

Compounding in Dutch

Geert Booij

This paper presents a survey of the patterns of compounding in Dutch. Nominal and adjectival compounding are productive, verbal compounding is not. Inflection and derivation can both precede and follow compounding, and hence they cannot be ordered in terms of levels in the lexicon. Phrases are allowed in non-head position, and thus there is no complete separation of morphology and syntax. The head constituent is always in the right position. Word-internal coordination is also possible.

1. Introduction.

The structure of Dutch compounds is $[X Y]_Y$, i.e. the right constituent is the head. In this paper I will present a survey of the possible types of Dutch compound, i.e. of the possible values of X and Y, and I will also discuss a number of more specific phenomena and theoretical issues concerning Dutch compounding.

2. Nominal compounding.

The most productive type of compounding in Dutch is nominal compounding. In nominal compounds, the value of X, the left constituent, can be N(oun), A(djective), V(erb), P(reposition), Adv(erb) or Num(eral):

- (1) X = N [[bureau]_N[[la]_N]_N 'desk drawer'
X = A [[groot]_A[[vader]_N]_N 'grandfather'
X = V [[kook]_V[[pot]_N]_N 'cooking pot'
X = P [[voort]_P[[gerecht]_N]_N 'first course'
X = Adv [[lang]_{Adv}[[slaper]_N]_N 'late riser'
X = Num [[drie]_{Num}[[hoek]_N]_N 'triangle'

The non-head position of compounds also allows for certain kinds of phrases; this phenomenon will be discussed in Section 2.5.

The productivity of nominal compounding, in particular NN compounding, is increased by the fact that both constituents can be compounds themselves, i.e. they exhibit recursivity. In this respect, nominal compounding differs from adjectival compounding, which is also productive. This recursivity is illustrated in (2):

- (2) *recursive left constituent*
 [[boek]_N[handel]_{NN} 'book shop'
 [[boek]_N[handel]_{NN}[korting]_{NN} 'book shop discount'
recursive right constituent
 [[auto]_N[handelaar]_{NN} 'car dealer'
 [[beroep]_N[[auto]_N[handelaar]_{NN} 'professional car dealer'

The head status of the right constituent is not only clear from the semantic interpretation of nominal compounds (an XY is a Y with some relation to X, not vice versa), but also from the way in which the gender and the selection of the plural suffix of nominal compounds is determined, viz. by the right constituent (cf. Trommelen & Zonneveld 1986).

Dutch distinguishes between neutral and non-neutral gender. Singular neutral nouns select the definite article *het* 'the, sg.' and the demonstratives *dit* 'this, sg.' and *dat* 'that, sg.'. Singular non-neutral nouns select *de* 'the, sg.', *deze* 'this, sg.' and *die* 'that, sg.'. Since the gender of the compounds is that of the right constituent, we find pairs such as the following:

- (3) *de soep* 'the soup' *het vlees* 'the meat'
de vleessoep 'the meat soup' *het soepvlees* 'the soup meat'
het geld 'the money' *de zak* 'the bag/pocket'
het zakgeld 'the pocket money' *de geldzak* 'the money bag'
de bal 'the ball' *de voetbal* 'the football'
het bal 'the ball, dancing' *het avondbal* 'the night ball'

These examples clearly show that the right constituent of compounds determines gender, and thus the selection of *de* or *het* as the definite article.¹

Dutch has two plural suffixes, *-s* and *-en*. The choice of the correct suffix is partially lexically determined, and partially by morphological and phonological factors.² For our purposes it is sufficient to demonstrate how the lexically determined choice is transferred from the right constituent to the whole compound. This is shown in (4):

- (4) *portier* 'doorkeeper' *portiers* 'pl.'
nachtportier 'night doorkeeper' *nachtportiers* 'pl.'
portier 'door' *portieren* 'pl.'
autoportier 'car door' *autoportieren* 'pl.'

¹ Cf. Booij (1992) for a more elaborate analysis of inflection in Dutch NP's.

² There are also 14 Dutch nouns with a plural form in *-eren*. However, the part *er* may be analysed as a stem extension, because it also occurs in other contexts. For instance, the plural of *kalf* 'calf' is *kalveren*, but we find *kalver* also in *kabertiefde* 'calf love'.

There are a number of cases, however, in which the determination of the gender of the compound by the right constituent is overridden by semantic considerations: some compounds that function as qualifications for human beings are non-neutral, although the right constituent is neutral (Paulissen & Zonneveld 1988, Booij 1989):

- (5) *het oog* 'the eye' *de spleet oog* 'the slit-eye'
het oor 'the ear' *de domoor* 'the idiot'
het been 'the leg' *de brekebeen* 'the dead loss'

This does not mean that the right constituent is no longer the head: the whole compound is still of the same syntactic category as the right constituent, and the same plural suffix is selected, in the examples in (5) *-en*. That is, this change of gender does not imply that we have to do here with exocentric compounds. Note, moreover, that semantically induced change of gender does not only occur with personal qualifications, but also in other cases. For instance, besides *de voetbal* 'the football', with a concrete interpretation, we also find *het voetbal* where *voetbal* refers to a specific branch of sport, soccer (note that *bal* 'ball' selects *de*).

More generally, the fact that some compounds can be used as personal qualifications does not imply that there is a morphological category of exocentric compounds in Dutch. A *bleekneus* 'lit. pale nose, pale person' is not a *neus* 'nose', but this follows from the fact that referring expressions, either phrasal or lexical, can be used as pars-pro-toto. This is shown in the following examples, in which the expression referring to a person is italicized:

- (6) a. *Dat rode jasje* moet zijn mond houden
 That red jacket should keep its mouth
 'The person with the red jacket should shut up'
 b. *Die regeerders* moet wel een detective zijn
 That raincoat must be a detective
 'The person with the raincoat must be a detective'

Note that simplex words such as *ziel* 'soul' and *kop* 'head' can also be used as pars-pro-toto forms for 'person'.

The form in which words function as constituents of compounds is usually the stem, i.e. the word without the inflectional ending. In the case of nominal compounds there are apparent exceptions to this regularity, compounds such as those in (7):

- (7) [eten]_N[stijd] 'eating time'
 [varen]_N[man] 'sea farer'
 [zien]_N[wijze] 'lit. seeing way, view'
 [uitgaan]_N[verbod] 'lit. outgoing prohibition, curfew'

In the words in (7) the non-head constituent has the infinitive form, i.e. verbal stem plus *-en* or *n* (s is a linking phoneme, to be discussed in Section 2.2.). The point is that infinitives can function as words in between verbs and nouns (cf. van Haafften et al. 1985), with both verbal and nominal

properties.³ The nominal nature of these infinitival forms is clear from the fact that they can occur with the determiner *het* 'the'. On the other hand, they can occur simultaneously with bare NP's just like (the tensed forms of) verbs (example from Hoekstra & Wehrman 1985: 260):

- (8) *het je moeder een cadeauje geven is een goede gewoonte*
 the your mother a present give is a good custom
 'to give a present to your mother is a good custom'

In other words, it is also possible for X to have a category value in between Noun and Verb. The same applies to the possible values of Y: Dutch has a substantial number of compounds of which the head is an *-en*-infinitive, and for which the corresponding tensed verbal forms do not exist, for instance (Booij 1989):

- (9) a. [school]_N[zwemmen] 'lit. school-swimming'
 [[touw]_N[trekken]] 'lit. rope-pulling, tug of war'
 b. [hard]_{Adv}[lopen]] 'lit. fast-walking, running'
 [[schoon]_{Adv}[springen]] 'lit. beautifully-jumping, platform-diving'

Moreover, this category of compounds is a productive one, in line with the general observation that nominal compounding is productive. Since the formation of infinitives in *-en* from verbal stems is usually considered as a case of inflection, the existence of such compounds implies that inflection can be internal to compounding, since such nominal infinitives can occur in both the head position and the non-head position of compounds.⁴

2.1. Compounds without right hand heads?

There is a class of nominal compounds in Dutch in which the semantic relation between the two constituents cannot always be straightforwardly qualified as a modifier-head relation. Most of them are personal names such as those in (10):

- (10) kind-ster 'child-star'
 leerling-verpleegster 'lit. pupil-nurse, student-nurse'
 directeur-geneesheer 'lit. director-doctor, medical director'
 assistent-beheerder 'assistant-manager'

The distinguishing property of such compounds is that both the left constituent and the right constituent qualify the person to which the compound refers. For instance, a *leerling-verpleegster* is both a *leerling* and

³ Observations about this dual, nominal and verbal, character of the Dutch infinitive can also be found in Dik (1985) and Hoekstra & Wehrman (1985).

⁴ There are a number of proposals as to how to account for this ambivalent nature of certain morphological categories, cf. Hoekstra (1984), Van Haften et al. (1985), Hoekstra & Wehrman (1985), Lefebvre & Muysken (1988).

⁵ Interestingly, we also find the reverse order *geneesheer-directeur* which underlines the (semantically speaking) copulative nature of this compound.

a *verpleegster*. From a formal point of view, there is no need to consider these compounds as special: the right constituent is the head, witness the gender and plural suffix selection of the compounds. Although *kind* is neutral, the gender of *kind-ster* is non-neutral because *ster* is non-neutral (de Haas, ms.). Similarly, although *leerling* selects the plural suffix *-en*, the plural suffix of *leerling-verpleegster* is *s*, since *verpleegster* selects *-s*. Therefore, such compounds can be considered endocentric compounds. Moreover, there is not always a clear-cut distinction between the modifier-head and the copulative interpretation of such compounds. For instance, in *leerling-verpleegster* one might also consider *leerling* as a kind of modifier, since *leerling-verpleegster* clearly designates a subset of the set of *verpleegsters* 'nurses', not a subset of the set of *leerlingen* 'pupils'. Also, a non-head constituent such as *assistent* is semantically comparable to the prefix *vice-* 'vice'.

Thus, there is only scarce evidence for the need to distinguish a special class of copulative compounds with a deviating morphological structure.⁶

In Janssen (1990) the following type of data is discussed:

- (11) commissie-Staal 'committee-Staal, Staal committee'
 regering-Lubbers 'government-Lubbers, Lubbers government'
 kwestie-Braks 'question-Braks, Braks question'

If such expressions are to be considered compounds -and Janssen suggests that a morphological process is involved here-, we would have left-headed compounds in Dutch, because the left constituent determines the gender, and takes the plural suffix, as in *de regeringen-Lubbers* 'the Lubbers governments'. However, although the two constituents are hyphenated in Dutch orthography, such expressions can as well be considered syntactic constructs, i.e. NP's parallel to *station Amsterdam* 'Amsterdam station', *meneer Janssen* 'mister Janssen', *de heren Booij* 'the sirs Booij', etc., with the first noun functioning as the head, and the second as a kind of apposition. Note that the constructions in (11) are also similar in that the appositional N is usually a name. Therefore, there is no reason to give up the generalization that all Dutch compounds are right-headed.

2.2. Linking phonemes.

Dutch has two linking phonemes, *s* and *e* (which stands for the schwa). It is a generally accepted idea among Dutch morphologists that it is not completely predictable whether a compound takes a linking phoneme, and

⁶ An exceptional formation in this respect is *minister-president* 'lit. minister-president, prime minister' with the plural form *ministers-presidenten*, i.e. both parts get a plural suffix. This, however, is the official norm, many native speakers spontaneously form *minister-presidenten*. Other isolated cases are *secretaris-generaal* 'secretary general' and *gouverneur-generaal* 'governor general' with the (official) plural forms *secretarissen-generaal* and *gouverneurs-generaal*.

which, although there are certain 'tendencies' (van den Toorn 1982). For instance, compounds with *schaap* 'sheep' as left constituent occur in all three varieties, and thus there seems to be no rule involved. This is confirmed by the fact that we also find doublets like *schaapskooi/schapekooi*:

- (12) a. *without linking phoneme*:
 [schaap][berder] 'shepherd'
 b. *with linking phoneme s*:
 [schaap][s]scheerder] 'sheep shaver'
 [schaap][s]kooi] 'sheep's head'
 [schaap][s]kooi] 'sheep fold'
 c. *with linking phoneme e*:
 [schape][vlees] 'mutton'
 [schape][wol] 'sheep's wool'

The linking phoneme *s* is historically a genitive suffix. However, nowadays it also occurs after verbal stems, as in [voorbehoed]_{vs} [middel] 'preservative' and [scheid]_{vs} [rechter] 'referee'. That is, synchronically, it can no longer be interpreted as an inflectional suffix.

The linking phoneme *e* can only occur after nouns that take the plural suffix *-en*. For instance, the plural form of *schaap* 'sheep' is *schape*, and thus *schape* is possible as the first constituent of compounds. On the other hand, *polder* 'polder' takes *s*, and hence a compound such as *polderjongen* 'polder boy' is ill formed (Mattrens 1970: 189). This suggests a historical relation between the linking phoneme *e* and the plural suffix *en* (note that the *n* is usually not pronounced). However, the linking phoneme *e* also occurs after verbal stems as in [drink]_e[broer] 'heavy drinker', [huis]_e[balk] 'cry baby' and [hebb]_e[dingetje] 'gadget'. This restriction on the occurrence of *e* could also be phrased in phonological terms by listing the phonological contexts in which the plural morpheme *en* can occur.

The fact that linking phonemes are not always predictable was illustrated above with compounds of which the non-head is simplex. If the non-head contains a suffix, the suffix may determine the choice of the linking phoneme. For instance, the diminutive suffix *-tje* always requires *s*:

- (13) vogeltjesmarkt, *vogeltjemarkt 'bird market'
 bloemetjesjurk, *bloemetjejurk 'floral dress'
 broodjeswinkel, *broodjewinkel 'sandwich shop'
 stoeltjeslift, *stoeltjelift 'chair lift'

The remarkable thing here is that the *s* is felt to be the plural suffix (diminutives have the plural suffix *-s*), so the generalization involved is that diminutive nouns can only occur as non-heads in compounds in their plural form.⁷ Thus, we encounter here another type of inflection within compounds: the non-head can be a plural noun.

⁷ According to Mattrens (1970) this restriction follows from the generalization that non-heads of compounds cannot be singular (they must be either unmarked with respect to number or pluralized) in combination with the observation that diminutivization usually has a singularizing effect (illustrated by the opposition between *bier* 'beer' and *bierkje* 'a glass of beer'). Problematic

The observation that suffixes may determine the choice of a linking phoneme is also relevant in the case of *-iteit* '-ity'. As observed by de Haas (ms.), the suffix *-iteit* at the right edge of the non-head requires a linking phoneme to be present, namely *s*:

- (14) identiteitscrisis, *identiteitscrisis 'identity crisis'
 kwaliteitsbewaking, *kwaliteitsbewaking 'quality monitoring'

Instead of using the linking phoneme *s*, it is also possible to use the plural form of the non-head, as in:

- (15) calamiteitenbestrijding 'calamities fighting'
 specialiteitenrestaurant 'specialties restaurant'
 minderhedenbeleid 'minorities policy'

A similar pattern occurs with the suffix *-beid*: it takes the linking phoneme *s*, unless one explicitly wants to express the plural meaning of the first constituent. Thus we get pairs like *minderhedenbeleid* 'minorities policy' versus *minderheidsstandpunt* 'minority position'.

A complicating factor in the analysis of linking phonemes is that the plural morphemes are also /s/ and /ə/. The written form of the plural suffix /ə/ is *-en*, but the *n* is usually not pronounced. For this reason, the Dutch orthographical system contains an (often disputed) rule which tells the writer of Dutch when to write the /ə/ that he hears as *e*, and when as *en*: one has to write *en* if the meaning of the compound necessarily implies that the first constituent receives a plural interpretation.

Here, I only want to show that there are a number of cases in which there are arguments to interpret *e*, *en* and *s* as standing for plural morphemes.

As pointed out by van den Toorn (1982) compounds do not take a linking phoneme when the first constituent ends in a vowel. This generalization can be maintained if we interpret *en*, *e* and *s* in the following examples as plural morphemes, which is unproblematical from the semantic point of view:

- (16) aardbeienjam 'strawberry jam' (jam from strawberries)
 bijenkorf 'beehive' (hive for bees)
 bijehoning 'bee honey'⁸ (honey produced by bees)
 damestasje 'lady's bag' (bag for ladies)
 meisjesboek 'girl's book' (book for girls)

In sum, although it is not possible to fully predict the occurrence of linking phonemes,⁹ certain regularities can be stated in terms of phonological or morphological properties of the first constituent.

cases are compounds such as *meisjeslijf* 'girl's corpse', since a corpse cannot belong to more than one girl, and *buisjeslak* 'lit. shells snail', since a snail has only one shell.

⁸ In this case the schwa is spelled as *e*, because the meaning of *bijehoning* does not necessarily presuppose that there is more than one bee involved, in contrast to *bijenkorf*. This has led to nonsensical questions such as: is a beehive for only one bee still a beehive?

⁹ According to Van den Toorn (1982) semantic factors and grammatical relations between the two constituents also play a role.

Although by definition a linking phoneme does not belong to one of the morphological constituents, from the phonological point of view it belongs to the first constituent, i.e. it is part of the preceding prosodic word. This can be seen from the syllabification pattern of a compound like *eendekroos* 'duckweed' with the morphological structure [[eend]_{NE}[kroos]_N], and the corresponding non-isomorphic prosodic structure ((en)(dʒ)_w((kros))_w, where *w* stands for prosodic word. Note that the schwa syllabifies with the final consonant of the preceding constituent. Thus, compounds with linking phonemes illustrate the insight of prosodic phonology that morphological and phonological structure are not necessarily isomorphic (cf. Booij 1985, Nespor & Vogel 1986).

2.3. Word-internal inflection.

As pointed out in the preceding section on linking phonemes, there is evidence for the claim that plural nouns can function as the first parts of compounds. In this section I will adduce further evidence for this claim.

First, Dutch has two kinds of pluralia tantum. On the one hand there are nouns that only occur in the plural form. They also occur within compounds, as illustrated below:

- (17) Alpen 'Alps' Alpenreis 'journey to the Alps'
 kleren 'clothes' klerenkast 'wardrobe'
 valuta 'currency' valutapolitiek 'currency policy'

Secondly, many nouns have a different meaning in their plural form:

- (18) letter 'letter' letteren 'literature'
 kruid 'herb' kruiden 'spices'
 antecedent 'id.' antecedenten 'personal record'
 goed 'cloth' goederen 'goods'
 medium 'id.' media 'communication media'

These plurals occur within compounds with their specific plural interpretation, e.g. *goederentransport* 'goods transport', *antecedentenonderzoek* 'security check', *kruidenrek* 'spices rack'.

Another class of compounds that require a plural interpretation for the compound-internal schwa written as *en* is formed by those compounds of which the meaning of the head necessarily requires a plural non-head, as was observed by van den Toorn (1982). Relevant examples are the following words:

- (19) dakenzee 'sea of roofs'
 vakkenpakket 'lit. packet of subjects, subjects chosen for graduation'
 huizenrij 'row of houses'

These cases also show that inflection cannot be linearly ordered after compounding since inflected forms must be available as inputs for compounding.

2.4. 'Ternary' compounds.

Dutch also features compounds that seem to consist of three rather than two constituents. Consider the following examples:

- (20) [twee]_{PERSON}[s]_{KAMER} 'double bed room'
 [vier]_{BAAN}[s]_{WEG} 'four lane road'
 [twaalf]_{MIJ}[s]_{ZONE} 'twelve mile zone'
 [drie]_{LETTER}[s]_{WOORD} 'three letter word'

The apparent problem with these compounds is that they cannot be divided into two constituents which are existing words. For instance, neither *tweepersoon* nor *persoonskamer* is an existing compound of Dutch. Note also that *tweepersoon* cannot be interpreted as a word-internal phrase, since *persoon* has the singular form although it is preceded by the numeral *twee* 'two' (the *s* cannot be a plural suffix, since *persoon* takes the plural suffix *-en*). Nevertheless, it is possible to assign a binary branching structure to such words, once we realize that possible, but not existing words may function as inputs for word formation. In particular, we might assume that *tweepersoon*, *vierbaan*, *twaalfmijl* and *drieletter* are possible compounds of Dutch. They belong to the category of Numeral + Noun compounds which is illustrated below:

- (21) tweedrank 'lit. two drink, mixture of two juices'
 driepoot 'lit. three leg, tripod'

Thus, the structure of the word *drieletterwoord* is as follows: [[_{drie}]_{NUM}[[_{letter}]_N[[_{woord}]_N]]. If we make the reasonable assumption that numerals only require formal expression of the plurality of the head in phrases, it follows that *letter* in *drieletterwoord* can do without the plural suffix *-s*. The stress patterns of these compounds confirm this analysis: compounds with the structure [[AB]C] have either the stress pattern 1-3-2 or the stress pattern 3-1-2, and both occur in these cases. For instance, *vierbaanweg* has 1-3-2, and *drieletterwoord* has 3-1-2.

Note that we do find expression of plurality when phrases are embedded within words as in *Driekoningsavond* 'lit. three kings evening, Twelfth Night' and *vierkleurenpotlood* 'four colour pencil', with the plural forms *koningen* 'kings' and *kleuren* 'colours' respectively. The fact that the nouns in the left constituent are plural does not prove the phrasal status since plural nouns can occur word-internally. However, the stress patterns of these non-heads is always that of phrases, i.e. with the most prominent stress on the second constituent, and thus support a phrasal interpretation.

2.5. Phrasal embedding.

There is no doubt that certain kinds of phrases can occur in the non-head position of nominal compounds. The restriction to the non-head

position is to be expected: if the head is a phrase, the whole expression is also a phrase, and no longer a word. In other words, the so-called 'No Phrase Constraint' (Botha 1984) does not hold.¹⁰ Phrasal embedding cannot be explained away in terms of lexicalization: although lexicalized phrases do occur as parts of compounds (and even form inputs for derivation) phrasal embedding of e.g. A + N phrases is productive in Dutch (cf. Hoeksema 1988).

The following kinds of word-internal phrases can be distinguished (cf. Hoeksema 1988), de Haas (ms.):

- (22) a. A + N
 [oude mannen] huis 'old men's home'
 [hete lucht] ballon 'hot air balloon'
- b. Num + N
 [drie landen] punt 'place where three countries meet'
 [vier kleuren] druk 'four colour printing'
- c. P + N
 [onder water] camera 'underwater camera'
 [buiten boord] motor 'outboard motor'
- d. N Prep N
 [huis aan huis] blad 'door-to-door magazine'
 [glas in lood] raam 'stained glass window'
 [mond op mond] beademing 'mouth-to-mouth resuscitation'
- e. N en N (coordination with explicit conjunction)
 [peper en zout] stel 'pepper and salt set'
 [kat en muis] spelletje 'cat-and-mouse game'
 [huis-tuin-en-keuken] voorbeeld 'household, common and garden example'
- f. N N (coordination without explicit conjunction)
 [Amsterdam-Rijn] kanaal 'Amsterdam-Rhine canal'
 [moeder-kind] relatie 'mother-child relation'
- g. Verbal Phrases
 [lach of ik schiet] humour 'laugh-or-I-shoot humour'
 [vrij veilig] actie 'sleep safely action'
- h. Sentences
 De [wie heeft het gedaan] vraag 'the who has done it question'
 God-is-dood-theologie 'God-is-dead-theology'

The phrasal character of the non-head is particularly clear in the examples (22a) because the adjective is inflected (-e is the inflectional ending of adjectives that function as modifiers in phrases) and in (22g, h). It is also confirmed by the fact that all these non-heads have the stress patterns

¹⁰ Note that the possibility of the expression *No Phrase Constraint* already refutes its empirical correctness, since *no phrase* is a phrase.

characteristic of phrases, i.e. the last constituent is the most prominent one (compare, for instance, *onderwatercamera* with main stress on *water* with the compound *onderbroekenlol* 'lit. underpants fun, tits-and-bums humour', with the compound *onderbroeken* 'underpants' as its first constituent, and main stress on *onder*).

An important observation is that not all kinds of NP's can be embedded in the non-head position: NP's with determiners are excluded (cf. Hoeksema 1988). This restriction applies to all the possibilities in (22a-f) where nouns occur.¹¹

A kind of asyndetic coordination occurs in compounds such as *Amsterdam Rijn-kanaal* 'Amsterdam-Rhine canal' and *moeder-kind-relatie* 'mother-child relation'. The rightmost constituent is formally the head, and the left constituent can be analysed as consisting of two subconstituents, connected by a zero-conjunction. It should be pointed out in this connection that there are many cases of apparent compound-internal coordination in Dutch, due to the phenomenon of conjunction reduction that also applies within complex words (cf. Booij 1985). For instance, the following sentences are wellformed in Dutch:

- (23) a. De land-en-tuinbouw wordt bedreigd
 The agri-and-horticulture is threatened
 b. De land- en tuinbouw worden bedreigd
 The agriculture and horticulture are threatened
 c. De land- en de tuinbouw worden bedreigd
 'The agri- and the horticulture are threatened'

In (23a) the nouns *land* and *tuin* are conjoined and form the non-head-constituent of the compound, which is singular. Therefore, the singular form of the tensed verb is selected. The surface form of (23b) is derived by conjunction reduction from the noun phrase *landbouw en tuinbouw*, which forms a plural subject, and hence requires a plural verb. In (23c) reduction has taken place in *de landbouw en de tuinbouw*. The rule of coordination reduction says that of two identical prosodic words one may be deleted if it is adjacent to the conjunction (Booij 1985). Hence, the first *bouw* can be deleted. This account of the facts presupposes that compounds form one grammatical, but two or more prosodic words. For instance, *landbouw* consists of the prosodic words *land* and *bouw*. There is ample motivation for this analysis based on phonological phenomena, for instance, that the constituents of a compound always form independent domains of syllabification.

Note that if we did not assume reduction, we would have to allow for coordination of inequal constituents such as *land* and *de tuin* in (23c). Also, we are no longer forced to assume that in the phrase *ijs- en bruine beren*

¹¹ This applies even to *de Rijn* 'the Rhine' which normally has an obligatory determiner *de*, but occurs without *de* in *Amsterdam-Rijn-kanaal*.

'ice bears and brown bears' the formally different constituents *ijs*, a noun, and *bruine*, an inflected adjective, are conjoined into the left constituent of a compound although they are formally different. Rather, *ijs-en bruine beren* is a phrase which has been subject to coordination reduction, and has been derived from *ijsberen en bruine beren*. Thus, we can maintain that coordination within compounds follows the formal rule that only words of the same morpho-syntactic status can be conjoined.

Another generalization to be made here is that only the non-head constituent of nominal compounds can exhibit phrasal properties like coordination.

3. Adjectival compounds.

Adjectival compounds form a productive morphological category in Dutch. X can be N, V or A, or an intermediate category:

- | | | | |
|------|-------|---|---|
| (24) | X = N | [[peper] _N [duur] _A] _A
[[auto] _N [vrij] _A] _A | 'expensive as pepper, very expensive'
'car-free, without cars' |
| | X = V | [[kots] _V [misselijk] _A] _A
[[spil] _V [ziek] _A] _A | 'puke-sick, sick as a dog'
'spendthrift, extravagant' |
| | X = A | [[licht] _A [grijs] _A] _A
[[wit] _A [gelfas] _{N+V}] _A | 'light grey'
'white-coated, with a white coat' |

The word in the non-head position has quite often lost its original, literal meaning, and has become a kind of intensifying modifier with the meaning 'very', as in the words *peperduur* and *kotsmisselijk* in (24) (and also *sterensbenaamd* in (25)).¹²

As in the case of nominal compounds, the non-head position can also be occupied by a nominal infinitive:

- | | | |
|------|---|--|
| (25) | [[sterven] _s [benaamd] _A] _A
[[leven] _s [moed] _A] _A | 'lit. dying-afraid, very afraid'
'lit. living-tired, tired of life' |
|------|---|--|

Another type of intermediate category that we encounter in Dutch is that of the verbal participles which are in between verbs and adjectives. They exhibit adjectival properties in that they occur in prenominal position with adjectival inflection, and also in that they can function as the head of compounds, unlike verbs. This is illustrated in (26):

- | | | |
|------|---|-------------------------|
| (26) | a. <i>present participles</i> (with suffix <i>-end</i>): | |
| | [[adem] _N [benemend]] | 'breath-taking' |
| | [[hart] _N [verscheurend]] | 'heart-breaking' |
| | b. <i>past participles</i> | |
| | [[computer] _N [gestuurd]] | 'computer-controlled' |
| | [[zwak] _A [begaafd]] | 'weak-minded, retarded' |

¹² A survey of nouns that function as intensifiers in adjectival compounds is given in Fletcher (1980).

As noted by de Haas (ms.) recursivity in adjectival compounds is rare. Adjectival compounds such as *ijsberesterk* 'ice bear strong', *personenautoorij* 'private car free' and *leeftmilieubewust* 'living environment conscious' are odd.

There are also copulative adjectival compounds such as *rood-wit-blauw* 'red-white-blue' and *Duits-Frans* 'German-French'. Only the last adjective bears an inflectional ending:

- | | | |
|------|---------------------------|---------------------------|
| (27) | de rood-wit-blauwe vlag | 'the red-white-blue flag' |
| | Duits-Franse betrekkingen | 'German-French relations' |

This clearly shows that these expressions are words, not phrases. However, it is hard to decide whether they should be considered normal compounds with a right head, or a cases of word-internal asyndetic coordination.

4. Verbal compounds.

Like other Germanic languages, verbal compounding in Dutch is unproductive. That is, although a few verbal compounds do exist, this morphological category cannot be extended in a direct way.

First of all, we find complex verbs which look like verbal compounds but which have been derived from nominal compounds by means of conversion (noun-verb conversion is productive in Dutch). This is illustrated in (28) (the citation form of Dutch verbs is the infinitive, hence the ending *-en*):¹³

- | | | |
|------|------------------------|------------------------------------|
| (28) | blinddoek 'blindfold' | blinddoeken 'to blindfold' |
| | voetbal 'football' | voetballen 'to play soccer' |
| | sjoelbak 'shovelboard' | sjoelbakken 'to play shovelboard' |
| | ijsbeer 'ice bear' | ijsberen 'to pace up and down' |
| | blokfluit 'recorder' | blokfluiten 'to play the recorder' |

The structural interpretation of these verbs as converts of nominal compounds is confirmed by the fact that the verb *blokfluiten* is inflected as a weak verb, i.e. according to the default rule of past tense information, although the verb *fluiten* that also exists, is a strong verb. Thus we find *blokfluitte* besides *floot*. This is exactly what we expect since the structure of *blokfluiten* is [[[blok]_N[fluit]_N]_N]_V, i.e. there is no verbal stem *fluit* that functions as the head of this word, and from which the diacritic marker [+strong] can percolate to the top node.

A second source of (apparent) verbal compounds are compounds with an infinitival form as head, which were already mentioned in Section 2. Given our structural interpretation, we expect such compounds to lack tense

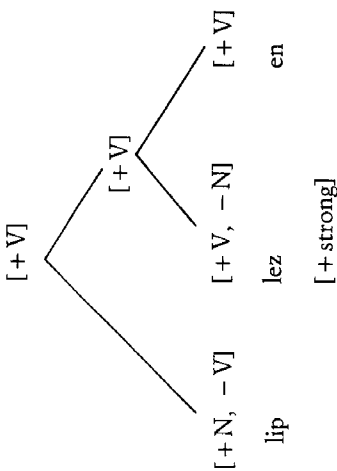
¹³ Other examples of verbal conversion of nominal compounds are given in de Vries (1975: 105-106).

forms, and they are indeed usually qualified as compounds verbs with a defective paradigm, without tense forms. For instance, the compound *liplexen* 'lit. to lipread, to do lip-reading' has the following structure, assuming that these infinitives (also) belong to the class of nouns:

(29) [[lip]_N[[lez]_ven]_N]

Given this structure, tensed forms cannot be made, and native speakers of Dutch usually use the periphrastic form *aan bet ...* in order to create tensed forms, for instance *ik ben aan bet liplexen* 'lit. I am at the lip-reading, I am doing lip-reading'. The only way in which tensed forms can arise is by reinterpretation. For instance, *liplexen* can be reinterpreted as the infinitive form of the verbal compound *liples*, and in that case we get weak tensed forms such as *liplesde* 'was doing lip-reading' (note that *las* is the tense form of *lezen*). Such reinterpretations regularly occur in Dutch.¹⁴

In order to understand why the compound verbs that arise through reinterpretation get the default (weak) conjugation, it should be realized that the percolation of the feature [strong] to the top node of the infinitival compound is blocked, because there is no proper path for the percolation of this feature: percolation is blocked if the dominating node has a different syntactic category. This is the case in e.g. *liplexen*, because the infinitive does not bear the features [+V, -N] like the verbal stem, but [+V] (or [+V, +N]):



¹⁴ For instance, the other day my daughter Rebecca (8 years old) used *genieveuleesd* 'level read, past part.' in the sentence *Ik heb dat boek al genieveuleesd* 'I already level read that book'. In Dutch primary schools there is an activity which is called [[nivea]_N[[lez]_ven]_N] 'level reading' which means that each child reads in a small group according to its own level of reading abilities. Clearly, Rebecca reinterpreted this compound with an infinitival head as the infinitive of the verbal compound *niveaulezen*. As predicted by my analysis, the form of the past participle is that of the weak conjugation, although *lez(en)* 'to read' is a strong verb with the past participle *gelezen*, not *geleesd*.

A few days later, my daughter Suzanne (10 years old) spontaneously coined the participle *gepaardrijd* from *paardrijden* 'horse-riding', although the past participle of *rijden* is *gereden*.

Reinterpretation of nouns is also the source of verbal compounds with a different type of related noun, namely one in *-ing* or *-er* (Booij 1989):

- (31) a. [[bloem]_N[[lez]_ving]_N]_N 'anthology'
 bloemlezen 'to make an anthology'
 b. [[beeld]_N[[houw]_ver]_N]_N 'sculptor'
 beeldhouwen 'to sculpture'

Some speakers of Dutch can only use the infinitival form in *-en*. For those speakers we therefore have to assume a form of 'paradigmatic' word formation, in which the suffixes *-ing* and *-er* respectively are replaced with *-en*. This form of paradigmatic word formation even applies to English loans in *-ing* (Posthumus 1991):

- (32) *English -ing-form: Dutch infinitive:*
 aquaplanning aquaplanken
 bodybuilding bodybuilden
 carpooling carpoolen
 brainstorming brainstormen

Some these verbs, for instance *brainstormen*, can even be inflected by some speakers of Dutch. Note that the English counterparts, verbs like *to brainstorm*, do not exist in English.

For speakers who accept tensed forms such as *beeldhouwde* 'sculptured, sg.' the verbal compound is formed by reinterpretation of *beeldhouwer* as the deverbal *er*-noun of the verb *beeldhouw(en)*. This account in terms of reinterpretation is again confirmed by the way in which the past tense is formed. Although the simplex verb *houwen* 'to hew' is a strong verb with the past tense form *bieuw*, the verb *beeldhouwen* has the default weak past tense *beeldhouwde*, which shows that *houwen* is not the head of *beeldhouwen*.

There is a third class of complex verb which look like verbal compounds; a list of 25 of such verbs is given in Weggelaar (1986):

- (33) schuimbekken 'to have foam at the mouth' (schuimen 'to foam' + bek 'mouth')
 likkebaarden 'to lick one's lips' (likken 'to lick' + baard 'beard')
 stampvoeten 'to stamp one's feet' (stampen 'to stamp' + voet 'foot')

The characteristic property of this class of verbs is that the left constituent is a verb, the right constituent a noun, and the resulting word a verb. Therefore, Weggelaar (1986) considers them as a case of noun incorporation, a kind of morphological operation that is also found in, for instance, Amerindian languages. Nevertheless, this kind of word formation is exceptional for Germanic languages, and Weggelaar (1986) accepts de Vries's (1975: 107) suggestion that verbal conversion of nominal compounds may be the origin of this kind of verbs. For instance, *knipooog* 'lit. to cut + eye, wink' exists as a nominal compound, and has also been converted into a verb. Other noun-incorporating verbs, for which no related V + N nominal compound exists, might have arisen through analogy with these verbal conversions.

One might be inclined to consider the verbal left constituent as the head of such words, given the syntactic category of the resulting word and the semantics of such verbs. For instance, *trekkebenen* 'to walk with an impediment' (from *trekken* 'to pull' and *been* 'leg') might be paraphrased as *trekken met zijn been* 'to pull with someone's leg', which is an existing expression in Dutch. Such an analysis implies that there are also Dutch compounds with left heads. However, there is formal evidence that the left constituent cannot be the head: in those cases where the left constituent is a strong verb, the whole complex verb is nevertheless weakly inflected. Crucial cases are the following words with the strong verbs *trekken* and *druipen* respectively:

- (34) *trekkebekken* 'to pull a face' (*trekken* 'to pull' + *bek* 'mouth')
druipstaarten 'to slink off with one's tail between one's legs' (from *druipen*
 'to drip' + *staart* 'tail')

For instance, the past tense of *trekkebekken* is *trekkebekte*, and not **trokkebek*.

We are then left with a few verbal compounds such as *raadplegen* 'lit. to advice-commit, to consult', *grasduinen* 'lit. to grass-dune, to browse' and *zinspelen* 'lit. to sense-play, to allude' to which none of the analyses above apply (they have tensed forms). But this class of words is a closed one. Note also that the meaning of these verbs is not a compositional function of their constituents, as should be the case for productive categories.

In sum, we can stick to the generalizations that Dutch compounds are right-headed, and that the class of compounds with a purely verbal (i.e. non-infinitival or-participial) head is the only class of non-productive compounds.

In order to get a clear picture of the issues around verbal compounding in Dutch, mention should also be made of the class of so-called separable complex verbs in Dutch. Dutch has a number of prepositions and some adverbs that combine with verbs into verbal expressions, which are called separable complex verbs, because they have both phrasal and word-like properties. An example is *op bellen* 'lit. to ring up, to phone'. The constituents can be separated by rules such as Verb Second and Verb Raising, as illustrated in (35) and (36) respectively. Verb Second is the rule that moves the tensed verb into second position in main clauses, and presupposes that the underlying word order of Dutch is SOV. Verb Raising is the rule that raises the verb of an embedded clause to the right of the verb of the dominating clause where it forms a unit with that verb:

- (35) Deep Str. John me op belde
 Surface Str. John belde_i me op t_i
 John rang me up
 'John phoned me'

- (36) Deep Str. dat John [PRO me op bellen] wil
 Surf. Str. dat John [PRO me op t_i] wil bellen
 that John me up wants ring
 'that John wants to phone me'

In Booij (1990a) it is argued that separable complex verbs are indeed phrases. They are minimal phrasal projections of verbs which are nevertheless created in the lexicon. Thus, they do not belong to the class of verbal compounds, and are not created by a strictly morphological process. Since this class of verbal expression is productive, this conclusion is important in that the generalization can be maintained that Dutch verbal compounds do not form a productive category.

These separable complex verbs also occur in the non-head position of nominal compounds, as in *opbergdoos* 'store box' and *doorkijkbloes* 'see-through blouse'. This is to be expected since phrasal embedding in non-head position is allowed, as we saw above.

5. Numeral compounding.

Numeral compounding is interesting, because we find two types of Num + Num compounds, both with modifier-head relation and with coordinative relation. This is illustrated in (37a) and (37b) respectively:

- (37) a. *driehonderd* '300'
tweeduizend '2000'
 b. *twee-en-negentig* '90'
honderd(-en)-drie '103'
honderd(-en)-twee-en-negentig '192'

Note that although *honderd* '100' and *duizend* '1000' have plural forms, they are not pluralized when they form part of compounds, and they are thus comparable to the *driepoot* 'tripod' type of compound discussed above.

In the case of coordinative compounds, the position of the smallest number is different below and above 100: in first position below 100, in second position above 100. The conjunction *en* must be realized obligatorily below 100, i.e. in case the smallest number occurs in first position, before the number indicating the number of tens. The difference between the obligatory *en* below 100, and the optional *en* above 100 also manifests itself in that the obligatory *en* is realized as [ən], and the optional one as [ɛn].

The coordinative compounds in (37b) are remarkable in that it seems to be impossible to designate one of the numerals as the head. However, they can be interpreted as instantiations of lexicalized phrasal patterns, and thus do not form clear evidence for a category of copulative compounds.

6. Compounding and derivation.

A first general observation on the interaction between compounding and derivation is that compounding can both precede and follow derivation (Booij 1990b: 236), as illustrated by the following examples:

- (38) a. *compounding before derivation*
 [[[[land]_N][bouw]_N]_N]_Ner]_N 'farmer'
 [[[[vader]_N][land]_N]_Nloos]_A 'fatherlandless'
 [[[[god]_N][dienst]_N]_Nig]_A 'religious'
- b. *derivation before compounding*
 [[[[[et]_Varen]_N][bond]_N]_N] 'teachers union'
 [[[[open]_Ving]_N][zitt]_Ving]_N] 'opening session'

A more specific issue is whether Dutch has so-called synthetic compounds, i.e. words created by compounding and derivation simultaneously. The general pattern of words which are candidates for this class is [X + Y + Suffix], where X and Y stand for words, and neither X + Y nor Y + Suffix is an existing word. So it seems that we have to do with ternary structures in such cases. Nevertheless, I will try to show that all so-called synthetic compounds in Dutch can be considered as binary branching structures, i.e. compounds with a derived head ([[X] [Y + Suffix]]) or as derivations from compounds ([[X Y] + Suffix]). The advantage of such an approach is that we do not have to allow for a formally special class of complex words, synthetic compounds. Moreover, all the suffixes involved in 'synthetic compounding' are also used in normal derivation: there are no special suffixes for synthetic compounding. That generalization can only be caught by analysing synthetic compounds in one of the two ways allowed for by the binary branching hypothesis.

The following classes of synthetic compounds are to be distinguished:

- (39) N + V + Suffix:
 ijsbereider 'ice preparer'
 machthebber 'commander'
 wraaknemer 'lit. revenge taker, revenger'
- (40) Num + N + nominal suffix:
 vierwieler 'four wheel carriage'
 driemaster 'three-master'
 veelwijverij 'polygamy'
- (41) A/P + N + adjectival -ig:
 blauwogig 'blue-eyed'
 inpandig 'walled in'
- (42) A/Num/P + N + adjectival -s:
 wijdbeens 'straddle-legged'
 naoorlogs 'post-war'
 derdejaars 'third year (student)'
- (43) Num + N + lijks:
 tweejaarlijks 'bi-annual'
 driewekelijks 'three-weekly'

The words in (39) can be analysed as compounds although, for instance, *nemer* does not exist as an independent word. The crucial observation is that this word is derived from an obligatorily transitive verb, and that this obligatory transitivity is inherited by the deverbal noun *nemer*. Therefore, *nemer* only occurs with a complement, which is either the non-head of the compound or a phrasal PP-complement, as in the nominal phrase *de nemer van wraak* 'the taker of revenge'.¹⁵

For the words of (40) there are two analytical options if we want to stick to binary branching: we may assume complex nonheads, which are possible, though non-existing words (e.g. *driemast*, *vierwiel*, *veelwijf*) or complex heads (*master*, *wieler* etc.) which are possible but non-existing words. Since denominal -er appears to prefer complex base nouns (van Santen 1992), the first option seems to be the best one.¹⁶

In the case of the words in (41) we have to do with the adjectival suffix -ig. In this case, we have two analytical options. For instance, *blauwogig* can be analysed as *blauw* + *ogig*, or as *blauwoog* + -ig. Neither *ogig* nor *blauwoog* is an existing word of Dutch. One might be inclined to choose the second option because *blauw* 'blue' modifies *oog* 'eye'. However, this is a purely semantic argument. Moreover, there are also adjectival compounds in Dutch where the non-head modifies a morphological subconstituent of the head constituent. Relevant examples are given in (44):

- (44) [[breed][geschouderd]] 'broad-shouldered'
 [[hoog][gehakt]] 'high-heeled, with high heels'
 [[kort][gerokt]] 'short-skirted, with a short skirt'

In these words, the modifiers are not structurally adjacent to the modified constituents *schouder* 'shoulder', *bak* 'heel' and *rok* 'skirt' which are surrounded by the discontinuous affix *ge ... t* 'provided with'. That is, structural adjacency is not crucial for a modification relation, and hence it is possible to assume that in *blauwogig* the non-head *blauw* modifies the subpart *oog* 'eye' of *ogig*.¹⁷

There are words, however, where an argument is available. This applies to the cases (42)-(43). Consider *tweejaarlijks* 'bi-annual'. The suffix -lijks is unproductive, and hence the only available analysis for this adjective is [[twee][jaarlijks]]. In the other analysis, [[tweejaarlijks], -lijks has to be a productive suffix, since we also have *driejaarlijks*, *vierjaarlijks* etc.. On the other hand, in *derdejaars* (cf. 42), the string *derdejaar* must be a constituent since it is a phrase with inflection (*derde* has the inflectional ending -e), and hence the first constituent must be taken to be complex.

¹⁵ Ample evidence for this analysis is provided in Booij (1988).

¹⁶ Although denominal -er usually creates personal names, there are also cases where the noun indicates an inanimate object such as *draaitopper* 'swivel top vacuum cleaner' derived from *draaitop* 'swivel top'.

¹⁷ A defense of a ternary analysis of *blauwogig* can be found in Van Santen (1992).

In sum, it is possible to maintain, with Hoeksema (1984), that there are no synthetic compounds in Dutch. All candidates for this class can be analysed as compounds of which the head is a morphologically complex constituent or as suffixal derivations from compounds, although it is not always possible to determine which of the two analytical options applies.

7. *Non-native compounding.*

Non-native roots of Greek or Latin origin, which do not occur as independent words, also play a role in Dutch word formation. There are two basic patterns: root + X and root + root. In the first case, a root is 'prefixed' to an existing non-native word:

- (45) audiovisueel 'audio-visual'
astrofysica 'astrophysics'
eurodollar 'id.'
telecommunicatie 'telecommunication'

In the second case, both constituents cannot function as independent words, as in:

- (46) psychografie 'psychography'
cardiologie 'cardiology'
audiologie 'audiology'

The first pattern conforms to the general Dutch pattern of compounding in that the second constituent is the head, as can be seen from the syntactic category of the compound. This also applies to the second pattern. To see this, compare *audiovisueel* with *audiologie*. The first word is an adjective, the second one is a noun. Hence, the syntactic category cannot have been determined by the root *audio*, so it must be the root *logie* that determines that the complex word *audiologie* is a noun. That is, roots must be assumed to belong to a syntactic category although they are bound morphemes.

8. *Conclusions.*

In this article I have shown that in Dutch compounds the right constituent is the head. In addition, we also found a few cases of so-called copulative compounds for which no head can be identified. The categories of nominal and adjectival compounds are productive, whereas the class of verbal compounds is not: verbal compounds only arise through reinterpretation.

The data concerning Dutch compounding also showed that it is impossible to order compounding, derivation and inflection on different levels or strata in the lexicon, because both derivation and inflection must be available before and after compounding.

The interaction of inflection and compounding also seems to suggest that word formation and inflection cannot be assigned to different components of the grammar, given that inflected forms function as inputs for compounding.¹⁸ This might be taken as evidence for the so-called strong lexicalist hypothesis which claims that word formation and inflection are located in the same morphological component. However, we should not draw that conclusion too hastily, since I showed that certain types of phrase also function as inputs for word formation. Once we have to allow for a loop from the syntactic components back to the morphological component in order to account for phrasal non-heads of compounds, inflection could also be located in the syntactic component, and yet feed the morphological component. The proper demarcation of morphology and syntax remains a complicated issue.

Address of the Author:

Vrije Universiteit
Faculteit der Letteren
Postbus 7161
NL-1007 MC Amsterdam

¹⁸ In Booij (1992) it is shown that this applies to forms with inherent inflection such as nouns, infinitives, participles and comparatives, whereas contextually determined inflected forms such as the inflected forms of adjectives do not occur word-internally.

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