Chapter 1

Noun Phrases as NPs – the case of Hebrew

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Abstract. Data from Hebrew have been claimed to support the hypothesis that noun phrases should be considered DPs universally. This paper shows that the application of the DP hypothesis to Hebrew is based on partial data and theory-internal considerations. A straightforward analysis of noun phrases as NPs is proposed; it is shown to account for a variety of facts that were believed to necessitate the introduction of functional categories and compulsory head raising in Hebrew NPs. Furthermore, this analysis provides a unified account for phenomena that were overlooked in previous works, such as definiteness agreement in the noun phrase and the similarities between construct state nouns and adjectives.

1 Introduction

Following [Abney, 1987], analyses carried out in Chomskian frameworks view noun phrases as DPs, headed by the functional category D. The DP hypothesis (DPH) has been applied to a variety of languages and is incorporated into most existing accounts for Modern Hebrew (MH). Originally motivated by the English '-ing' gerunds, that simultaneously possess properties of both sentences and noun phrases, the importance of the DPH is that it assigns parallel structures to clauses and noun phrases; in particular, both are headed by functional categories. In HPSG, however, functional categories are discouraged: English noun phrases are viewed as NPs, headed by the noun, and determiners – as subcategorized specifiers of nouns ([Pollard and Sag, 1994, section 9.4]). HPSG analyses for other languages, notably German, consider article-noun combinations to be DPs ([Netter, 1994]). Preferring either of the two analyses, in the context of HPSG, boils down to deciding whether it is the determiner or the noun that heads a nominal phrase. [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 on both the article and the noun. Determinerless noun phrases require, in German, disjunctive subcategorization frames for nouns under an NP analysis, and

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empty categories in a DP analysis. Finally, it is the declension phenomenon that causes [Netter, 1994] to favor a DP analysis. When applied to MH, these considerations yield a different result: information that is relevant for agreement, such as number and gender, is expressed on the noun only; determinerless phrases are always grammatical; and there are no declensions. Nevertheless, most existing analyses of MH noun phrases apply the DPH, with the definite article as the D head. This paper shows that there is no theory-independent reason to apply it to Hebrew; on the contrary, such accounts miss generalizations and yield the wrong predictions. We show that an NP analysis is not only possible but also plausible, accounting for a body of data traditionally believed to require functional categories and compulsory head raising in noun phrases.

2 The Hebrew Noun Phrase

MH has one definite article, *ha-*, which attaches (as a prefix) to *words* (nouns, adjectives, numerals and demonstratives, henceforth *nominals*), not phrases. Many elements in the noun phrase are marked for, and must agree on, definiteness:

(1.1) *ha- sepr ha- gadol ha- ze/lii*
the book the big the this/third
'this big book / the third big book'

MH provides two major ways of forming genitive relations: *free genitives* (FG), in which the genitive phrase is introduced by the preposition *$ell* 'of':

(1.2) *(ha-) sparim $ell m$orer*
(the) books of poet
'(the) books of a poet'

(ha-) sparim $ell ha- m$orer
(the) books of the poet
'(the) books of the poet'

and *constructs* (CS), in which the head noun is morphologically marked (and is said to be in the *construct* state, *cs*) and the genitive phrase must immediately follow it, preceding any other of the head's modifiers:

(1.3) *siprei m$orer xda$im*
books-*cs* poet new
'new books of a poet'

siprei *ha-* *m$orer* *ha-* *xda$im*
books-*cs* the poet the new
'the new books of the poet'

In FG the definiteness of the possessor is independent of that of the head, allowing for *four* different combinations of definiteness (both the head and the possessor can each be either definite or indefinite); in CS, the definiteness of the phrase is inherited from the possessor, allowing only *two* combinations: either both are definite, or both are not ([Wintner, 1998]). The definite article never combines with *cs*-nouns. A poorly studied yet closely related phenomenon is *cs*-adjectives, which exhibit the same definiteness behavior:

(1.4) *yruqqat* *(ha-)* *&einaym*
green-*cs* (the) eyes
'a/(the) green eyed'

3 Existing Analyses

The DPH is first applied to Hebrew by [Ritter, 1988], but this analysis is modified and extended in [Ritter, 1991], which is very similar in the main points to the one suggested in [Siloni, 1991, Siloni, 1994]. [Ritter, 1991] uses CS noun phrases, headed by derived (deverbal) nouns, as an evidence for DPs. It is indicated that in such constructions, only N-S-O order of the arguments is possible:

(1.5) **a.** *'ahbat* *dan* *'et* *'immo*
love-*cs* Dan ACC his-mother
'Dan's love of his mother'

b. *'kilat* *dan* *'et* *ha-* *tappux*
eating-*cs* Dan ACC the apple
'Dan's eating of the apple'

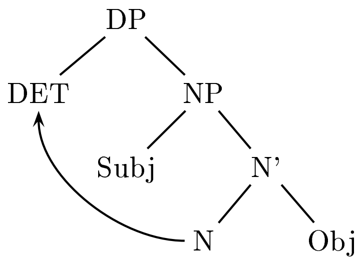
In addition, in such constructions the subject can bind an anaphoric object, but the object cannot bind an anaphoric subject:

(1.6) **a.** *'ahbat* *dan* *'et* *&acmo*
love-*cs* Dan ACC himself
'Dan's love of himself'

b. ∗*'ahbat* *&acmo* *'et* *dan*
love-*cs* 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, as depicted in (1.7):

(1.7)



To explain the fact that *ha-* never attaches to *cs*-nouns, [Ritter, 1991] further claims that CS noun phrases are DPs, headed by a phonologically null determiner called D_{gen}. As both D_{gen} and *ha-* are DETs, they appear in complementary distribution. The definiteness feature of CS DPs is inherited from the head D_{gen}, after the head of the construction has moved to its position, where it participates in a spec–head agreement with the genitive. In FG, DET is realized as *ha-*; the analysis is slightly more complicated, as compatability with the binding theory necessitates yet another functional category.

Several arguments against this analysis must be made. First and foremost, it is based on partial data. Derived nouns in Hebrew, even in the construct state, are not limited to the N-S-O order. Indeed, (1.6.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:

(1.8)	*'ahbat*	*&acmo*	*$ell*	*dan*	
	love-*cs*	himself	of	Dan	
	'Dan's self-love'				
	'kilat	*ha-*	*tappux*	*$ell*	*dan*
	eating-*cs*	the	apple	of	Dan
	'Dan's eating of the apple'				

Moreover, the conclusion that the subject must asymmetrically c-command the object is a direct implication of the GB binding theory. This might not be the case in other linguistic theories, in which grammatical relations are not expressed solely by tree configurations. 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. It is also unclear where determiners other than *ha-* and D_{gen} fit into this analysis, as their natural position would have been heads of DPs, but this position is already occupied by the functional DET. Finally, this analysis completely ignores the strikingly similar phenomenon of *cs*-adjectives, and a unified account seems to be difficult to obtain.

4 An Alternative Analysis

The analyses delineated above are discussed by [Borer, 1994], listing some of their limitations and suggesting that definiteness is a feature of nouns, base generated on the N stem. An affixal view of the MH definite article is established in [Wintner, 1997], and is the starting point for the analysis we propose here. We first account for the fact that *cs*-nouns must have an immediate complement. We then explain why the article does not combine with *cs*-nominals. We justify a treatment of possessives as complements, and finally sketch an analysis for both FG and CS noun phrases as NPs.

4.1 Immediate Complementation of Constructs

Most subcategorized complements are optional in MH: objectless VPs are grammatical in many contexts, as are subjectless clauses. The requirement that *cs*-nouns have compulsory, immediate complements was used to motivate the application of the DPH to Hebrew. But this property is not unique to *cs*-nouns only; it holds for *cs*-adjectives and cardinals, as well as for prepositions and some quantifiers. In spite of the differences among these elements, there are some striking similarities: they can never occur without a noun phrase complement, which cannot be extracted, or 'moved'. But when the complement is a pronominal pronoun, it is always realized as a clitic on the element, never as a full form ([Borer, 1984, chapter 2]):

(1.9) *siprei ha- m$or_rim / sipreihem*
books-*cs* the poets / books+3rd-pl-m
'the poets' books / their books'

lot ha- m$or_rim / lotam
three-*cs* 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)'

&al yad ha- m$or_rim / &al yadam
near the poets / near+3rd-pl-m
'near the poets / near them'

koll ha- m$or_rim / kullam
all the poets / all+3rd-pl-m
'all the poets / all of them'

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 stress. This same phonological reduction process applies to construct adjectives and cardinals, too. We do not suggest a theory of prosody in HPSG; rather, taking advantage of the observation that the discussed constituents correlate well with phrases in MH, we account for them in the following way: we add a DEPendency feature to the lexical entries of *words*. The DEP feature is reminiscent of the ADJACENT feature of [Gunji, 1995], which is also used to encode immediate complementation. It is not clear from [Gunji, 1995] whether there is some phonological common property to words with non-empty ADJACENT list.

The relations between prosodically dependent words and their complements vary: the complement is an object in the case of prepositions, a subject or an object in the case of construct state nouns, a head in the case of construct state cardinals etc. But the obligatory complement is bound to be a member of the ARG_S of those words. The value of DEP can either be an empty list, or – for all the prosodically dependent words listed above – a list of one element, in which case this element must be reentrant with some element in some valence list of the word (in other words, DEP points to some element on the ARG_S value of the word). In addition, we introduce the *prosodic dependency* principle, by which 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 and complements:

> 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.

4.2 The Combinatorial Properties of '*ha-*'

The fact that the definite article does not combine with *cs*-nouns is not an argument for the DPH. Not only nouns have construct states: adjectives (1.4) and cardinal numbers do, too. While *ha-* combines with the default form of these words, it does not combine with their construct forms. The rules that govern the combination of *ha-* with nominals are simple, when the article is viewed as an affix ([Wintner, 1997]): (i) *ha-* attaches to words, not to phrases; (ii) it attaches only to nominals, and to all kinds of nominals; (iii) it only combines with indefinite words. 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 *nominal*s. Viewing definiteness as a lexical process, justified by the affixal nature of the definite article, we introduce the *Definite Lexical Rule*[1] (DLR).

(1.10)
$$ {}_{word}\left[\begin{array}{ll}\text{PHON:} & \boxed{1}\\ \text{S:L:C:HEAD:} & {}_{nominal}\left[\begin{array}{ll}\text{DEF:} & -\end{array}\right]\end{array}\right] \mapsto \left[\begin{array}{ll}\text{PHON:} & \mathit{definite}(\boxed{1})\\ \text{S:L:C:HEAD:DEF:} & +\end{array}\right] $$

The DLR operates on all nominal words whose DEFiniteness feature is '−'. In all categories its effect on the phonology is determined by the same phonological rules, abstracted over by the function *definite*. The rule 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. As for *cs*-nominals, these are not indefinite; we show below that they are unspecified for definiteness, and hence the DLR cannot apply to them.

4.3 Possessives as Complements

In standard HPSG ([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

[1] 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.

English, but other languages might require different accounts. We advocate a position by which possessives of all kinds are not specifiers in MH. First, possessives differ from other determiners in their distribution. While most determiners precede the noun, possessives follow it:

(1.11) *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:

(1.12) *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.[2]

Thus, possessives can be either subjects or non-subject complements. As all possessives occur post-nominally in Hebrew, and as the order among possessives that correspond to agent and theme in argument-taking nouns

[2]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.

is free, we prefer to view all of them as (non-subject) complements, with no possessive designated as subject. Other arguments for viewing possessives as complements, in two languages that show many similarities to Hebrew, namely Welsh and Arabic, are given in [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. Possessors, therefore, are listed in the COMPS list of nouns. When the noun has additional arguments, they are listed in its COMPS list preceding[3] the possessor. Thus, in the lexical entry of *sepr* ('book'), the value of the COMPS list has two members, an agent and an optional[4] possessor.

4.4 A Unified Treatment of Construct Phrases

As *cs*-nominals are words, their lexical entries express an expectation for an immediate complement; that is, an indication (the SYNSEM value) of the compulsory complement of *cs*-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 default form by means of a morphological process, modelled by a lexical rule:

(1.13)

$$
{}_{word}\left[\begin{array}{ll}
\text{PHON:} & \boxed{1} \\
\text{S:L:C:} & {}_{cat}\left[\begin{array}{ll}
\text{HEAD:} & {}_{noun}\left[\text{DEF:}\ -\right] \\
\text{COMPS:} & \boxed{3} \oplus \langle \text{PP}[\text{OF}] \rangle \oplus \boxed{5}
\end{array}\right] \\
\text{DEP:} & \langle\rangle
\end{array}\right] \mapsto
$$

$$
{}_{word}\left[\begin{array}{ll}
\text{PHON:} & \textit{phon\_reduce}(\boxed{1}) \\
\text{S:L:C:} & {}_{cat}\left[\begin{array}{ll}
\text{HEAD:DEF:} & \boxed{2}\text{BOOLEAN} \\
\text{COMPS:} & \boxed{3} \oplus \left\langle \boxed{4}\left[\text{L:C:HEAD:}\ {}_{nominal}\left[\text{DEF:}\ \boxed{2}\right]\right] \right\rangle \oplus \boxed{5}
\end{array}\right] \\
\text{DEP:} & \langle \boxed{4} \rangle
\end{array}\right]
$$

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

[4]Recall that most subcategorized elements are optional in Hebrew.

Apart from modifying the phonology[5] of the nominal, this process has a double effect. First, the rule picks a genitive complement from the COMPS list, replaces it by a nominative noun phrase and unifies 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 to this complement, indicating that *cs*-nominals are prosodically dependent. When the nominal is combined with its complement, the resulting phrase inherits the definiteness from the latter. Notice that the results of this process, i.e., the lexical entries of *cs*-nouns, are not specified as 'DEF −' (in fact, they are not specified for definiteness at all), and hence the DLR cannot apply to them. The fact that *cs*-nominals cannot be rendered definite directly is naturally obtained.

Noun-noun constructs are thus constructed by the head-complement schema. An independent *cs*-noun, with no immediate complement, cannot be promoted to the status of a phrase, as the dependency principle prohibits its combination with other phrases until its DEP requirements are discharged. 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. This process is depicted in figure (1.1); notice in particular how the definiteness of the phrase is inherited from the complement using a reentrancy in the head.

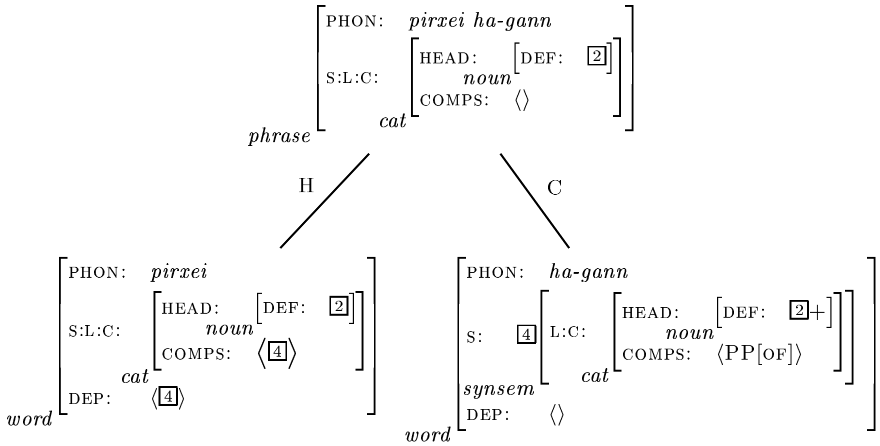

Figure 1.1: A construct NP

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 both phenomena is bound to be redundant. We simply extend the analysis of noun-noun constructs delineated above to the case of *cs*-adjectives. The

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

lexical rule that derives *cs*-adjectives is slightly different from (1.13), since its inputs do not have a genitive PP on their COMPS list. But its outputs are such that *cs*-adjectives are lexically specified to subcategorize for nouns. They cannot occur independently, with no immediate complement, and hence are marked as dependent; and their phrase is constructed through the head-complement schema.

5 Conclusions

We have shown in this paper that there is no theory-independent reason to believe that noun phrases in Hebrew are anything other than NPs. While most existing analyses apply the DP hypothesis to Hebrew, we proposed a straightforward analysis of noun phrases as NPs, accounting for facts such as the combinatorial properties of the definite article, definiteness inheritance in constructs and the similarities between construct-state nouns and adjectives.

To reinforce the validity of the suggested analysis, many of its details still have to be worked out. In particular, a generalized lexical rule for generating all kinds of *cs*-nominals is missing. Determiners other than the definite articles must be accounted for, and the full range of data regarding word order in CS and FG must be explained. Finally, the analysis suggested here must be extended to cover the semantics of noun phrases. We intend to investigate these directions in the future.

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