1. Morphology and construction grammar

1.1. Construction grammar

The title of this book, *Construction Morphology* (henceforth *CM*), promises a theory of linguistic morphology in which the notion 'construction' plays a central role. The theory of *CM* aims at a better understanding of the relation between syntax, morphology, and the lexicon, and at providing a framework in which both the differences and the commonalities of word level constructs and phrase level constructs can be accounted for.

In this chapter, I outline the main ingredients of this theory: a theory of word structure, a theory of the notion 'construction', and a theory of the lexicon. These are the topics of sections 1.2 and 1.3. In section 1.4, I discuss how the notion 'construction' can be made fruitful for morphological analysis and theorizing. A specific advantage of the notion 'construction' is that it can be used both at the level of word structure and that of syntactic structure without obliterating the differences between these two domains. This is shown in section 1.5 where phrasal units with word-like properties are introduced. Although this book focuses on word formation, inflectional phenomena also provide strong evidence for the correctness of a constructional approach, as briefly discussed in section 1.6. Section 1.7 provides a survey of the issues and phenomena that are discussed in the following chapters.

1.2. Word-based morphology

There are two basic approaches to the linguistic analysis of complex words. In the morpheme-based approach which was dominant in post-Bloomfieldian American linguistics, a complex word is seen as a concatenation of morphemes. In this approach, morphological analysis can be defined as the 'syntax of morphemes'. For instance, the English word *walker* can be seen as a concatenation of the verbal morpheme *walk* and the nominalizing suffix *-er* that carries the meaning 'agent'. This is the way in which English morphology is often taught in textbooks, for example in Harley (2007). In a more radical form, the morpheme-based approach has even led to the claim that 'morphologically complex words are the outcome of the manipulation of morphemes that take place in syntax' (Julien 2002: 297). Alternatively, we might take a word-based perspective in which words are the starting points of morphological analysis (Aronoff 2007). This is done by comparing sets of words like:

(1)   buy   buyer

         eat   eater

         shout   shouter

         walk   walker

We then conclude to a formal difference between the words in the left column and those in the right column. This difference correlates systematically with a meaning difference: the words on the right in (1) have an additional sequence *-er* compared to those on the left, and denote the agents of the actions expressed by the verbs on the left. Words like *buy* and *buyer* stand in a paradigmatic relationship, as opposed to the syntagmatic

relationship that holds for words that are combined in a phrase or a sentence. This paradigmatic relationship between pairs of words like *buy* and *buyer* can be projected onto the word *buyer* in the form of word-internal morphological structure:

(2) $[[buy]_V er]_N$

In the mind of the speaker of English, the set of words listed in (1) may give rise to an abstract schema of the following (provisional) form:

(3) $[[x]_V er]_N$ 'one who Vs'

This schema expresses a generalization about the form and meaning of existing deverbal nouns in *-er* listed in the lexicon, and can also function as the starting point for coining new English nouns in *-er* from verbs. That is, new deverbal nouns in *-er* are not necessarily coined on analogy with a specific existing deverbal word in *-er*, but may be formed on the basis of this abstract schema.[1] A new word is formed by replacing the variable *x* in the schema with a concrete verb. This is the operation of 'unification'. For instance, the recently coined English verb *to skype* 'to communicate by means of Skype' can be unified with schema (3), resulting in the new noun *skyper*. As Tomasello (2000: 238) points out, language acquisition starts with storing mental representations of concrete cases of language use. Gradually, the language learner will make abstractions across sets of linguistic constructs with similar properties, thus acquiring the abstract system underlying these linguistic constructs.

The idea that word formation patterns can be seen as abstractions over sets of related words is rooted in a venerable tradition. For instance, the German linguist and Junggrammatiker Hermann Paul wrote in his famous *Prinzipien der Sprachgeschichte*, published in 1880, that the language learner will start with learning individual words and word forms, but gradually (s)he will abstract away from the concrete words (s)he has learned, and coin new words and word forms according to abstract schemas. This enables the language user to be creative in word formation and inflection (Paul 1880 [3rd edition 1898]: 102). This tradition is continued in the paradigmatic approach to word formation in the European tradition of word formation research (Schultink 1962, Van Marle 1985; 2000), in recent work in various varieties of non-transformational generative grammar such as Head-driven Phrase Structure Grammar (Riehemann 1998; 2001), and in the theoretical framework of Cognitive Linguistics (Croft & Cruse 2004, Langacker 1987; 1991; Taylor 2002).

Since such schemas depend on relationships between words, this morphological model has been called the network model (Bybee 1995), and the notion 'network' is indeed a proper term for conceptualizing the set of relationships between words in a lexicon (Bochner 1993). This approach may also be qualified as the 'abstractive' approach (Blevins 2006) because the coinage of new words depends on abstractions over sets of existing words and word forms in the lexicon of a language.

Schema (3) may be said to license the individual deverbal nouns in *-er* in the English lexicon. Complex words, once they have been coined will be stored in the lexicon of a language (which generalizes over the lexical memories of the individual speakers of that language), if they have idiosyncratic properties and/or they have become

conventionalized. A word is conventionalized if it has become the word to be chosen in a language community to denote a particular concept. For instance, the English compound *cash dispenser* is a word used to denote a machine from which one can take cash money. This machine can also be denoted by *cash machine* and *automatic teller machine* (*ATM*), but the word *money machine*, though well-formed and transparent as to its meaning, is not a conventional term for this device. Hence, words like *cash dispenser* must be stored in the lexicon.

This very short sketch of the analysis of a morphological pattern makes two assumptions. First, it assumes that there are specifically morphological generalizations or rules that cannot be reduced to either syntax or phonology. That is, this book takes the lexicalist position that the grammars of natural languages have a relatively autonomous morphological sub-grammar. Secondly, it assumes that complex words, i.e. the outputs of morphological operations, can be listed in the lexicon.

Morphological schemas have the following functions: they express predictable properties of existing complex words, they indicate how new ones can be coined (Jackendoff 1975), and they give structure to the lexicon since complex words do not form an unstructured list, but are grouped into subsets. This conception of the grammar avoids the well known rule / list fallacy (Langacker 1987), the unwarranted assumption that linguistic constructs are either generated by rule or listed, and that being listed excludes a linguistic construct from being linked to a rule at the same time.

The relation between schema (3) and the individual words that conform to this schema is that of 'instantiation': each of the nouns in *-er* listed in (1) instantiate the schema in (3). Schema (3) provides a direct account of the fact that *-er* is a bound

morpheme that does not occur as a word by itself, since this morpheme is not listed in the lexicon as an autonomous lexical item. Its existence is bound to its occurrence in schema (3). The same sequence of sounds /ər/ is used in other morphological schemas as well, for instance in the schema for the comparative form of English adjectives.

The use of constructional schemas like (3) looks similar to the use of word formation rules, as proposed in Aronoff (1976). The equivalent Aronovian rule is:

(4) $[x]_V \rightarrow [[x]_V \text{ er}]_N$ Semantics: 'one who Vs habitually, professionally'

The similarity between the two approaches is that they are both word-based (and hence affixes are not lexical items themselves), and both assume the coexistence of abstract patterns (rules / schemas) and complex words instantiating these rules / schemas listed in the lexicon. Yet, there are a number of advantages of schemas over rules that will be discussed in more detail in the next chapter. One difference that can already be mentioned here is that, whereas rules are always source-oriented (you take a base word, and perform some morphological operation on that base word), schemas can also be product- or output-oriented (Bybee 1995, Haspelmath 1989). For example, in Ngiti, a Central-Sudanic language of Zaire the plural forms of nouns that are kinship terms or denote other inalienable possession are always characterized by a Mid-High tone patterns whereas the corresponding singular forms have a number of different tone patterns (Kutsch Lojenga 1994: 135) (Low tone is marked by `, High tone by ', and Mid tone is unmarked):

(5)   *singular*   *plural*

        àba 'father'   abá

        abhu 'grandfather'   abhú

        adhà 'co-wife'   adhá

Hence, the plural forms can only be characterized uniformly in terms of an output-oriented schema that specifies the Mid-High tone pattern of all these plural forms. The following schema is output-oriented, and expresses the relevant generalization:

(6)   [Mid High]$_{Ni}$ 'plural N$_i$' (where N$_i$ is inalienable)

The notion 'schema' is a very general notion from cognitive science. It is "a data structure for representing the generic concepts stored in memory" (Rumelhart 1980: 34). That is, it can be used for making generalizations across all sorts of linguistic levels and types of (linguistic and non-linguistic) information. In Chapter 2, I discuss the properties of schemas in more detail in relation to the structure of the lexicon.

    What is the implication of word-based morphology as outlined very briefly above for our conception of the architecture of the grammar? How does morphology fit into that architecture? My starting point is that each word is a linguistic sign, a pairing of form and meaning. The form of a word in its turn comprises two dimensions, its phonological form, and its morpho-syntactic properties. Hence, each word is a pairing of three types of information which will be labeled as PHON, SYN, and SEM respectively. Its meaning (SEM) may have both strictly semantic and pragmatic components (McConnell-Ginet

2008). Morphology affects all three dimensions of words. That is why we need a

'tripartite parallel architecture' of the grammar (as advocated by (Culicover & Jackendoff

2005; 2006, Jackendoff 2002a; 2007) on the basis of primarily syntactic considerations).

The essence of this model is that each level of representation is governed by rules and

principles of its own, and that there are interface modules that specify the links between

types of information on the different levels (Jackendoff 2002a: : 125).

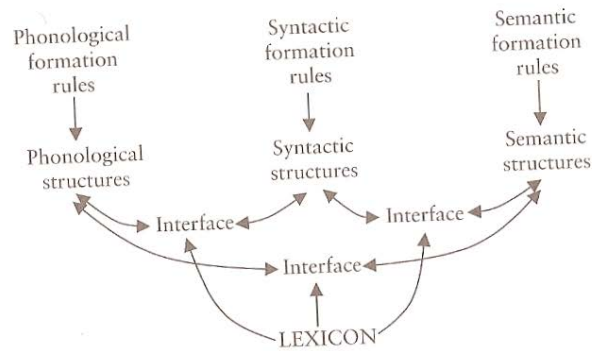Figure 1.1. The tripartite parallel architecture of the grammar

Fig. 1.1. The parallel architecture

In this figure, Jackendoff uses the term 'rules' for regularities on a particular level

of linguistic description, such as phonology or syntax. However, nothing hinges on this

term, and one could use the term 'schema' here as well. For instance, for each language

we need a phonological grammar that specifies how the sounds of a word are grouped

into syllables and higher-level prosodic constituents such as the foot and the phonological

word. The regularities in the phonological structure of words can be expressed by

schemas for phonological structure, and the actual assignment of phonological structure

to a word will then have the form of matching the sound sequence of that word with phonological schemas including those for prosodic structure. Hence, we might express the commonalities in the phonological properties of words as phonological schemas, that generalize over the phonological properties of words. The notion 'schema' is a far more general notion than the notion 'construction' or 'constructional schema' which denotes a schematic pairing of form and meaning.

In sum, a word, like a sentence, is a complex piece of information. It links a particular sequence of sounds to a particular meaning, and it has formal properties such as a syntactic category label. The information contained in the English simplex word *dog*, for instance, can be represented as follows, where the symbol ↔ stands for 'correspondence' :

Figure 1.2. The lexical representation of *dog*.

$$\omega_i \quad \leftrightarrow \quad N_i \quad \leftrightarrow \quad DOG_i$$
$$|$$
$$\sigma$$
$$|$$
$$dog$$
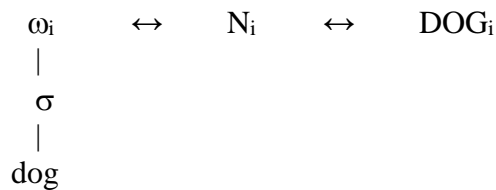
The first piece of information in Figure 1.2 concerns the phonological properties of this word: it is a phonological word (ω) that consists of one syllable (σ) that in its turn consists of a sequence of three sounds. This phonological word bears the same index as the syntactic information about this word (that it is a noun), and is also co-indexed with the semantic information that it expresses the predicate DOG. Co-indexation is used to
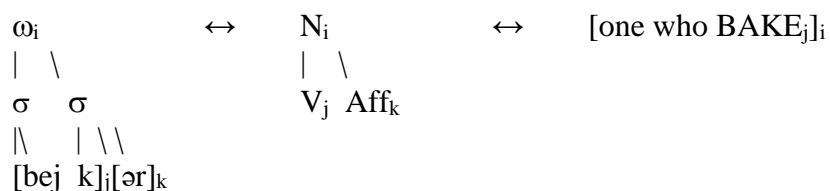
specify the correspondence between the three kinds of information involved in knowing a word. We thus see that a word has a tripartite parallel structure.[1]

Jackendoff considers each word as a set of interface rules between the different levels of representation. Instead, I use the term 'correspondence' for denoting such relationships. The term 'interface' is used to denote the systematicity in the correspondence between the three types of information.

In many cases we need to specify more morpho-syntactic properties of words than their syntactic category. For instance, in many languages nouns belong to a particular gender or noun class, a property that is often only indirectly visible, through the behaviour of a noun in agreement processes (Corbett 2006).

Let us now look at a complex word such as the English word *baker*, a noun derived from the verb *bake* through suffixation with *-er*. The three kinds of information (phonological, morpho-syntactic, and semantic) concerning this word may be represented as follows:

Figure 1.3. The lexical representation of *baker*

```
ωᵢ              ↔      Nᵢ            ↔      [one who BAKEⱼ]ᵢ
|  \                   |  \
σ    σ                 Vⱼ  Affₖ
|\    | \ \
[bej  k]ⱼ[ər]ₖ
```

The phonological structure of *baker* is that of a phonological word consisting of two syllables, $(bej)_\sigma$ and $(k\ni r)_\sigma$. Its formal structure is that of a deverbal noun, as indicated by the tree that represents its morphological structure. The (informal) semantic representation expresses that *baker* is a subject noun that denotes the subject of the action

of baking. The co-indexed pieces of information with the index *j* together form the

information concerning the base word *bake* that recurs in the meaning of *baker*. That is,

the relation between base word and derived word is expressed by co-indexation of the

three pieces of information concerning the base word that recur in the derived word. Let

us therefore assume that each word in the lexicon has a lexical index that is attached to

the three pieces of information of a word. If the verb *bake* carries the lexical index 82,

then we can refer to its properties as $PHON_{82}$, SYN_{82}, and SEM_{82}. Note that affixes do

not have a lexical index since they are not words. Hence, co-indexation for affixes is of

restricted relevance, and is only used for correlating phonological information with a

position in morpho-syntactic structure.

The representation in Figure 1.3 may be generalized into a schema for agentive

subject nouns derived from verbs by means of the suffix *-er,* because there is a large set

of such deverbal nouns in English. This is achieved by omitting the word-specific

information. This morphological schema thus specifies that there is the following

systematic relation between the three kinds of linguistic information involved (this

schema is a generalization of the lexical representation given in Figure 1.3):

Figure 1.4. The schema for deverbal *-er*.

$$\omega_i \quad\quad \leftrightarrow \quad N_i \quad\quad \leftrightarrow \quad [\text{one who } PRED_j]_i$$
$$| \quad\quad\quad\quad\quad\quad\quad | \; \backslash$$
$$[\;\;]_j[\text{ər}]_k \quad\quad\quad\quad V_j \; Aff_k$$

In Figure 1.4 the level of the syllables has been omitted because the number of syllables

of words ending in *-er* is not fixed, but depends on the phonological make-up of the base

verb. Hence it is a computable, predictable property of each individual deverbal noun

in *-er*. Instead of the specific predicate BAKE, the general label PRED (Predicate) is used to refer to the semantics of the base verbs.

The operation on the PHON level specified in this schema is that of concatenation: the sound sequence corresponding to the affix is concatenated to the right of that of the base word. Thus, a particular sequence of sound segments is created. In addition, the general phonological algorithm of a language for prosodic structure, which is partially universal, will compute the prosodic structure of these nouns in *-er*, and predict the syllabification of *baker* as *ba.ker* (dots indicate syllable boundaries).

The systematic aspects of the correspondence relations between the three levels of information is accounted for by interface modules. The notion 'interface' refers to the fact that properties of one level may relate to those of another. An example of a relation between the phonological and the morpho-syntactic level is that the suffix *-er* is one of the so-called cohering suffixes of English. This means that this suffix forms one domain of syllabification with the stem to which it has been attached. The word *baker* is syllabified in the same way as the word *father*, in which the sequence *-er* is not a suffix. The sound sequence *-er* forms one syllable with the preceding consonant in both words: *ba.ker, fa.ther*. Thus, the morphological boundary between *bak-* and *-er* in *baker* is not respected in phonology, in the sense that it does not coincide with a syllable boundary. That is, morphological and prosodic structure are not necessarily isomorphic. In the default case, a word-internal suffix boundary is ignored in computing the prosodic structure of a complex word.

There are also suffixes that do influence the way that a complex word is syllabified. The English suffix *-less*, for example, is a non-cohering suffix. This means

that this suffix forms its own domain of syllabification. The adjective *help-less*, for instance, is syllabified as *help.less*, with a syllable boundary coinciding with the internal morphological boundary. Compare the syllabification of this adjective to the syllabification of the word *staples*, which is *sta.ples*, with a syllable boundary before the consonant cluster /pl/. The distinction between cohering suffixes and non-cohering ones is therefore a theoretical distinction that we need for a proper account of the interface between morphology and phonology. This shows that there are two competing phonological subsystems or co-phonologies (Orgun & Inkelas 2002) for English complex words with suffixes: one subsystem for cohering suffixes such as *-er*, in which the suffix boundary is ignored in prosodic structure, and one subsystem for non-cohering suffixes such as *-less* in which the suffix boundary coincides with a syllable boundary.

Affixation and compounding are the most common, but not the only two formal mechanisms for creating complex words. Other (forms of) words may also be created by vowel alternation (Umlaut or metaphony, as in German *Vater* 'father.SG' versus *Väter* 'father.PL', and Ablaut or apophony, as in *run-ran*), tone and stress alternations, and truncation processes (as in the formation of hypocoristics, for instance *Rebecca – Becky*). In those cases the morphological structure of a word cannot be represented in term of constituent structure. Instead, we need to assign these words features such as [plural] or [+ hypocoristic] that trigger the application of specific phonological processes unique for words with that feature. Thus, each class of words may have its own co-phonology.

In sum, the interface module between morphology and phonology specifies which types of morphological information are accessible for the computation of the phonological properties of complex words, and how they influence these phonological

properties. Inversely, morphological processs may make use of phonological information.

For instance, the English word formation process that derives verbs from adjectives

through the addition of the suffix *-en* only applies to momosyllabic bases. Hence, we find

the verbs *to blacken* and *to redden*, but *to yellowen* is ill-formed.

Similarly, there is an interface module for the relation between morpho-syntax

and semantics. The most general principle for the relation between the morpho-syntactic

structure of a word and its semantics is the Compositionality Principle: the meaning of a

complex word is a compositional function of the meaning contribution of its constituents,

and its structure (Hoeksema 2000). An example of the role of the structure of words in

the computation of the semantic interpretation of complex words is the following. In

Germanic languages, the right constituent of a compound, that is, its formal head that

determines its syntactic category, is its semantic head as well. Hence, we get a contrast in

interpretation between the following pairs of compounds that consist of the same word

constituents:

(7)   *Dutch*

        (de) geld-zak '(the) money bag' (common gender)

        (het) zak-geld '(the) pocket money' (neuter gender)

        German

        (die) Wasser-leitung '(the) waterpipe (feminine gender)

        (das) Leitung-s-wasser '(the) tap water' (neuter gender)

The different definite articles indicate that the two compounds of each pair differ in gender as well: in the first example, *geldzak*, the head *zak* 'bag' has common gender, and hence the compound has common gender as well, whereas the head *geld* 'money' in the second compound *zakgeld* is a neuter noun that takes *het* as its DEF.SG. article, and thus the compound *zakgeld* is neuter as well. Similarly, the gender difference between the German compounds in (7) follows from a corresponding gender difference between *Leitung* 'pipe' (feminine) and *Wasser* 'water' (neuter). The compound construction as a whole provides a specific meaning contribution, since it designates the right constiuent as the head. As shown more extensively in chapter 2, morphological constructions are the carriers of specific meaning components that are not derivable from the meaning of their constituents.

Another systematic relation between SYN and SEM of words concerns argument structure. For instance, in English a predicate with two semantic roles, an Agent and a Patient, will be a verb with the Agent expressed as subject, and the Patient as direct object. That is, there are systematic links between the semantic structure of predicates and their syntactic valency that can be expressed by linking rules. Morphological operations may create semantic properties of derived verbs in such a way that they systematically create transitive verbs (as in the case of causativization where a Causer-role is added). For instance, if we derive the Dutch causative verb *verduidelijken* 'to clarify' from the adjective *duidelijk* 'clear', this causative verb is predictable transitive.

In short, we need an interface module that computes predictable properties of words on the SYN and SEM levels. Note, however, that the syntactic valency of a verb

may also depend on the specific construction in which it occurs, as discussed in section 1.3.

A direct interface between SEM and PHON is also possible. This applies to phenomena like the marking of focus, and the marking of questions by means of specific intonation patterns. Sound symbolism may be considered as case of such interface at the word level (Marchand 1969: Chapter 7). For instance, English words that begin with the consonant sequence *spr-* tend to express the meaning of spreading, as in *sprawl, spread,* and *sprinkle*. Since *spr-* is not a morpheme, there is a direct interface between the level of the sounds and that of meaning here. However, this kind of symbolism is hard to capture in hard-and-fast rules.

The tripartite structure in Figure 1.4, an instance of a word formation schema, makes clear that morphology is not a module of grammar on a par with the phonological or the syntactic module that deal with one aspect of linguistic structure only. Morphology is word grammar, and similar to sentence grammar in its dealing with the relationships between three kinds of information. It is only with respect to the domain of linguistic entities that morphology is different from sentence grammar since morphology has the word domain as its focus.

This architecture for morphology is the same as that for sentence grammar, but its domain is smaller, namely that of the word. However, this does not mean that the two sub-grammars are completely separate components, with lexical insertion as the only point of contact between them (as suggested in Ackema & Neeleman (2004)). As argued in this book, there are various forms of interaction between these two domains, which will force us to reconsider how syntactic and morphological structures relate.

1.3. Constructions

The notion construction (defined as a pairing of form and meaning) is a traditional notion used in thousands of linguistic articles and books. In most cases it refers to a syntactic pattern in which particular formal properties correlate with specific semantics. For instance, many linguists of English speak of 'the passive construction' since the grammar of English possesses a specific sentence form in order to express this meaning.

A well known example of a syntactic construction is the caused motion construction exemplified by sentence (8) (Goldberg 2006: 73):

(8)   Pat sneezed the foam off the cappuccino

In this sentence, the verb *to sneeze* is used as a transitive verb, although it is normally an intransitive verb. Its use as a transitive verb correlates with the presence of an object that moves along a path specified by a PP. The transitivity of the normally intransitive verb *to sneeze*, and meaning component that the sneezing caused the foam to move is therefore to be seen as a property of this construction as a whole. A similar example from Dutch is the resultative construction exemplified by the following sentence:

(9)   De nieuwe kok kookte twee Michelin-sterren bij elkaar
        The new cook cooked two Michelin-stars by each other
        'The new cook acquired two Michelin-stars by his way of cooking'

The verb *koken* 'to cook' does not select objects like stars, but objects of the food type. Yet, in this resultative construction the object *Michelin-sterren* is possible.

Another example of a syntactic construction is the NPN-construction, exemplified by phrases like the following (Jackendoff 2008):

(10)   day by day, point for point, face to face, week after week, argument upon

argument

The NPN construction consists of a bare singular count noun followed by one from a restricted set of prepositions and the same bare singular count noun. Jackendoff, following Culicover, refers to this construction as a 'syntactic nut', a non-canonical structure of English that is strongly entrenched in the grammar of English, and productive as well.

The individual instantiations of the construction as listed in (10) will be referred to as 'constructs'. Jackendoff does not specify a general meaning of this NPN construction; instead, he provides meaning specifications for each specific preposition choice, such as 'succession' for *by* and *after*, and 'matching / exchange' for *for*. This illustrates that not all linguists require a construction to always have a specific holistic, non-compositional meaning component.

The choice of words in a particular construction may be partially fixed. Consider the following phrases of Dutch, all instantiations of a particular construction:

(11)   een schat van een kind 'lit. a sweetheart of a child, a sweet child'

        een kast van een huis 'lit. a cupboard of a house, a big house'

        die boom van een kerel 'lit. that tree of a chap, that big chap'

The structure of these phrases and the corresponding semantic interpretation can be represented as follows:

(12) $[[x]_{Ni} [[van]_P [[een]_{Det} [x]_{Nj}]_{NP}]_{PP}]_{N' k} \leftrightarrow [SEM_j$ with SEM_i-like property$]_k$

That is, these phrases exemplify the general structure of Dutch NPs with a N as head, preceded by a determiner, and followed by a PP complement. Semantically, however, it is the noun of the PP-complement that functions as the head, and it also determines the gender of the relative pronoun for which it is the antecedent as shown by the following example:

(13)   een kast van een huis, {*die / dat} nodig geverfd moet worden

        a cupboard of a house that urgently painted must be

         'a big house that has to be painted urgently'

The noun *kast* 'cupboard' is of common gender, whereas *huis* 'house' is neuter; the relative pronoun *dat* is the pronoun for antecedents with neuter gender, whereas *die* is used for antecedent of common gender. The two nouns have to agree in number. For instance, the plural of *een schat van een kind* is *schatten van kinderen*, with both nouns in

their plural form and the zero plural indefinite article: both *schatten van een kind* and *een schat van kinderen* are ill-formed in the interpretation given here.

A schema like (12) is a constructional idiom, that is, a type of idiom in which not all positions are lexically fixed, and hence some are variable.[2] In (12) it is only the fillings of the determiner and the preposition slots of the PP complement that are lexically fixed. The set of constructs of the type (12) can be extended, and hence they do not form a fixed list of expressions. The first noun has to be a noun that expresses an evaluation of properties of the noun in the PP-complement. For instance, it is possible to coin the phrase *een godin van een vrouw* 'lit. a goddess of a woman, a ravishing woman' as a new instantiation of this constructional idiom. Nevertheless, this construction does not lend itself to unlimited extension, and the example *een godin van een vrouw* is experienced as a case of creative language use. That is, the notion 'restricted productivity' applies here, a notion that is normally used for describing the use of morphological patterns. Similar constructs are found in English (*a brute of a man*) (Aarts 1998), German (*ein Teufel von einem Mann* 'a devil of a man, a brute man') (Leys 1997), Spanish (*esa mierda de libro* 'that shit of book, that shitty book') and French (*ton phénomène de fille* 'your phenomenon of daughter, your amazing daughter') (Hulk & Tellier 1999).

The existence of such constructional idioms has implications for our view of the lexicon. Traditionally, the lexicon is conceived of as the list of conventional and fixed linguistic expressions, both words and larger, idiomatic phrasal units. However, the facts discussed here imply that the lexicon has to be extended with partially underspecified idioms, in the case of Dutch the N'-type *N_1 van een N_2* with the meaning 'N_2 who/which is like an N_1' or similar constructions in other languages.

In both Dutch and English (and in a number of other languages as well (Himmelmann 1998), we find PPs in which a preposition is followed by a bare count noun. That is, the determiner that is expected to precede a count noun is lacking. Examples are:

(14)   *Dutch*   *English gloss*

     per trein   by train

     per vliegtuig   by plane

     per bus   by bus

     per auto   by car

The nouns do not denote specific entities, but are used generically, to denote a particular means of transportation. The specific properties of this construction are the choice of the preposition (*by* in English, the preposition *per*, a Latin borrowing in Dutch), and the bare count noun, which correlates with the specific meaning 'means of transportation' (Baldwin et al. 2003). Note that these phrases are in conformity with the general constraints on the form of Dutch and English PPs, and form a specific subset of these phrases. The constructional schema for these expressions is therefore:

(15) $[[\text{per /by}]_P \ [[x]_{Ni}]_{NP}]_{PPj} \leftrightarrow [\text{through transportation by SEM}_i]_j$

Recall that the symbol $\leftrightarrow$ stands for the relation of correlation between the different types of information. SEM stands for the meaning component of the noun. The choice of noun is semantically restricted to nouns that denote a means of transportation. This restriction

will be imposed by the meaning of this construction. Hence, if we were to coin the Dutch phrase *per tapijt* 'by carpet', this implies that carpets can be used as a means of transportation. Schema (15) is also another example of a constructional idiom, since the slot for the preposition is lexically fixed, whereas the slot for the noun is occupied by a variable.

The notion 'construction' plays an important role in a number of recent linguistic models: Construction Grammar (Croft 2001, Fried & Östman 2004, Goldberg 1995; 2006), the Simpler Syntax Model (Culicover & Jackendoff 2005; 2006), Cognitive Linguistics (Langacker 1999), and Head-driven Phrase Structure Grammar (HPSG) (Sag 2007; Sag et al. 2003). The following features of the constructional approach are of high relevance for the further articulation of *CM* in this book:

(16)   Pieces of syntactic structure can be listed in the lexicon with associated meanings, just as individual words are; these are the MEANINGFUL CONSTRUCTIONS of the language.

Construction grammar makes no principled distinction between words and rules: a lexical entry is more word-like to the extent that it is fully specified, and more rule-like to the extent that it contains variables [...].

L]exical entries are arranged in an inheritance hierarchy. (Jackendoff 2008: 15)

Goldberg stresses the point that constructions can vary in size and complexity. She provides the following table to illustrate this point (Goldberg 2009: 94):

Table 1.1. Examples of constructions varying in size and complexity

	example
Word	tentacle, gangster, the
Word (partially filled)	post-N, V-ing
Complex word	textbook, drive-in
Idiom (filled)	like a bat out of hell
Idiom (partially filled)	believe <one's> ears / eyes
Ditransitive	Subj V Obj$_1$ Obj$_2$ (e.g. he baked her a muffin)

In a previous publication, Goldberg also listed the category morpheme in this list of constructions (Goldberg 2006: 5). However, the category 'morpheme' should not appear on this list, because morphemes are not linguistic signs, i.e. independent pairings of form and meaning. The minimal linguistic sign is the word, and the occurrence of the category 'morpheme' in this list is to be seen as an infelicitous remnant of morpheme-based morphology. Instead, bound morphemes form part of morphological schemas, and their meaning contribution is only accessible through the meaning of the morphological construction of which they form a part. This insight is done justice in Table 1, and also in the sketch of the syntax-lexicon continuum by Croft in Table 1.2:

Table 1.2. The syntax-lexicon continuum (Croft 2001: 17)

Construction type	Traditional name	Examples
Complex and (mostly) schematic	syntax	[SBJ *be*-TNS VERB-*en* *by* OBL]
Complex and (mostly) specific	idiom	[*pull*-TNS NP'*s leg*]
Complex but bound	morphology	[NOUN-s], VERB-TNS]
Atomic and schematic	syntactic category	[DEM], [ADJ]
Atomic and specific	word / lexicon	[*this*], [*green*]

Note that in this table we do not find the morpheme as a construction type.

Michaelis and Lambrecht also mention the relevance of construction grammar for the analysis of words:

In Construction Grammar, the grammar represents an inventory of form-meaning-function complexes, in which words are distinguished from grammatical constructions only with regard to their internal complexity. The inventory of constructions is not unstructured; it is more like a map than a shopping list. Elements in this inventory are related through inheritance hierarchies, containing more or less general patterns. (Michaelis & Lambrecht 1996: 216).

It should be clear by now that the notion 'construction' has relevance for the theory of word structure. Yet, the investigation of the constructional aspects of word structure is still in its beginnings. Culicover & Jackendoff state: 'We take morphology to be the extension of the parallel architecture below the word level' (Culicover &

Jackendoff 2006: 19). Although this is a good starting point, we also have to investigate to what extent morphology has principles of its own which makes it partially different from syntax.. In their study Culicover and Jackendoff focus on the phrase level, and at the end of their 2005 book they observe: 'We have looked not at all at morphology. How does it integrate into the system? What are the implications for the structure of the lexicon?' (Culicover & Jackendoff 2005: 545). It is the aim of this book to contribute to answering these questions, and find out about the commonalities and differences of syntax and morphology..

1.4. Construction Morphology

The use of the notion 'morphological construction' is by no means a recent innovation. For instance, Bloomfield in his chapters on morphology, speaks of "three types of morphologic constructions" (Bloomfield 1935: 227), and he remarks that a complex word reveals "an outer layer of inflectional constructions, and then an inner layer of constructions of word formation" (p. 222). What is new, however, is the use of the notion 'construction' as developed in Construction Grammar for morphological analysis.[3]

Let us return to the schema for English deverbal nouns in (3). This schema can be qualified as a constructional idiom at the word level, that is, a word level construction with one fixed position, that of the suffix. The meaning of the constructional idiom is also specified. This meaning is a holistic property of the construction as a whole: the agent meaning cannot be derived from the suffix *-er* as such, since this meaning is only invoked when this suffix forms a noun together with a verbal base. In combination with an

adjective, the bound morpheme *-er* evokes a completely different meaning, that of the comparative. The individual deverbal nouns in *-er* are morphological constructs that instantiate this construction. In schema (3) the two form levels, phonological form and morpho-syntactic form, are conflated into one representation. I will continue to do so, for ease of exposition, but these levels will be split when necessary for the purpose of analysis or argumentation.

Schema (3) is a case of derivation, word formation by means of an affix. Patterns of compounding, the other main type of word formation, can also be represented straightforwardly as constructions, as in schema (17) for the nominal compounds of Germanic languages which are normally are right-headed:

(17) $[[a]_{Xk} [b]_{Ni}]_{Nj} \leftrightarrow [\text{SEM}_i \text{ with relation R to SEM}_k]_j$

The variable X stands for the major lexical categories (N, V, A and P). The lower case variables *a* and *b* in this schema stand for arbitrary sound sequences. The lower case variables *i, j, k* stand for the lexical indexes on the PHON, SYN and SEM properties of words. The use of phonological variables indicates that phonological information does not play a restrictive role in this type of word formation in Germanic languages. In (17) the general meaning contribution of the compound schema is specified, since morphology is about form-meaning pairs. The nature of R is not specified, but is determined for each individual compound on the basis of the meaning of the compound constituents, and encyclopaedic and contextual knowledge (Downing 1977; Jackendoff 2009). The following English compounds exemplify the various options defined by schema (17):

(18)   NN   book shelf, desk top, towel rack

VN   drawbridge, pull tab

AN   hard disk, blackbird, blackboard

PN   afterthought, overdose, inland

Schema (17) does not yet express that it is not only the syntactic category of the head that is identical to that of the whole compound, but that the two N-nodes are also identical with respect to properties such as gender and declension class. Hence, we elaborate schema (17) as (17)' in which [αF] stands for the set of relevant subclass features:

(17)' $[[a]_{Xk} [b]_{Ni}]_{Nj}$ $\leftrightarrow$ $[SEM_i$ with relation R to $SEM_k]_j$

$[αF]$ $[αF]$

Template (17)' thus specifies the category of right-headed nominal endocentric compounds of Germanic languages. It specifies that the head is not only the formal head, but also the semantic head: a compound with an N in the right position denotes a certain N, not a certain X. Each individual nominal compound is an instantiation of this constructional schema.

A clear advantage of this schematic description of nominal compounds is that we do not need an additional separate Right-hand Head Rule (Williams 1981) in order to express the generalization (that holds for Germanic languages, but is not a universal) that the category of a compound is determined by its right constituent.

New complex words can be coined through the unification of a schema with a lexical item. For instance, the unification of the verb [*skype*]$_V$ 'to communicate by means of Skype' with schema (3) results in the construct [[*skyp*]$_V$*er*]$_N$ 'one who SKYPEs' (where SKYPE stands for the meaning of the base verb). That is, through unification the variables in the formal structure and the semantic specification of the schema are turned into constants. Unification is the basic operation, both at the word level and the phrase level, to create well formed linguistic expressions.

Prefixation can be analyzed in the same way. Consider the following English prefixed words, verbs in which the word *out* is 'prefixed' to a verbal stem, as in

(19)   out-achieve, out-bid, out-class, out-dance, out-do, out-grow, out-jockey, out-perform

The common meaning of these verbs is that the subject of the action surpasses someone / something else in quality in the relevant domain of action.[4] If Mary outdances John, Mary dances better than John. All these *out*-verbs are transitive verbs, and the pattern is productive, as illustrated by the following sentence from the internet with the verbs *outthink* and *outgun*:

(20)   Your success depends solely on your ability to out-gun and out-think your opposition

The word *out* can be used as a preposition, and as an adverb. Hence, one may classify these *out*-verbs as compounds of the word *out* with a verb. Yet, these *out*-verbs are usually considered cases of prefixation. Although *out* is a polysemous item with quite a range of meanings, it has developed this special meaning of surpassing / exceeding in combination with verbs, and this is why it is looked upon as a prefix in many descriptions of the morphology of English. This specific meaning of *out* can still be related to the other ones, because *out* can have the meaning 'away from, beyond', as in *outbuilding* and *outreach* which is related to the 'prefixal' use of *out*. That is, *out-V* exhibits a constructional semantic property, since it implies the selection of a specific meaning of the constituent *out* that is tied to this class of verbs. This can be expressed directly by assuming the following morphological construction:

(21) $[[\text{out}]_{Adv} [x]_{V_i}]_{V_j} \leftrightarrow [\text{to exceed someone/thing in SEM}_i]_j$

In this constructional schema we can still do justice to the property of *out* that it is not a bound morpheme *stricto sensu*, but a word with a specific meaning in a specific construction. This morphological construction thus has a 'configurative meaning', in line with a Gestalt-view of pattern-based morphology. We do not need to classify *out* as a prefix, with the unwanted implication that it is just homophonous by coincidence with the word *out*.

1.5. Multi-word units

The lexicon is the repository of all simplex words, and of all complex words that are idiosyncratic or conventionalized. In addition, the lexicon has to specify multi-word units that are idiomatic. Being idiomatic means for a linguistic construct that is has unpredictable properties that have to be learned and memorized by the speaker. The size of idiomatic constructs may vary from sentences (for instance, proverbs) to phrases consisting of two words, the minimal size for lexical phrases (for instance, the NP *red tape* as idiom for bureaucracy, *urban legend* 'popular myth' or *black death* for 'pest'). Phrases may be stored in the lexicon for another reason as well. They might be completely regular, but conventionalized expressions. For instance, the conventional name in Dutch for a decision made by the king or queen is the AN phrase *koninklijk besluit* 'royal decree'. The possible alternative expression for this meaning is the NN compound *koningsbesluit* 'king's decree', but this is not the conventional expression. Hence, the coinage of this NN compound is blocked by the existence of the conventional NP *koninklijk besluit*. The blocking effect can be used as a test for the conventionality of such expressions.[5]

As has been pointed out in the recent literature, multi-word expressions (MWEs) are not just fixed sequences of words with an atomic meaning, but differ in their degree of compositionality and syntactic flexibility (Pitt & Katz 2000; Sag et al. 2002). The notion 'constructional idiom' introduced above can be used to do justice to certain aspects of this flexibility, in particular to the fact that idiomatic constructions can receive new instantiations.

It is not my aim in this book to develop a complete analysis of MWEs. I focus on those MWEs that instantiate productive patterns, and that are functionally similar to

complex words. A clear example is the class of phrasal verbs in Germanic languages that are usually referred to as particle verbs. Examples from English are *to put down* and *to phone up*. The Dutch equivalents of these particle verbs are *neer-leggen* and *op-bellen*, with the particle preceding the verb (written as one word, although they are phrasal and other words can come in between the particle and the verb). These particle verbs function as alternatives for prefixation in the coinage of complex predicates, and this explains the restricted productivity of deverbal prefixation in Germanic languages: there is strong competition from particle verb formation which is a functionally equivalent means of creating complex predicates. In Chapter 5 I argue that these particle verbs can be seen as instantiations of phrasal constructional idioms, whereas prefixed verbs are instantiations of constructional idioms at the word level. This is illustrated here by means of the following minimal pairs from Dutch, with different locations of the main stress:

(20) *particle verb*   *prefixed verb*

      óver komen 'to come over'   over-kómen 'to happen to'

      dóor leven 'to continue living'   door-léven 'to live through'

These particle verbs are clearly lexical units, and we can do justice to their properties by analyzing them as being formed according to phrasal constructions (Chapter 5). By using the notion 'constructional idiom' for the analysis of particle verbs, we can maintain the boundary between phrasal and morphological constructs, and yet do justice to the word-like (lexical) properties of particle verbs.

Another reason for dealing with phrase-sized constructs in a theory of Construction Morphology is the phenomenon of periphrasis. This notion is used to refer to the fact that cells in the inflectional paradigms of words may be filled by word combinations instead of words. For instance, in most European languages we find periphrastic tenses like the perfect, expressed by the combination of a specific verb (the auxiliary) and a participle. In Latin, the perfective passive is expressed by a combination of the verb *esse* 'to be', and the past participle:

(21)   Paradigm of 3rd pers. sg. forms of *laudare* 'to praise'

IMPERFECTIVE	*Active*	*Passive*
Present	laudat	laudatur
Past	laudabat	laudabatur
Future	laudabit	laudabitur

PERFECTIVE	*Active*	*Passive*
Present	laudavit	laudatus/a/um est
Past	laudaverat	laudatus/a/um erat
Future	laudaverit	laudatus/a/um erit

The fact that this periphrastic form is the only possible form for expressing the perfect past shows that the form fills a cell in the inflectional paradigm. Moreover, in the case of deponentia (verbs with a passive form and an active meaning) such as *loquor* 'to speak',

the periphrastic form has an active meaning, just like the other, synthetic, forms. For instance, *locutus est* means 'he has spoken' (Börjars et al. 1997).

This means, that phrasal constructs may express morphological properties (Ackerman & Stump 2004, Ackerman & Webelhuth 1998, Börjars et al. 1997, Sadler & Spencer 2001). Therefore, we have to investigate how such phrasal constructs with a morphological function can be accounted for in morphology. In *CM* such an account is readily available because these periphrastic expressions can be analyzed in terms of constructional idioms. In English, for instance, the passive construction consists of a form of a lexically fixed verb *be* with a participle. This specific pattern expresses the passive meaning, which cannot be derived from the meaning of one of the constituent words: neither the verb *to be*, nor the participle itself is the carrier of the passive meaning.

A special class of lexical constructs is formed by complex numerals. Compare the form of the following complex numerals in Spanish and Dutch:

(22)	*number*	*Spanish*	*Dutch*
	31	trenta y un/uno/una	een-en-dertig
	32	trenta y dos	twee-en-dertig
	33	trenta y tres	drie-en-dertig

The construction of these numerals is similar in that in both languages the mechanism of coordination is used: the two constituent numbers are linked by the conjunction for 'and': *y* and *en* respectively. Hence, these number names look like syntactic constructs. Moreover, they cannot be considered as lexically fixed idioms because the formation of

number names is, for obvious reasons, productive. Yet, this is not syntactic coordination *tout court* since in these languages the order of the two constituents is fixed differently: in Spanish the smaller addend has to follow the larger one, whereas in Dutch the smaller addend precedes the larger one. In both languages, the order of the coordinated constituents is not free, as is normally the case in coordination (as in Dutch *dertig koeien en twee paarden* 'thirty cows and two horses', or *twee paarden en dertig koeien* 'two horses and thirty cows'). An additional observation is that the vowel of the Dutch constituent *en* is [ə], whereas normally *en* is pronounced as [ɛn]. Does this mean that these complex number names are to be considered as word constructs? In other words, such lexical constructs raise the question of how to demarcate word constructs from phrasal constructs. We can do justice to the intermediate status of such constructs in *CM*, by assuming specific constructional schemas for such number names in the lexicon, as argued in detail in Chapter 7.

In sum, the use of the notion 'construction' in morphological analysis is also motivated by the fact that lexical phrasal constructions with word-like functions must be dealt with as well, and can receive an insightful analysis in *CM*.

1.6. Inflectional patterns as constructions

Inflectional systems are a classical problem for a morpheme-based analysis of word-internal structure because in many languages there is no one-to-one correspondence between the building blocks of inflected words and their morpho-syntactic and morpho-semantic properties. The phenomena involved are described in terms of notions like

cumulative exponence, extended exponence, stem allomorphy, inflectional classes, thematic vowels, syncretism, suppletion, and periphrasis. This is why morphologists have proposed variants of realizational morphology in which there are rules that spell out the phonological form of each word form, a word with a particular array of features (Ackerman & Stump 2004, Anderson 1992, Spencer 2004, Stump 2001). The crucial observation from a constructionist point of view is that it is the specific array of building blocks like stem allomorph, thematic vowel, ending, etc that as a whole evokes a specific set of morpho-syntactic and morpho-semantic properties. That is, this set of properties is a holistic property of the inflectional construction. The thematic vowel in the conjugations of various Indo-European languages do not contribute a particular property directly, but only as part of the array of morphological building blocks in a verb form. Indeed, Spencer explicitly concludes that for these reasons we have to consider morphologically complex words as constructions (Spencer 2004)). As an example of such a holistic property, Spencer observes that the Spanish future conditional verbal word forms consist of the infinitival stem followed by the inflectional ending for the imperfect indicative of the 2nd and 3rd conjugation, as in *cantar-ía* 'sing, future conditional, 1sg'. It is the combination of the two building blocks that provides this specific interpretation. Similarly, in Dutch present participles are derived from the infinitival form by adding the suffix -*d*, without an infinitival meaning being involved. Consider the following examples. There is a small set of verbs (23b) that have an infinitival form in -*n* instead of the regular -*en*. The same difference is found in the present participle:

(23)   a.   lop-en 'to walk'   lop-en-d 'walking'

hei-en 'to drive piles'   hei-en-d 'driving piles'

b.   doe-n 'to do'   doe-n-d 'doing'

slaa-n 'to hit'   slaa-n-d 'hitting'

Hence we should derive the present participle from the infinitival form even though the infinitival 'meaning' is not involved.

Therefore, inflectional phenomena provide direct evidence for the idea that morphologically complex words should be seen as constructions, with holistic properties. However, this book will focus on constructional properties of word formation because it is for this domain that I am able to present a number of in-depth analyses that flesh out the theory of Construction Morphology.

1.7. Outlook

In this chapter some initial considerations for the use of the notion 'construction' in the analysis of morphological and lexical phrasal constructs have been presented. In the following chapters, these analyses will be fleshed out.

In Chapter 2 I give a more detailed analysis of the nature of the lexicon, and of the advantages of using constructional schemas to express morphological generalizations. Chapter 3 discusses the advantages of a hierarchical conception of the lexicon in more detail.

Chapters 4-7 deal with specific phrasal lexical constructs that support *CM*: quasi-incorporation (Chapter 4), particle verbs (Chapter 5), phrasal names (Chapter 6), and

numeral expressions (Chapter 7). Chapter 8 deals with a particular type of periphrasis, progressive constructions. In Chapter 9 I deal with construction-dependent morphology, the phenomenon that the occurrence of bound morphemes is linked to specific syntactic constructions.

Chapter 10 deals with some phonological issues related to Construction Morphology, in particular the nature of lexical phonological representations, and the question whether lexically encoded allomorphy affects the identification of morphological relations between words.

Chapter 11 discusses what the findings of this book imply for our view of the architecture of the grammar, and their implications for models of language processing. In this chapter I also identify some issues that have not been broached in detail in this book, thus suggesting topics for further research.

Notes to Chapter 1

1. This is a traditional insight, formulated as follows by the linguist E. M. Uhlenbeck in his dies lecture for the University of Leiden in 1976: 'woorden zijn eenheden waaraan drie dimensies zijn te onderkennen. Zij vertonen een hoorbare vorm - dit is hun fonische dimensie -, zij leveren in het gebruik een kennisbijdrage tot het geheel waarvan zij deel uitmaken - dit is hun semantische dimensie -, en tenslotte hebben zij een grammatische dimensie waaronder allereerst moet worden verstaan dat zij over systematische verbindingsmogelijkheden beschikken ten opzichte van andere woorden' [words are units for which three dimensions can be distinguished. They exhibit an audible form – this is their phonic dimension- , they contribute knowledge to the expression as a whole – this is their semantic dimension - , and finally they have a grammatical dimension, which means first of all that they dispose of systematic possibilities of connection in relation to other words. [my translation] (Uhlenbeck 1976).

2. The idea of 'constructional idioms' can be found in the work of Langacker (Langacker 1987), in Construction Grammar (Fillmore et al. 1988, Goldberg 1995, Goldberg 2006, Kay & Fillmore 1999, Pitt & Katz 2000), and in work by Jackendoff (Jackendoff 1997; 2002a; 2002b). Other terms used are 'lexical phrases with a generalized frame (Nattinger & De Carrico 1992), and 'idiomatic pattern' (Everaert 1993).

3. The view that complex words instantiate morphological constructions is also stated explicitly in Croft (2001: 17), in Goldberg (2006: 5), and in Inkelas & Zoll (2005: 11-16),

which presents a cross-linguistic construction-morphological analysis of reduplication. An example of a constructional analysis of prefixed words is the analysis of English *be*-verbs in (Petré & Cuyckens 2008).

4. This does not mean that this is the only meaning of *out* in verbs, as shown by a verb like *outblaze* that has both the meaning 'to exceed in shining, to outshine', and the intransitive meaning 'to flare up'.

5 .See (Jackendoff 1997: Chapter 7) for a discussion of the relevant English facts.

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