated in the same way is called for. Indeed, this is what Borer (1984), Shlonsky (1990) and Siloni (1994), among others, attempt to achieve. While a complete analysis of possessive constructions is beyond the scope of this paper, some remarks must be made here.

The most important observation is that there must be a distinction between the *form* of possessives and their *function* in the noun phrase (or their *relation* to the head noun). Independently of its form, the function of a possessive can be any of the following (see Shlonsky (1988) for a detailed discussion): a possessor, as in (47.a); an agent, as in (47.b); or a theme, as in (47.c).

(47) ha- tmuna $ell dan
the picture of Dan
'the picture owned by Dan'

ha-	tmuna	$ell	rembrandt
the	picture	of	Rembrandt

'the picture painted by Rembrandt'

ha-	tmuna	$ell	mi$mar	ha-	layla
the	picture	of	watch	the	night

'the picture portraying the Night Watch'

Possessives filling these different functions traditionally bear three different relations to the head noun:[14] a possessor is usually viewed as a specifier, an agent as a subject and a theme as a complement.

There are attempts to relate the form of possessives to their function. For example, Engelhardt (1997) claims that in non-process nouns, a doubled construction is possible with subjects and possessors, but not with complements, by contrasting the following two examples:

(48)

taxzito	$ell	ha-	par$an
forecast-*c*+3rd-sg-m	of	the	commentator

'the commentator's forecast'

*taxzitan	$ell	ha-	toca'ot
forecast-*c*+3rd-pl-f	of	the	results

(putatively) 'the forecast of the results'

However, such relations are very hard to define. For example, doubled constructions in which the possessive is a complement are possible with (non-process) nouns such as truma (contribution):

(49)

trumatan	$ell	ycirot	ha-	'omanut	l-	ha-	muze'on
contribution-*c*	of	creations-*c*	the	art	to	the	museum

'the contribution of the works of art to the museum'

Engelhardt (1996) claims further that in

(50)

ciyyureihem	$ell	ha-	yladim
drawings-*c*+3rd-pl-m	of	the	children

'the children's drawings'

[14]Of course, the roles of subject and complement are appropriate for certain nouns only, whereas a possessor can modify *any* noun.

the children can not be interpreted as being depicted in the drawing. This does not comply with our judgments, and in fact the following phrase will have virtually a single interpretation, the one in which the possessive is a complement (due to semantic preferences):

(51) tmunato $ell ben-gurion
picture-*c*+3rd-sg-m of Ben-gurion
'Ben-gurion's picture'

In general, then, it is difficult to determine the function of a possessive by structural considerations only. Therefore, when a noun subcategorizes for both a subject and a complement (as is the case with deverbal nouns and 'picture'-type nouns), and a possessive is indeed present (either as a free genitive, as a construct complement or as a doubled complement), three different ways of combining the noun with the possessive are possible. However, when more than one possessive is expressed, there are some constraints on the *order* of the possessives. As shown in (52), the function of *possessor* can only be realized by the last (rightmost) possessive; the combinations not shown are ungrammatical. In all the examples, the intended interpretation is that of a picture, drawn by Rembrandt, depicting the Night Watch and owned by Dan.

(52) ha- tmuna $ell / tmunat mi$mar ha- layla $ell
the picture of / picture-*c* watch the night of
rembrandt (?$ell dan)
Rembrandt of Dan

ha- tmuna $ell / tmunat rembrandt $ell mi$mar ha-
the picture of / picture-*c* Rembrandt of watch the
layla (?$ell dan)
night of Dan

ha- tmuna $ell / tmunat mi$mar ha- layla ($ell dan)
the picture of / picture-*c* watch the night of Dan

ha- tmuna $ell / tmunat rembrandt ($ell dan)
the picture of / picture-*c* Rembrandt of Dan

In standard HPSG (Pollard and Sag 1994, pp. 51-54), possessives have some properties of determiners (in particular, their CATegory) and some (in particular, CONTent) – of personal pronouns. In the revised theory (Pollard and Sag 1994, section 9.4.5) possessives are *specifiers*: they combine with an N' to form a complete NP through the specifier-head schema, and they express the expectation for an N' as the value of the SPECified feature in their HEADS, just like other determiners do. As Pollard and Sag (1994, p. 375) note, this analysis is valid for German and English, but other languages might require different accounts. We want to advocate a position by which possessives of all kinds are *complements* in Hebrew.

First, note that possessives differ from other determiners in their distribution. While most determiners precede the noun, possessives follow the head:

(53) koll sepr
every book
'every book'

koll ha- sparim
all the books
'all books'

lot ha- sparim
three the books
'the three books'

ha- sparim $selli / $ell dan
the books my / of Dan
'my/Dan's book'

Second, possessives can regularly co-occur with other determiners:

(54) koll sepr $selli / $ell dan
every book my / of Dan
'each of my/Dan's books'

koll ha- sparim $selli / $ell dan
all the books my / of Dan
'all my/Dan's books'

lot ha- sparim $selli / $ell dan
three the books my / of Dan
'my/Dan's three books'

If determiners occupy the specifier position in NPs, possessives cannot fill the same function (unless one assumes a double-specifier analysis, as in Ng (1997)). Of course, if determiners other than the definite article are viewed as heads, this argument is not valid. We do not explore this possibility here.

Other arguments for viewing possessors as complements, in two languages that show many similarities to Hebrew, namely Welsh and Arabic, are given by Borsley (1989) and Borsley (1995). The arguments of Borsley (1995) are based on the following observations: both languages have subject-initial and verb-initial clauses; they have constructions in which an argument-taking noun is followed by its subject, but not vice versa; pronominal objects in subject-initial clauses can be realized as clitics; and the same clitics appear instead of a pronominal subject of a noun. All these observations are valid in Hebrew, too.

In non argument-taking nouns possessives are always interpreted as possessors. In the case of 'picture'-type nouns, possessives are ambiguous: they can be interpreted as either arguments or possessors. As shown in (52), the order of the arguments in such nouns is free. In deverbal nouns the situation is more complicated: such nouns never have possessors (presumably for semantic reasons); and the argument order is more restricted. Following Borer (1994), we assume that there are two basic orders, one corresponding to the active reading of the underlying verb and one that corresponds to the passivized form of this verb. In nouns that are derived from transitive verbs, for example, two orders are possible: either the (genitive) subject precedes an accusative object, or the (genitive) object precedes an optional by-PP representing the subject. These two possibilities are depicted in (55).

(55)

ha-	hrisa	$ell	ha-	caba'	'et	ha-	&ir	
the	destruction	of	the	army	ACC	the	city	
ha-	hrisa	$ell	ha-	&ir	&al ydei	ha-	caba'	
the	destruction	of	the	city	by	the	army	

'the army's destruction of the city'

We therefore view possessors as (most oblique) complements of nouns, listed on the noun COMPS list. When the noun has additional arguments, they are listed in its COMPS list preceding[15] the possessor. Thus, the lexical entry of sepr ('book') is as depicted in figure 1 above; the value of the COMPS list has two members, an agent and an optional[16] possessor. The lexical entry of hrisa ('destruction') must have a disjunctive COMPS

[15]This order reflects the prominence of the noun's complements. Its interaction with HPSG's binding theory has not been investigated yet.

[16]Recall that all subcategorized elements are optional in Hebrew.

list to reflect the two possible orders of the arguments. We use 'PP[of]' as a shorthand notation for

$$\begin{bmatrix}\textbf{synsem} \\ \textit{loc} : \textit{cat} : \textit{head} : \begin{bmatrix}\textbf{prep} \\ \textit{pform} : [\textbf{of}]\end{bmatrix}\end{bmatrix}$$

When two possessives are present, the structure depicted in figure 7 is obtained.

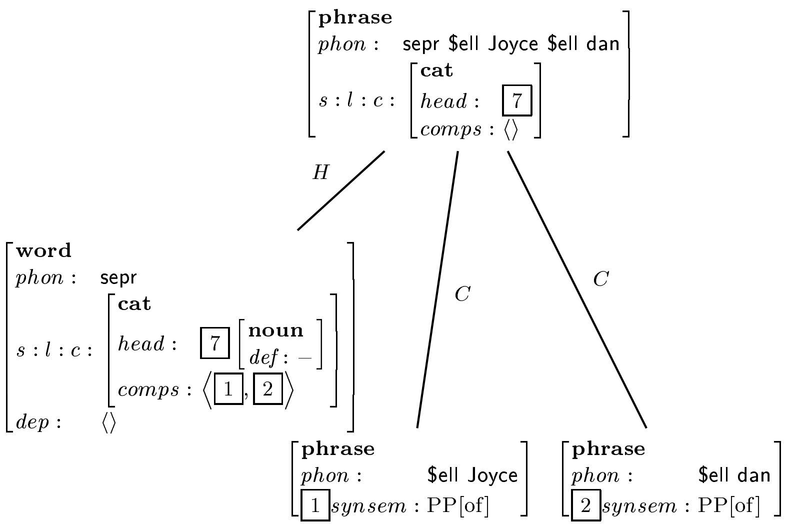


FIGURE 7. A noun phrase with two possessives

5.6. **Constructs.** It is common practice in HPSG to account for so called "movement" phenomena by means of value sharing (reentrancies). This very solution is applicable to the case of construct state nominals in Hebrew, too. To explain the fact that such nominals cannot be rendered definite explicitly, but rather "inherit" the definiteness feature of their complements, Borer (1988), Ritter (1988), Shlonsky (1990) and Siloni (1994) all resort to an analysis by which the head noun must be raised from its base position. This results in awkward structures that are not independently motivated. However, this phenomenon can be easily explained in a theory such as HPSG: construct state nominals are words, and their lexical entries must express an expectation for an immediate complement; that is, an indication (the SYNSEM value) of the compulsory complement of construct nominals is present in the lexical entry of the nominal. It is thus possible to share, in the lexicon, the values of the definiteness feature in both the nominal and its complement. This results in only two possibilities of definiteness combinations for constructs, as opposed to the four possible combinations of free genitives.

The construct form is generated from the absolute form by means of a morphological process. Apart from modifying the phonology[17] of the nominal, this process has a double effect. Recall that nouns are specified for a possessor in their COMPS list; therefore, there is no need to add a subcategorized complement for construct state nouns. The rule only has to pick a complement from this list, change it from a genitive PP to a noun phrase, and unify the values of the DEF feature of the nominal and the complement it depends on. In addition, the rule sets the value of 'DEP' to point ot this complement, to indicate the fact that construct state nominals are prosodically dependent. When the nominal is combined with its complement, the resulting phrase inherits the definiteness from the latter. Figure 8 depicts the effect of this process when applied to nouns. Notice that the results of this process, i.e., the lexical entries of construct-state nouns, are not specified as 'DEF $-$' (in fact, they are not specified for definiteness at all). Consequently, the definiteness lexical rule stated above cannot apply to them. The fact that construct state nominals cannot be rendered definite directly is naturally obtained.

Once this process is applied to construct-state nouns, their lexical entry specifies that they expect a nominal complement. Noun–noun constructs can thus be constructed by the head-complement schema. Furthermore, an independent construct-state noun, with no immediate complement, cannot be promoted to a status of a phrase, as the dependency principle prohibits its combination with other phrases. Since the DEF value of the construct head and its complement are shared, and since DEF is a head feature, it is also shared by the mother; thus, the DEF feature of the phrase is inherited from the complement, as required. Figure 9 depicts this process; notice in particular how the definiteness of the phrase is inherited from the complement using a reentrancy in the head.

The striking similarities between noun–noun and adjective–noun constructs imply that they are actually only two instances of one process: any analysis that would suggest two different mechanisms to account for

[17]The function *phon_reduce* computes the phonology of the construct noun.

$$
\left[\begin{array}{ll}
\textbf{word} & \\
\mathit{phon}: & \boxed{1} \\
s:l:c: & \left[\begin{array}{ll}
\textbf{cat} & \\
\mathit{head}: & \left[\begin{array}{l}\textbf{noun}\\ \mathit{def}: -\end{array}\right] \\
\mathit{comps}: & \boxed{3} \oplus \langle \mathrm{PP[of]} \rangle \oplus \boxed{5}
\end{array}\right] \\
\mathit{dep}: & \langle\rangle
\end{array}\right] \mapsto
$$

$$
\left[\begin{array}{ll}
\textbf{word} & \\
\mathit{phon}: & \mathit{phon\_reduce}(\boxed{1}) \\
s:l:c: & \left[\begin{array}{ll}
\textbf{cat} & \\
\mathit{head}: & \left[\begin{array}{l}\textbf{noun}\\ \mathit{def}: \boxed{2}\end{array}\right] \\
\mathit{comps}: & \boxed{3} \oplus \left\langle \boxed{4} \left[\begin{array}{ll}\textbf{synsem} & \\ \mathit{cat}:\mathit{head}: & \left[\begin{array}{l}\textbf{nominal}\\ \mathit{def}: \boxed{2}\end{array}\right]\end{array}\right] \right\rangle \oplus \boxed{5}
\end{array}\right] \\
\mathit{dep}: & \langle \boxed{4} \rangle
\end{array}\right]
$$

FIGURE 8. The relation between absolute and construct forms

both phenomena is bound to be redundant. We simply extend the analysis of noun–noun constructs delineated above to the case of construct-state adjectives: such adjectives are lexically specified to subcategorize for nouns. They cannot occur independently, with no immediate complement, and hence are marked as dependent; the compound is constructed through the head-complement schema. To account for the only difference between nouns and adjectives in this respect, the noun on the COMPS list of construct-adjectives is required to be a *word*.[18] Figure 10 depicts a derivation of the adjective–noun construct gdolat &einaym (big eyed).

5.7. **The definite article as a phrasal affix.** In section 2.6 we showed some data, suggesting that the definite article, at least in colloquial Hebrew, might sometimes attach to phrases rather than to words. In particular, it seems that constructions in which ha- is expressed on the edge of a phrase, rather than on the head word, are acceptable in adjectival phrases, where the head is preceded by a degree modifier.

[18]The elements that heads subcategorize for are SYNSEMS, not signs, so this information has to be explicitly encoded, but this is a minor technical problem.

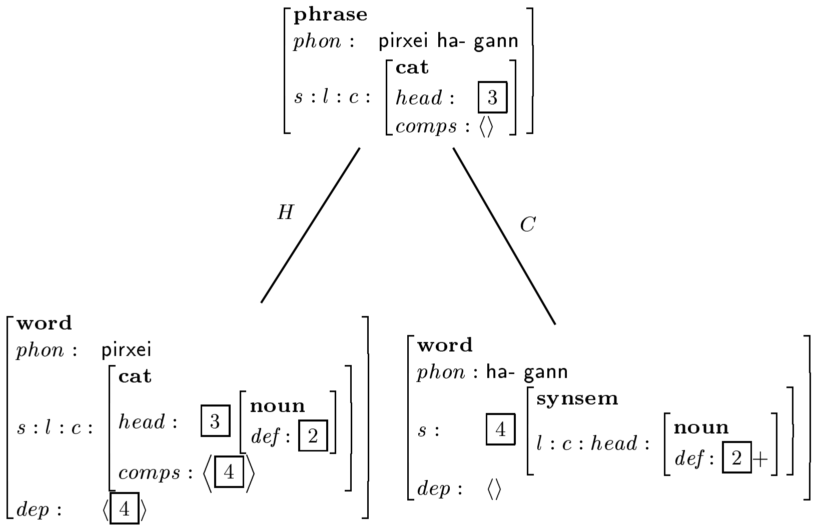


FIGURE 9. A construct-state NP

This behavior, albeit peculiar, still does not contradict the assumption that ha- is an affix: as pointed out by Miller (1992, 1993), there are several items which have a distribution that can only be stated in phrasal terms, but which are classified as affixes by other criteria. In the terms of Miller (1993), the morphological marking "misses the head". In most of those cases, the affix is attached either to the first or to the last word in the phrase, which is also the case with ha-. A similar analysis is suggested by Halpern (1992) for the so-called 'second-position' clitics in Bulgarian and other Balkan languages. Miller (1992) proposes the *edge feature principle*, augmented by a few linear precedence constraints, to explain the position of phrasal affixes within the phrase. Halpern (1992) proposes a similar account for the distribution of definiteness marking in the Balkan languages: viewed as affixes, they are not required to be realized on the head of a phrase, and two simple rules are sufficient for determining their final position within the phrase. We do not account for such cases of phrasal affixes here; however, we believe that they can be treated using the above-mentioned techniques.

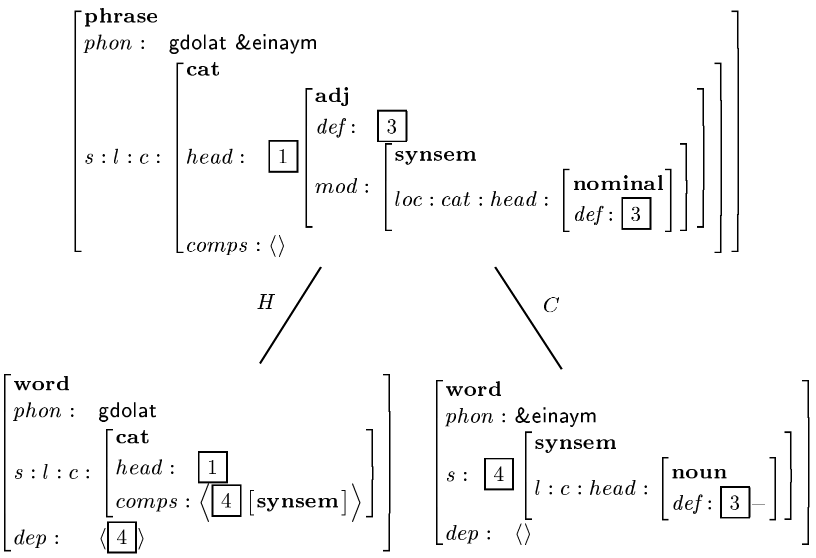


FIGURE 10. A construct-state ADJP

6. CONCLUSION

We have provided in this paper an HPSG analysis for Modern Hebrew noun phrases, based on two assumptions: that the Hebrew definite article, ha-, is an affix, combining with nominals in the lexicon; and that the noun phrase is headed by the noun, rather than by a functional (possibly empty) category. We have provided a variety of arguments to justify these two assumptions. The analysis accounts for a wide range of data, including agreement on definiteness in the noun phrase, inheritance of definiteness in construct state phrases, the similarities between construct state nouns and adjectives and the impossibility of direct modification of constructs. It provides a uniform account for the two major ways of constructing genitive relations in Hebrew, namely constructs and free genitives.

Naturally, many interesting phenomena remain unexplained. A uniform lexical rule for relating the absolute and the construct forms of all nominals is still missing. The behavior of the definite article in adjectival phrases is not accounted for. It is required to extend this analysis to determiners other than the definite article, and to provide a good explanation of the word order in the Hebrew noun phrase, especially when argument taking nouns are concerned. Finally, the analysis suggested here must be extended to cover the semantics of noun phrases. We hope to investigate some of these directions in the future.

This work is part of a broader project whose aim is to provide an HPSG-based grammar for noun phrases in Hebrew. The analyses described herein are incorporated into this larger project.

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