Linking elements
A case study on Dutch

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Abstract
So-called linking elements may actually fulfil two very different roles: they may be phonotactic elements or they may realize a morphosyntactic head. I present a case study of linking elements in Dutch which do fulfil a morphosyntactic role. I note first that when 'linking elements' are of this type, the linguist should be aware of the fact that they may be null morphemes. I show that, indeed, Dutch may have such a null affix in its inventory. I then argue that the Dutch linking elements are in fact noun class markers and as such, I derive the fact that two of them are identical to plural marking through cumulative exponence. I point out that these noun classes co-exist with gender marking and may cause so-called erroneous reference. The analysis shows that a careful study of such elements provides us with new insights into two domains simultaneously. Firstly, we learn more about the morphosyntax of the compound's left-hand part, the structure of the compound itself and the inventory of compounding types in the language. The importance of the left-hand part cannot be underestimated in my opinion. It is a unique domain: it shows how a category behaves functionally in the absence of functional material that guarantees reference, such as number and the D-layer. As such, we learn, secondly, something about the morphosyntax of a category. In this contribution it appears that the Dutch nominal domain has nominal classes which are less visible in the nominal group as they are syncretic with number marking. Take away number marking and they become visible.

Key words compounding, linking elements, noun classes, nominal inflection, number marking, gender marking, erroneous reference, Dutch

1. Introduction

The term linking element is generally used when a phoneme or a string of phonemes can be found between two parts of a compound. The term suggests that the role of this element is to link the parts of the compound. This can indeed be observed in the following example from Brazilian Portuguese (example and analysis taken from Nóbrega 2020):

(1) cervej-o-chato
beer-LE-snob
'beer snob'

The linking element -o- is there for phonotactic reasons. It connects a root that ends in a consonant and one that begins with one. It is absent in other phonological contexts, as can be seen in *hidr-electric* 'hydroelectric'. Note that, in (1) the vowel -o- does not belong to the left-hand noun, which would surface as *cerveja* 'beer'. The -o- is thus to be analyzed as a phonological element of the compounding structure, not as part of the compound's left-hand part. For good measure, Nóbrega (2014:211) analyses it as a dissociated morpheme. In other words, it would be a morpheme that is inserted after syntax proper, but it would reflect

syntactic structure, without realizing syntactic structure (see also Embick 1997). It is thus more than just an epenthetic vowel according to him.[1]

However, so-called linking elements may fulfil a different role than improving the phonotactics of a compound. They may realize a head in the functional sequence of the left hand's part morphosyntactic structure. The aim of this article is to show that this is indeed the case for the Dutch so-called linking elements *-s* and *-en*. I will argue that they realize class marking. For such affixes the term linking element is a misnomer. Their role is not to link two parts of a compound. Their function is to realize syntactic structure of the left-hand part of the compound.

More generally, the aim of this article is to draw attention to the fact that the term 'linking element' may refer to two very different linguistic elements: there are phonemes that improve the phonotactics of the compound and there are affixes that realize syntactic structure that belongs to the left-hand part of the compound. By presenting a case study, I aim to define criteria to approach the distinction.

This distinction corresponds to two types of primary compounds I have set apart in De Belder (2017). In De Belder (2017) I argued that Dutch has two types of primary compounds: those of which the non-head is a bare root (root primary compounds) and those of which the non-head bears nominal structure (nominal primary compounds). In that article I presented a discussion of the first type. The second type will be presented in this article. The root primary compounds discussed in De Belder (2017) never show any type of linking element in Dutch. The nominal primary compounds presented here show the so-called linking elements that in fact realize a piece of nominal functional structure.

As recently pointed out by Nóbrega (2020) the absence of a linking element is not a necessity for root primary compounds cross-linguistically. If it can be shown that a linking element is there for purely phonotactic reasons, and thus does not realize syntactic structure (as is consistent with his analysis of the -o- as a dissociated morpheme in (1)), it may still be possible that what precedes the linking element is a bare root, as in (1). In contrast, if it can be shown that the so-called linking element in fact realizes syntactic structure that belongs to the non-head, the non-head cannot be a bare root by definition, as it is marked with functional structure. Hence, in order to understand the typology of non-heads in compounds cross-linguistically, it is crucial to appreciate the role the 'linking element' fulfils in the compound.

A further example from Dutch can be found in De Belder & Van Koppen (2016). They discuss Dutch compounds of which the non-head contains an adjective. This may occur in primary compounds, when the non-head is an adjective or in more complex compounds, of which the non-head is a partial nominal group containing an adjective. Both types of compounds may show a schwa. De Belder and Van Koppen (2016) argue that this schwa is sometimes genuine adjectival inflection, which indeed, may be realized by a schwa in Dutch, as in the following example (2a):

(2) a. kaal-e-kat-en-adoptie
bald-ə-kat-PL-adoption
'adoption of hairless cats'

b. de kaal-e katten
the bald-INFL cats
'the hairless cats'

In (2a) the non-head of the compound is the partial nominal group *kale katten* 'hairless cats'. The schwa of *kale* 'bald' is indeed genuine adjectival inflection, as one would attest in a DP, see (2b).

For other compounds that contain an adjective in the non-head, they argue that the schwa is merely there for phonotactic reasons. More specifically, they show that if the compound's head is a neuter noun, the schwa is unexpected as an inflectional marker on the adjective due to the details of Dutch adjectival inflection that should not concern us here. However, sometimes the schwa is present even though the head is a neuter noun. Yet, it is then always the case that the final consonant of the adjective is a dental or a lateral consonant. As a result,

[1] Eulàlia Bonet (p.c.) points out that an epenthetic vowel would surface as a default vowel (maybe [i] or [e], but not [o] for Brazilian Portuguese).

contrasting pairs such as the following ones can be found in Dutch. Example (3) shows compounds with a neuter noun as the head (the noun *jaar* 'year' is a neuter noun) and adjectives in the non-head position that differ phonologically: *oud* 'old' ends in a dental, whereas *nieuw* 'new' does not:

(3) a. oud-e-jaar
old-ə-year
'New Year's Eve'

b. nieuw-jaar
new-year
'New Year'

For the compounds where the schwa genuinely seems to functions as adjectival inflection, they proposed that there is adjectival functional structure present in the compound's non-head. The compounds that merely showed a phonotactic schwa were analyzed as root primary compounds. As such, they can be seen as an instance of compounds with linking elements that are there for phonotactic reasons, with the non-head being a bare root, as in Nóbrega's (2020) Brazilian Portuguese example above. The discussion illustrates the importance of a correct identification of the linking element as a syntactic head or a phonotactic phenomenon when analyzing specific compounds. A correct analysis of the structure of the compounds and the nature of a compounds' non-heads depends on a precise analysis of the role and the nature of the compounds' linking elements.

As pointed out above, this contribution presents one half of the story. I will show which characteristics can be found for linking elements that do fulfil a syntactic role. Readers who are interested in the other half of the story are referred to a discussion of root primary compounds in De Belder (2017), the discussion of adjectival non-heads in De Belder and Van Koppen (2016) and the discussion of linking elements in Brazilian Portuguese and Greek in Nóbrega (2020) and references therein.

This article is structured as follows. The next section presents the main data. Section 3 discusses the selection of the linking element. Section 4 argues that there may be a null affix in Dutch that fulfils the role of a linking element. Section 5 discusses the relation between linking elements and plural markers in Dutch: there seems to be a connection, but one cannot conclude that linking elements are plural markers. In section 6 it is argued that linking elements are class markers in Dutch and the analysis is fleshed out technically in section 7. Section 8 comments on the co-existence of noun classes and gender in Dutch. Section 9 concludes.

2. Dutch linking elements: main data

The non-head of a Dutch primary compound may be followed by either an *-s* or *-en*[2], as in (4). These intervening morphemes have been called linking morphemes (Don 2009).[3]

(4) a. boek-en-kast
book-EN-case
'book case'

b. zon-en-klaar
sun-EN-bright
'very bright'

c. ezel-s-dracht
donkey-S-pregnancy
'long pregnancy'

d. hemel-s-blauw
sky-S-blue
'blue as the sky'

[2] A mentioned in the introduction, there is also -e- as in oud-e-jaar (old-e-year) 'New Year's Eve' and *wit-e-brood* (white-e-bread) 'white bread', which is truly phonotactic and not under discussion in the present contribution. The string *-er*, as in *kind-er-wagen* (child-er-car) 'pram'. belongs to an allomorph *kinder* from *kind* 'child' (see De Belder 2020).

[3] It will become clear the term 'linking morpheme' is a misnomer from a theoretical point of view as its purpose is not to link anything.

Previous studies have suggested that these linking elements are a piece of nominal inflection. This assumption stands to reason as it only follows nominal non-heads, as can be deduced from (5).[4]

(5) a. speur-hond
track-dog
'tracking dog'

b. drie-luik
three-panel
'triptych'

c. snel-trein
fast-train
'high-speed train'

d. achter-grond
back-ground
'background'

The debate has centered around the question which piece of nominal inflection is realized by the linking morpheme. The most dominant claims are that it is a remnant of case inflection or that it realizes plural marking (Neijt and Schreuder 2009) (and see Schreuder, Neijt, Van der Weide and Baayen 1998 for an overview of previous approaches). However, these proposals are unsatisfactory. The analysis which proposes that it etymologically goes back to case marking may be insightful (see Van Tiel, Rem and Neijt 2011 for a critical discussion), but it fails to provide an analysis of its present function. Given that present-day Dutch does not have overt case marking and given that the distribution of linking morphemes does not reflect the distributional patterns of case, the etymology does not lead us to an analysis of the facts in contemporary Dutch. The claim that they realize plural marking has much more plausibility as the linking elements are identical to Dutch' main plural markers. Yet, such an analysis faces empirical problems, as will become clear in section 5.

In this paper I provide an alternative proposal. I argue that linking morphemes realize noun class marking. I derive the close similarity between linking morphemes and plural markers through cumulative exponence. I propose that Dutch plural marking should be understood as an extension of noun class marking (cf. Harbour 2008 on Kiowa). Both projections, noun class and plurality, can be realized simultaneously by means of a single vocabulary item. It follows that linking morphemes and plural marking are highly similar, as they are realized by means of the same vocabulary item. Yet, they can be distinguished as well as they are two separate syntactic projections. I will further argue that noun class marking can be realized by means of a null vocabulary item, i.e. that the linking morpheme can be null. This again emphasizes the syntactic nature of these affixes, rather than a phonotactic nature. Finally, I point out that gender co-exists alongside number marking in Dutch. Such a view has been presented before for Romance languages (cf. Harris 1991 on Spanish), but it has been denied for Germanic languages (see, for example, Delfitto, Fábregas and Melloni 2008).

Given that the term linking morpheme is a misnomer both descriptively and theoretically for these facts, I will avoid using it much. I will call the morpheme the NCM, which can be interpreted as short for 'nominal compound marker', reflecting its descriptive properties or for 'noun class marker', matching the theoretical proposal in this contribution.

3. The selection of the NCM

In this section I will present some basic facts on Dutch NCMs. I will show that they are selected by the non-head in a regular fashion. As we have seen above, Dutch has two overt NCMs, viz. *-s* and *-en*, as in (6).

(6) a. peer-en-boom
pear-NCM-tree
'pear tree'

b. varken-s-hok
pig-NCM-pen
'pig's pen'

[4] See footnote 1 in which it is pointed out that the *-e-* in, for example, *oudejaar* is a phonotactic linking element and thus does not pattern with these examples.

The NCM *-en* may be pronounced as ə, ən or as a syllabic n, depending on the dialect and the phonological context of the word (Hanssen 2012). Below we will see there is perhaps yet a third NCM, which is a null morpheme.

The NCM is selected by the compound's non-head. For example, *kat* 'cat' selects *-en*, as in (7), whereas *koning* 'king' selects *-s*, as in (8).

(7) a. kat-**en**-luik
cat-NCM-shutter
'cat flap'

b. kat-**en**-voer
cat-NCM-food
'cat food'

c. kat-**en**-staart
cat-NCM-tail
'cat tail'

d. kat-**en**-bak
cat-NCM-box
'cat litter box'

(8) a. koning-**s**-kind
king-NCM-child
'child of a king'

b. koning-**s**-kroon
king-NCM-crown
'royal crown'

c. koning-**s**-troon
king-NCM-throne
'royal throne'

d. koning-**s**-paar
king-NCM-couple
'royal couple'

If two non-heads are coordinated, they still select their own NCM, as in (9) (Botha 1968). This indicates that the head of the compound does not influence the selection of NCM.

(9) dame-s- en heer- en- jassen
lady-NCM- and gentleman- NCM- coats
'coats for ladies and gentlemen'

The selection of the NCMs is much more regular than commonly assumed. Admittedly, their distribution seems somewhat irregular in Standard Dutch. For example, (10)a and (10)b exist alongside one another (see the dictionary *Van Dale*). They both contain the non-head *stad* 'city', yet (10)Ref224104162a selects *-s*, whereas (10)b selects ∅.

(10) a. stad-s-bewoner
city- NCM-inhabitant
'citizen'

b. stad-∅-bewoner
city-NCM-inhabitant
'citizen'

Yet, native speakers share intuitions on the selection of NCMs. If one asks a native speaker to form a compound with *stad* 'city' as the non-head and *hond* 'dog' as the head, the result, which is shown in (11), can be predicted.

(11) stad-s-hond
city-NCM-dog
'dog suited for/living in a city'

This point was confirmed in a questionnaire which was filled out by 689 native speakers of Dutch. I asked native speakers to indicate their preferred NCM in newly formed compounds. More than 90% of the speakers agree in most cases. For example, 95% of the speakers agree the neologism in (12)a is better than its competitors in (12)b and (12)c.

(12) a. toren-∅-burcht
tower-NCM-castle
'castle with towers'

b. toren-s-burcht
tower-NCM-castle
'castle with towers'

c. toren-en-burcht
tower-NCM-castle
'castle with towers'

Admittedly, for some non-heads there is variation. For example, 49% of the native speakers prefer (10)a, but 56% of the speakers prefer (13)b.[5] None of them like (13)c.

(13)	a. pater-∅-korting	b. pater-s-korting	c. pater-en-korting
	priest-NCM-reduction	priest-NCM-reduction	priest-NCM-reduction
	'reduction for priests'	'reduction for priests'	'reduction for priests'

I will come back to this issue in section 6.3. I will point out that even though one cannot predict a native speaker's choice between *-s* and ∅ in (13), it still can be predicted that exactly this non-head will trigger variation and that *-en* will not be selected. In sum, it is possible to draw descriptive generalizations on the distribution of NCMs.

Observe that neologisms which have been listed only recently in Dutch dictionaries are completely regular. It can be checked in dictionaries that newly created compounds with *stad* 'city' as their non-head invariably select *-s* as a NCM, as in (14).

(14)	a. stad-s-eiland	b. stad-s-cowboy
	city-NCM-isle	city-NCM-cowboy
	'urban isle[6]'	'urban cowboy[7]'

I will therefore assume that the NCM which appears in neologisms is the regular one. The fact that neologisms show a regular selection of NCMs in contrast with older compounds dovetails with the fact that compounds with NCMs are only attested relatively recently in Dutch. They only appear since the sixteenth century and they are only attested frequently since the twentieth century (van Tiel, Rem and Neijt 2011). This indicates that the irregular forms as in (10)b are but remnants of older word-formation types. As such, they do not *per se* indicate that the selection of NCMs is irregular. It merely shows that the lexicon contains words which originated in different periods and which are preserved in their original form in the lexicon. I therefore propose to mainly ignore lexicalized compounds when drawing generalizations and to focus on productively formed new compounds in the discussion (cf. Bauer 1978:78 who makes the same point).

4. The NCM can be null

A crucial prediction that sets apart affixes that realize syntactic heads from those that are there for phonotactic reasons (see introduction) is that the syntactic affixes may be null affixes, whereas the phonotactic linking elements may not. Phonotactic null elements, in the sense of epenthetic elements, cannot exist by definition.[8] Yet, if NCMs realize nominal inflection, one may certainly hypothesize they may be null. After all, it is common for inflection in Dutch to be realized by means of a null vocabulary item. A In this section I will argue that there is indeed a null NCM alongside the overt ones *-s* and *-en*.

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[5] The sum is more than 100% because the informants were able to choose both forms in case they had no preference. Some speakers thus accepted both forms equally.

[6] A *stadseiland* is an artificial island which is created for urban development. The lemma appeared in the dictionary Van Dale in 2007 (Dikke Van Dale Online, no authors (2020)).

[7] The lemma *stadscowboy* appeared in the dictionary *Van Dale* dictionary in 2009.

[8] To be entirely clear: if the only ground for the presence of an exponent is a phonological one (i.e. if the exponent would optimize the phonological surface representation of the compound), it would not make any sense to get a zero exponent; it would defeat its own purpose. Eulàlia Bonet points out that languages may have exponents the overt presence of which can be motivated by an interplay of phonological and syntactic factors (Bonet 2018, see also Zygis 2010 and De Belder to appear). The present reasoning does not apply to such exponents: their overt or null realization would depend on syntactic factors as well. I am not aware of studies of such exponents in compounds, but they are certainly a hypothetical possibility.

Compounds with a nominal non-head followed by a NCM are not the only type of primary compounding in Dutch. As mentioned in the introduction, De Belder (2017) argues there are two types of primary compounds in Dutch. The first type is the one under discussion in the present article. It is characterized by a nominal non-head and the presence of an NCM (these compounds are called nominal primary compounds in De Belder 2017). The second type contains a bare root as its non-head which is never followed by any overt affixes (these compounds are called root primary compounds in De Belder 2017). Examples of root primary compounds can be found in (15).

(15) a. speur-hond
track-dog
'tracking dog'

b. drie-luik
three-panel
'triptych'

c. snel-trein
fast-train
'high-speed train'

d. achter-grond
back-ground
'background'

The fact that the non-head may be a bare root results in a methodological problem. How to set apart those compounds which have a bare root not followed by anything as their non-head (root primary compounds) and those compounds which contain a null NCM (nominal primary compounds)? At the surface, they are both expected to look the same.

A puzzling data set in this respect are compounds of which the non-heads refer to mass concepts. Such compounds never show an overt NCM.

(16) a. kaas-boer
cheese-farmer
'cheese farmer'

b. zand-grond
sand-soil
'sandy soil'

c. vuur-steen
fire-stone
'flint'

d. siroop-fles
syrup-bottle
'syrup bottle'

e. klei-grond
clay-soil
'clay soil'

f. wol-draad
wool-yarn
'wool-yarn'

We may now ask the question whether such non-heads systematically occur in root primary compounds or whether they systematically select a null NCM. In Standard Dutch, it is, to the best of my knowledge, impossible to find empirical support for any of these two hypotheses.

West-Flemish Dutch data shed light on the issue. Nouns are marked for gender in Dutch. Yet, whereas in Standard Dutch the gender of the noun is only noticeable via agreement on the adjective and the determiner, West-Flemish feminine nouns are also marked via an obligatory schwa ending on the noun (Haegeman 1998), as in (17).[9]

(17) e school-e
a school-F
'a school'

As in Standard Dutch, mass concepts are not followed by an overt marker in West-Flemish when they are the non-head in a primary compound:

(18) a. de koas
thecheese
'the cheese'

b. het zand
the sand
'the sand'

c. het vier
the fire
'the fire'

(19) a. koas-boer

b. zand-groend

c. vier-stêen

[9] The West-Flemish Dutch examples in this article are taken from Blankenberge Dutch. I would like to thank Katlijn Van Audenaerde and Monica Roose for data and judgments.

cheese- farmer	sand- soil	fire- stone
'cheese farmer'	'sandy soil'	'flint'

However, crucially, this fact only holds for masculine and neuter mass nouns in this dialect, as can be seen in (19). (18) shows that the non-heads are indeed not feminine, as they do not select the schwa marker. In (18), the nouns preceded by the definite article *de* are masculine, those preceded by the definite article *het* are neuter nouns. If the root which refers to a mass concept is feminine, as in (20), its schwa ending is retained within the compound, as in (21).[10]

(20) a. de siroop-e
thesyrup-F
'the syrup'

b. de kliet-e
theclay-F
'the clay'

c. de sjette
thewool-F
'the wool'

(21) a. siroop-e-flasche
syrup-F-bottle
'syrup bottle'

b. kliet-e-groend
clay-F-soil
'clay soil'

c. sjette-e-droad
wool-F-yarn
'wool-yarn'

The fact that gender marking is present in these examples indicates that the root is followed by nominal inflection in general. Hence, the non-head in these compounds is not a bare root, but a root under nominal inflection. If we do not want to multiply the assumed types of compounding in Dutch beyond necessity, it stands to reason that West-Flemish compounds containing a feminine mass noun followed by a gender marker as their non-head are nominal primary compounds. More generally, there is evidence in Dutch that primary compounds with a mass noun as their non-head can be nominal primary compounds. I extend this conclusion to Standard Dutch and I assume that compounds with a root referring to a mass concept may be nominal primary compounds as well. They then do contain nominal markers, albeit covertly. I therefore postulate the presence of a null NCM for the data in (16).

For good measure, note that the feminine marker is not obligatorily present in West-Flemish compounds. Just as Standard Dutch (and Germanic languages in general, see De Belder 2017), West-Flemish Dutch certainly has root primary compounds which may contain roots that may occur as feminine nouns. In such compounds, the feminine marker is absent in West-Flemish Dutch, as expected:

(22) a. vrouw-mens
woman.FEM-human
'woman (pejorative)'

b. stroat-kat-e
street.FEM-cat-FEM
'street cat'

c. school-gebouw
school.FEM-building
'school building'

d. kliet-soort-e
clay.FEM-kind-FEM
'kind of clay'

Loanwords behave similarly as mass nouns. There is no overt NCM in Standard Dutch when the compound's non-head is a loanword:

(23) a. Ford-fabriek
Ford-factory
'Ford factory'

b. dollar-koers
dollar-currency
'dollar currency'

c. café-baas
pub-holder
'pub holder'

Haegeman (1998) observes that if a loanword happens to end in a schwa, it will be treated as a feminine noun in West-Flemish:

(24) a. e lift-e

b. e disket-e

[10] Note that, as expected, the schwa is not present in Standard Dutch examples, which lack an overt gender marking on the noun (e.g. *siroop-fles* 'syrup bottle' and *klei-grond* 'clay soil').

a.F elevator-F
'an elevator'

a.F floppy.disk-F
'a floppy disk'

Now, my informants often allow both nominal primary compounds and root primary compounds in West-Flemish:

(25) a. lift-(e)-telefong
elevator-F-telephone
'telephone in an elevator'

b. disket-(e)-hoesje
floppy.disk-F-case
'case for a floppy disk'

c. col-e-fabriek
glue-F-factory
'glue factory'

This suggests that the Standard Dutch data in (16) probably underlyingly show variation between root primary compounding and nominal primary compounding as well. When they are nominal primary compounds, the NCM is a null affix. Of course, we are extending here a logic established on the basis of dialectal data to Standard Dutch data. Within Standard Dutch, the data themselves do not reveal anything relating to this matter.

I would like to note that there are classes of nouns that do not show this type of variation. Nouns that refer to body parts and kinship terms (a pair of semantics fields that is known as a natural class of referring to inalienable possession) never show an NCM in Standard Dutch:

(26) a. hoofd-pijn
head-ache
'head ache'

b. arm-band
arm-band
'bracelet'

c. lever-ziekte
liver-disease
'liver disease'

d. huid-ziekte
skin-disease
'skin disease'

(27) a. broeder-moord
brother-murder
'fratricide'

b. dochter-knoop
daughter-node
'daughter node'

c. vader-land
father-land
'fatherland'

d. oom-zegger
uncle-adresser
'nephew/niece'

e. zoon-wens
son-wish
'desire to have a son'

f. moeder-taal
mother-language
'mother tongue'

Yet, they never show feminine markers in West-Flemish Dutch compounds either:

(28) a. e nek-e
a.F neck-F
'a neck'

b. nek-(*e)-klachtn
neck-(*F)-complaints
'neck complaints'

(29) a. e moedr-e
a.F mother-F
'a mother'

b. moeder-(*e)-melk
mother-(*F)-milk
'breast milk'

It seems that body parts and kinship terms are limited to primary root compounds. For good measure, I would like to note that proper names systematically resist overt NCMs as well in Standard Dutch:

(30) a. Nijl-delta
Nile-delta
Nile delta'

b. Vitra-stoel
Vitra-chair
'Vitra chair'

c. Mozart-kenner
Mozart-specialist
'Mozart specialist'

Whether proper names pattern with mass nouns and loanwords or with kinship terms and body parts is unclear to me.

In sum, this section aimed to point out that what is called 'a linking element' may be there for syntactic reasons and, as soon as one accepts that, there may be a null affix that fulfils this function. I aimed to point out that it is reasonable to assume that Dutch indeed has such a null affix. The next section discusses which piece of nominal inflection is realized by the linking

element. I first argue they are not plural markers. In a later section I will propose they realize noun class marking.

5. NCMs and plural markers

In this section I discuss the close relation between NCMs and plural markers: they are similar formally and distributionally and psycholinguistic experiments show that native speakers associate NCMs with plural markers. Yet, it can be shown that NCM are not plural markers.

Let us first consider the formal relation between NCMs and plural markers. Recall that the two overt NCMs in Dutch are *-s* and *-en*. Dutch' main[11] plural markers are formally identical, they are *-s* and *-en* as well, as is illustrated in (31).

(31) a. twee ezel-**s**
two donkey-PL
'two donkeys'

b. twee kat-**en**
two cat-PL
'two cats'

Hanssen (2012) has shown that this formal identity is absolute in all Dutch dialects. The NCM *-en* may be pronounced as ə, ən or as a syllabic n, depending on the dialect and the phonological context of the word. It now appears that regardless how the NCM *-en* is pronounced in a given dialect, its pronunciation will be identical to the pronunciation of the one of the plural marker *-en*.[12] The set of NCMs and the set of plural markers are thus formally identical across dialects.

NCMs and plural markers show a certain relation in their distribution. Mattens (1984) observed the generalization in (32).

(32) The *s*-plural generalization
If a root takes *-s* as its plural marker, it will not take *-en* as its NCM in the same idiolect.

For example, from the fact that *ezel* 'donkey' takes *-s* as its plural marker, as is shown in (33), we predict correctly that (34) is excluded.

(33) twee ezel-**s**
two donkey-PL
'two donkeys'

(34) * ezel-**en**-dracht
donkey-LP-pregnancy

There is thus a certain distributional relation between NCMs and plural markers. I come back to this relation in more detail below.

Finally, there is a psychological relation between NCMs and plural markers. Psycholinguistic experiments show that native speakers associate the NCM with plurality, even if such an association is contextually implausible, as in *zwaluw-en-ei* (swallow-NCM-egg, the egg comes from a single bird) (Schreuder, Neijt, Van der Weide and Baayen 1998, Neijt, Baayen en Schreuder 2006, Neijt and Schreuder 2009). In sum, there is a clear link between NCMs and plural markers. They are formally identical, they are related in their distribution and native speakers associate them with one another.

Unsurprisingly, it has been proposed that NCMs *are* plural markers (see Neijt and Schreuder 2009 for an example of such an analysis). Yet, such an analysis faces four empirical problems. Firstly, it has been noted that semantic plurality is not a predictor of the selection of a NCM (Booij 2001). The non-head of the compounds in (35) are interpreted as singular. Yet, they do

[11] I am ignoring plural markers on loan words, such as *-a* in *musea* 'museums'.

[12] In contrast, the pronunciation between the plural marker *-en* and the plural agreement marker *-en* on the verb may differ.

select a NCM. If the NCM were a plural marker, it is not clear how the meaning of the examples in (35) is derived.[13]

(35) a. hond-en-drol
dog-NCM-turd
'turd of a dog'

b. vrouw-en-lijk
woman-NCM-corpse
'corpse of a woman'

c. rijtje-s-huis
row-NCM-house
'row house'

The second problem is the fact that the NCM may arguably be null (see section 4), whereas there is no null plural marker in Dutch. In other words, there is at least one NCM which cannot be analyzed as a plural marker.

The third empirical problem is the fact that the NCM which is selected by a specific root does not necessarily match the plural marker which is selected by this root. For example, the root *dorp* selects *-s* as its NCM, as in (36)a, yet its plural marker is *-en*, as in (36)b.

(36) a. dorp-s-café
village-NCM-pub
'pub in a village'

b. twee dorp-en
two village-PL
'two villages'

Similarly, roots selecting a null NCM, selects *-s* or *-en* as their plural marker:

(37) a. koffie-∅-kop
coffee-NCM-mug
'coffee mug'

b. twee koffie-s
two coffee-PL
'two coffees'

(38) a. kaas-∅-boer
cheese-NCM-farmer
'cheese farmer'

b. twee kaaz-en
two cheese-PL
'two kinds of cheese'

Fourthly, we have seen above that there is a distributional relation between NCMs and plural markers: if a root takes *-s* as its plural marker, it will not take *-en* as its NCM in the same idiolect. This generalization certainly points to a connection between the two affixes, but it does not follow that they are one and the same affix. Furthermore, from the plural marker *-en* no prediction can be derived with regards to the NCM. In other words, a root which selects *-en* as its plural marker may select either NCM. These facts are summarized in the table below. They will play a central role in the analysis in section 7.

(39)

	Plural Marker	Noun Class Marker
s-plurals	s	∅
	s	s
en-plurals	en	∅
	en	s
	en	en

[13] Admittedly, the strength of this argument depends on the precise semantic analysis of plurality.

Under the assumption that NCMs are plural markers, the lack of a one-to-one mapping in the distribution cannot be captured.

The relation between NCMs and plural markers in Dutch is puzzling. They are clearly related, yet they cannot be equated. How, then, should we understand the close relation between the NCMs in Dutch and plural marking? An analysis of NCMs as noun class markers is particularly promising to answer this question. Cross-linguistically, it is extremely common for noun class markers to be syncretic with plural markers (Kihm 2005:462). As such, noun class markers and plural markers may be closely related, yet not identical.

6. NCMs realize noun class marking

6.1 Introduction

In this section I argue that NCMs are noun class markers in Dutch. Considering cross-linguistic properties of noun class markers (Harris 1991, Aikhenvald 2000, Kihm 2005, Harbour 2008), we know that if Dutch had them, they would be restricted to nouns, syncretic with plural markers, distributed according to their morphological and phonological and/or semantic properties and they would trigger agreement in the DP or clause. We have seen in the previous sections that NCMs and plural markers are indeed formally related. In this section I will show that Dutch NCMs show precisely those other properties as well.[14]

Noun class markers are of course part of the nominal domain. We have seen in section 2 that NCMs are indeed restricted to compounds with nominal non-heads. Non-nominal ones were restricted to root primary compounds and did not select an NCM. NCMs are thus a typical property of nominal non-heads. As such, they qualify for the first and most evident requirement of noun class marking. In the next sections, I will argue that they show more particular characteristics of noun class marking as well.

In the previous sections we have seen that the understood plurality of the compound's non-head is not a predictor of the selection of the NCM. One may wonder then what does predict its selection. Although a complete description of this matter transcends the ambitions of this article, I will point out that the choice of the NCM is determined by exactly those features which are known to define noun classes. These are the phonological, semantic and morphological properties of the root (Aikhenvald 2000).

6.2 Phonological criteria

Phonological criteria play a role in the selection of the NCM. Note first that the distribution of plural marker *-s* is partially determined by phonological criteria. Some roots trigger the plural marker *-s* for phonological reasons. I will refer to these roots as *-s*-plurals: Roots which take -s as their plural marker for phonological reasons (in a given dialect/idiolect/register) are called s-plurals (for that dialect/idiolect/register).

S-plurals include two main groups.[15] The first group are roots which end in a schwa followed by a sonorant. Examples are given in (40).

(40)	a.	bodem-s	b.	vogel-s	c.	toren-s	d.	letter-s
		bottom-PL		bird-PL		tower-PL		letter-PL
		'bottoms'		'birds'		'towers'		'letters'

The second group are roots which end in a open vowel, which is not /i/ or /e/, as in (31).

(41)	a.	piano-s	b.	mama-s	c.	tiramisu-s

[14] Harris (1991) notes that class markers are not exclusive to nouns, they occur on adverbs as well. Interestingly, Dutch adverbs often end in an -s, see Corver (2017) for discussion.

[15] An exhaustive discussion of the relation between the phonological make-up of the root and the selection of the plural marker would take us too far afield. For a detailed discussion see Kooij & van Oostendorp (2003).

piano-PL	mommy-PL	tiramisu-PL
‘pianos’	‘mommies’	‘tiramisus’

Now recall from section 5 that there is a distributional link between the selection of the plural marker and the NCM. The relevant generalization is repeated in (42).

(42) The *s*-plural generalization
If a root takes *-s* as its plural marker, it will not take *-en* as its NCM in the same idiolect.

It follows that roots which end in a schwa followed by a sonorant or in an open vowel, which is not /i/ or /e/ will select either -∅- or *-s-* as their NCM, but not *-en-*. As such, the selection of NCMs is partially determined phonologically.

6.3 Conceptual criteria

Conceptual properties of the non-head influence the selection of the NCM. These properties include mainly masshood, animacy and concreteness (see Mattens 1984). There are other minor relevant factors such as granularity and edibility. These and comparable properties support the hypothesis that NCMs are noun class markers as they are textbook examples of the relevant criteria which determine noun classes cross-linguistically (Aikhenvald 2000).[16]

A study on lexical statistics (Krott et al. 2009) has shown that Dutch non-heads referring to animate and concrete concepts tend to get the NCM *-en*, whereas abstract roots tend to select *-s* and inanimate ones favor ∅. Telling though these results may be, they focus on coarse distinctions. Below I present some more fine-grained observations.

As we have seen above, non-heads which refer to mass concepts select the NCM ∅, regardless whether they are *s*-plurals or *en*-plurals (see also Mattens 1984). More examples are given below. (43) shows compounds with *s*-plurals as their non-heads, (44) shows compounds with *en*-plurals.

(43) a. ijzer-∅-erts (iron ore)
iron-NCM-ore
‘iron ore’

b. koper-∅-mijn
copper-NCM-mine
‘copper mine’

c. water-∅-bron
water-NCM-source
‘water source’

d. gember-∅-koek
ginger-NCM-cookie
‘ginger cookie’

e. amber-∅-steen
amber-NCM-stone
‘amber stone’

f. balsem-∅-geur
balsam-NCM-scent
‘balsam scent’

(44) a. wijn-∅-glas
wine-NCM-glass
‘wine glass’

b. melk-∅-fles
milk-NCM-bottle
‘milk bottle’

c. siroop-∅-fles
syrup-NCM-bottle
‘syrup bottle’

d. kaas-∅-boer
cheese-NCM-farmer
‘cheese farmer’

e. honing-∅-wijn
honey-NCM-wine
‘honey wine’

f. zand-∅-strand
sand-NCM-beach
‘sandy beach’

g. vuur-∅-steen
fire-NCM-stone
‘flint’

h. ijs-∅-gletsjer
ice-NCM-glacier
‘ice glacier’

i. licht-∅-straal
light-NCM-beam
‘light beam’

[16] These properties are unified by the property of influencing the individuation of the referent (see Grimm 2012).

There is one class of exceptions. If the root is an *en*-plural which refers to an edible grain, it may select *-en*, even though it may be considered to be a mass concept. Examples are given in (45).

(45) a. gerst-en-bier
barley-NCM-beer
'barley beer'

b. gort-en-pap
pearl.barley-NCM-porridge
'porridge of pearl barley'

c. spelt-en-meel
spelt-NCM-flour
'spelt flour'

These examples may seem particular exceptions, yet an interplay between masshood and granularity is not unique to Dutch noun classes. In Kiowa, for example, non-granular mass nouns belong to one class, whereas granular mass nouns belong to another one (Harbour 2008:50). Hence, *áápenhaa* 'honey, syrup' belongs to a different class than *éíyóguei* 'rice' in Kiowa. Admittedly, the Dutch data are not fully parallel to the data in Kiowa. In Dutch it does not suffice to be granular for a mass noun to belong to the exceptional class. The granular mass concept needs to be edible and vegetable (i.e. a grain) as well. Yet, the underlying similarity is striking.

For Dutch non-heads which end in a schwa plus a sonorant animacy is relevant. Mattens (1984) observed that inanimate roots of this type select ∅, whereas animate ones select *-s*. I have checked these conclusions in a questionnaire, to which 689 speakers of Dutch responded. It appears that his generalizations should be adjusted slightly. Roots which end in a schwa plus a sonorant and which refer to inanimate concepts indeed select ∅ in neologisms,[17] as illustrated in (46). However, roots referring to animals select ∅ as well, as in the examples in (47).[18]

(46) a. bodem-∅-hut
bottom-NCM-cabin
'bottom cabin'[19]

b. deken-∅-kast
blanket-NCM-closet
'closet for blankets'

c. kabel-∅-web
cable-NCM-web
'web consisting of cables'

(47) a. wezel-∅-tuin
weasel-NCM-garden
'garden for weasels'

b. ezel-∅-taart
donkey-NCM-pie
'pie for donkeys'

c. otter-∅-tuin
otter-NCM-garden
'garden for otters'

Roots which refer to human beings pattern differently. They allow variation between the NCM *-s* and ∅, as in (48) and (49).

(48) a. dokter-s-babbel
doctor-NCM-chat
'chat with the doctor(s)'

b. minister-s-lied
minister-NCM-song
'song for the minister'

c. pater-s-korting
priest-NCM-reduction
'reduction for priests'

[17] I was not interested in NCMs which occur in lexicalized compounds. I tested newly formed compounds (see section 3 for a justification of this approach). Given that I invented neologisms for the test, it should not come as a surprise that some examples in (46)-(49) are slightly unconventional meaningwise. In the questionnaire I made sure to provide the informants with a background context to render the neologism plausible from a pragmatic point of view.

[18] From the test it appeared that *varken* 'pig' exceptionally selects *-s* as its NCM. We may account for this observation if we suppose that *varken* is morphologically complex, with *vark* being the root and *-en* being a suffix. This hypothesis is supported by the fact that one may substandardly attest the diminutive *vark-ske* 'little pig', indicating that *vark* is a root. Below I point out that in morphologically complex non-heads the affix selects the NCM. I thus capture the fact that the selection of the NCM by *varken* pig' is exceptional.

[19] In the test this neologism referred to a newly invented cabin in a zoo. The cabin had a transparent bottom which allows visitors to see insects living in the earth.

(49) a. dokter-∅-babbel
doctor-NCM-chat
'chat with the doctor(s)'

b. meester-∅-huisje
teacher-NCM-house.DIM[20]
'small house for teachers'

c. pater-∅-korting
priest-NCM-reduction
'reduction for priests'

Although I fail to understand the variation between these two NCMs, it is striking that it can be predicted which class of roots is subject to it. They all end in a sonorant plus a schwa and they all refer to human beings. Despite the idiolectal variation a specific semantic field is singled out when it comes to the selection of NCMs. Again, a parallel can be drawn with languages with *bona fide* noun classes. Human beings form a separate class in, for example, Manjaku. In this language the noun *na-kiëj* 'thief' selects the noun class marker *na-* of class 1 in the singular, whereas the noun *u-ndali* select the class marker *u-* of class 3 in the singular (Kihm 2005:464).

Another example of a semantic field which patterns alike when it comes to the selection of NCMs are non-heads which refer to geographical units.[21] They select the NCM *-s*, even when they are all *en*-plurals.

(50) a. dorp-s-café
village-NCM-pub
'pub in a village'

b. stad-s-bus
city-NCM-bus
'city bus'

c. staat-s-bank
state-NCM-bank
'state bank'

d. land-s-verraad
land-NCM-betrayal
'treason'

e. rijk-s-wacht
state-NCM-guard
'gendarmerie'

All non-heads in (50) are *en*-plurals, yet they all select *s* as their NCM. One might conjecture that the roots in (50) do not form a class and that the observation is due to happenstance. Yet, morphologically simplex *en*-plurals which select *-s* as their NCM are rather rare. As such, the examples in (50) genuinely pattern alike. This example of a unified selection of the NCM is again tied to the fact that they share a semantic property. The fact that locative nouns pattern alike when it comes to noun classes has been attested cross-linguistically as well. For example, KiVunjo-Chaga has a separate class for such nouns (Moshi 1995).

Similarly, morphologically simplex en-plurals referring to a geographic unit of water will select the null morpheme as well:

(51) a. rivier-∅-bedding
river-NCM-bed
'river bed'

b. zee-∅-visser
sea-NCM-fisherman
'sea fisherman'

c. meer-∅-aal
lake-NCM-eel
'lake eel'

d. beek-∅-forel
creek-NCM-trout
'creek trout'

In sum, we have seen that the non-head's conceptual properties determine the selection of the NCM. Relevant factors are notions such as animacy, masshood, concreteness, granularity, edibility, geographical units,… In this respect, NCMs pattern with *bona fide* noun class markers cross-linguistically. I conclude that the observations support the hypothesis that NCMs are noun class markers.

[20] DIM = diminutive

[21] These are new observations, they were not included in Mattens (1984).

6.4 Noun class agreement

Now, if Dutch nouns are marked for class, we may perhaps expect to notice the existence of noun classes outside of the domain of compounds. This is indeed the case. More specifically, there is an agreement pattern I would like to draw attention to.

Let me start with a small detour. Notice that Dutch has *bona fide* gender marking on nouns. Northern Dutch distinguishes between common and neuter gender, southern Dutch distinguishes between masculine, feminine and neuter gender. There is no correlation whatsoever between the classes we have observed above and gender marking in Dutch. For example, the group of nouns in (50) contain both common nouns (*stad, staat*) and neuter nouns (*dorp, land, rijk*). Gender is visible via agreement on definite articles, adjectival agreement and on indefinite articles in some dialects. Pronouns that refer back to a noun may also agree in gender with that noun in the more southern variants of Dutch:

(52) De deur, **ze** staat open.
the door.F, she stands open
'As to the door, it is open.'

For some nouns, it has been observed that the reference may be 'erroneous'. In (53) a feminine possessive pronoun refers back to a neuter noun, in (54) a neuter pronoun refers back to a masculine noun.

(53) % **Het**$_{\text{NEUTER}}$ **volk**$_{\text{NEUTER}}$ heeft **haar**$_{\text{FEM}}$ eigen mening. (Belgian Dutch)
the people has her own opinion
'The public has its own opinion.'

(54) % **Vis**$_{\text{MASC}}$, ik vind **dat**$_{\text{NEUTER}}$ lekker. (Belgian Dutch)
fish, I find it tasty
'Fish, I like it.'

An in-depth study (Audring 2009) reveals that the so-called erroneous reference is not random. The following morphologically simplex 'collective' nouns can be referred to with a feminine pronoun, even though they are neuter or masculine:

(55) raad$_{\text{MASC}}$ 'council' bestuur$_{\text{NEUTER}}$ 'governing board'
staat$_{\text{MASC}}$ 'state' volk$_{\text{NEUTER}}$ 'public'
tijd$_{\text{MASC}}$ 'time' publiek$_{\text{NEUTER}}$ 'public'
arbeid$_{\text{MASC}}$ 'labor'

Mass DPs can always be referred to with a neuter pronoun, regardless of their gender, as in the example in (54), in which *fish* gets a mass reading.

I would like to point out that these erroneous references correlate with the classes I have proposed above. We have seen that mass readings constitute a class on their own, triggering a null NCM. The collective nouns all behave on a par as well. The table below shows that their gender can vary, but they can all select an 'erroneous' feminine referring pronoun, they all select the *-s-* as an NCM, as was shown in (50) and they all get the same plural marker *-en*, which differs from their plural marker, which is invariably *-en*.[22]

Table 1: the class of abstract collections

noun	**gender**	**erroneous ref**	**Noun Class Marker**	**Plural Marker**

[22] The noun *arbeid* is quite rare in general and not commonly used in plural contexts. The plural form of *volk* is *volkeren*: it involves the allomorph *volker-*.

raad ‘council’	masc	fem	s	en
staat ‘state’	masc	fem	s	en
tijd ‘time’	masc	fem	s	en
arbeid ‘labor’	masc	fem	s	unattested
bestuur ‘board’	neuter	fem	s	en
volk ‘public’	neuter	fem	s	en
publiek ‘public’	neuter	fem	s	en

We now observe that even though the singular DP is not marked for class overtly by means of a marker, it does show a grammatical effect regulated by class by means of erroneous reference. Structurally, it must be the case that the singular DP contains a class projection. It must further be the case that the compound’s left-hand part contains this projection as well.

6.5 Morphological criteria

Before closing off this section, I would like to make a final remark for good measure. The morphological make-up of the non-head may influence the selection of the NCM as well. More specifically, the findings presented above are only relevant for non-heads which do not contain suffixes. Suffixes select their own NCMs. For example, *-heid* ‘-ity’, as in (56), and the diminutive morpheme, as in (57) select *-s*.

(56) a. werkelijk-heid-s-besef
real-HEID-LP-sense
‘sense of reality’

b. schoon-heid-s-ideaal
beautiful-HEID-LP-ideal
‘beauty ideal’

c. waar-heid-s-waarde
true-HEID-LP-value
‘truth value’

(57) a. bloem-etje-s-behang
flower-DIM-LP-wallpaper
‘flowered wallpaper’

b. rij-tje-s-huis
row-DIM-PL-house
‘terraced house’

c. kraaan-tje-s-water
tap-DIM-LP-water
‘tap water’

It may be clear for now that the selection of the NCM may depend on a suffix. If NCMs are analyzed as noun class markers, it should not come as a surprise that their selection can be determined by affixes. This phenomenon has been attested in various languages (Aikhenvald 2000:25). I will not discuss this fact any further.

6.6 Conclusion

This section focused on the fact that Dutch NCMs show the prototypical features of noun class markers. They are restricted to nouns, they are syncretic with plural markers, they are selected on the basis of the phonological, conceptual and morphological properties of the noun and they show agreement.

Considering the non-head’s phonological, conceptual or morphological properties or a combination thereof is the best way to predict the NCM it will select. Phonologically, Dutch nouns fall into two classes, i.e. *s*-plurals and *en*-plurals. The distribution of the plural marker influences the distribution of the NCM through the *s*-plural generalization. As such, the selection of the NCM is indirectly affected by the phonological properties of the non-head. We have further seen that conceptual properties of the non-head determine the selection of the NCM as well. Relevant factors are notions such as animacy, masshood, granularity, … The class of a noun has an effect on the selection of the NCM and erroneous references. Finally, I have pointed

out that affixes select their own NCM. The morphological make-up of the non-head is thus relevant as well when it comes to selecting an NCM.

The observations support the hypothesis that NCMs are noun class markers. Cross-linguistically, noun class markers are selected via precisely the criteria presented above, i.e. the phonological, conceptual and morpological properties of the noun. Furthermore, the mere fact that the principles of assignment are mixed is widely attested as well (Aikhenvald 2000).

A promising result of this section is the fact that the NCM is analyzed as a piece of nominal inflection which is syncretic with plural marking. It opens up the possibility to capture the formal similarity between NCMs and plural markers, avoiding the fallacious view that NCMs are plural markers. In the next section I will present a detailed analysis of this cumulative exponence.

7. Formal analysis of the cumulative exponence of NCMs and plural markers

7.1 Introduction

In this section I will present an overview of the inventory of Dutch noun classes. On the basis of this inventory I will present a structural analysis which captures their cumulative exponence with plural markers. Throughout the analysis I will adopt the insights from Distributed Morphology. Most importantly, I assume that syntax merges feature bundles which are realized post-syntactically along the lines of the Subset Principle, which is given in (58). (Halle and Marantz 1993, Harley and Noyer 1999).

(58) The Subset Principle

The phonological exponent[23] of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the syntactic features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen (Halle 1997:428).

7.2 The features of Dutch noun class markers

The table in (59) contains an overview of what an inventory of Dutch noun classes might look like. The overview serves to give an impression of the patterns, it does not have the ambition to be exhaustive. A class is defined by which plural marker and the NCM is selected by its members.

(59)

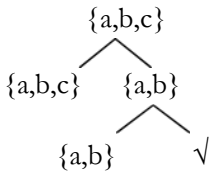
Noun Class Marker	Plural Marker	
∅	Subclass 1.1: -s Subclass 1.2: -en	▪ mass concepts
∅	s	▪ most roots ending in a schwa+sonorant or in an open vowel ▪ loanwords

[23] A vocabulary item consists of a phonological form and information about its context of insertion. Its phonological form is called the phonological exponent of a vocabulary item.

s	s	▪ some exceptional animate concepts (e.g. *kok* 'cook') ▪ roots referring to humans ending in a schwa+sonorant or in an open vowel ▪ diminutives ▪ many affixes
s	en	▪ concepts with salient subparts ▪ many affixes ▪ abstract concepts
en	en	▪ most saliently animate and concrete concepts, i.e. prototypical atoms)

To analyze these classes structurally, I adopt some main ideas from Harbour's (2008) analysis of noun classes and number marking. He essentially proposes that number marking is a projection on top of class marking. Both projections may contain a subset of the same feature set. For example, if there is a feature set *{a,b,c}* determining the noun classes in the languages a specific class marker and a specific number marker will both contain a subset of these features. An example of such a hypothetical derivation is given in (60).

(60)



In the structure which is shown in (60) the first merger of the features {a,b,c}, in this case the one that contains {a,b}, define the noun class, the second merger of this feature set derives a plural interpretation. LF thus interprets the second merger of class features as plurality. Plural marking should then not be understood as a specific feature such as [plural] which merges on top of class marking, but rather as an extra projection which influences the features values of the class projection. In short, plural marking is understood as a class extension on top of bare class marking. Bare noun class marking, which solely consists of a class projection, is thus structurally smaller than plural marking, which consists of both a class and number projection. I would like to point out that an analysis of plurality along these lines may capture the fact that plurality has both lexical and functional features. Semantically, plural marking may be subject to idiomatic interpretations (see Acquaviva 2008 and Borer 2013). If we assume that plural marking is in fact class marking, its lexical nature comes for free. At the same time, plural marking is regular from a functional point of view in the sense that it invariably combines with count superstructure. Plurality is hard-wired in the structure by being a functor on noun classes. In other words, the precise features of the classes are lexical, the class functor is a structural (hence, functional) property.

If one takes a closer look at the table in (59), one may observe a matryoshka doll effect in Dutch noun classes, which is summarized below. The licit combinations of NCMs and plural markers in a class are summed up in (61), the illicit ones are given in (62).

(61) a. the NCM ∅ can be contained in the plural marker *-s*
b. the NCM ∅ can be contained in the plural marker *-en*
c. the NCM *-s* can be contained in the plural marker *-s*
d. the NCM *-s* can be contained in the plural marker *-en*
e. the NCM *-en* can be contained in the plural marker *-en*

(62) a. the NCM *-s* cannot be contained in a plural marker -∅[24]
b. the NCM *-en* cannot be contained in a plural marker -∅
c. the NCM *-en* cannot be contained in the plural marker *-s*

Through this Russian doll effect it is clear that the vocabulary item -∅ is smaller than *-s*, which is smaller than *-en*. Let us express this difference in size formally by assuming that the bigger vocabulary items realize more features. This idea is expressed in (63).

(63) a. /∅/ ↔ {a}
b. /s/ ↔ {a,b}
c. /ən/ ↔{a,b,c}

Note that the vocabulary items in (63) may realize both NCMs and plurality, even though bare noun class marking and plurality differ structurally. As such, we are able to derive the formal identity between NCMs and plural markers without the fallacious assumption that NCMs *are* plural markers. Having established the inventory of noun classes and the feature composition of the class markers, we are now able to derive the noun class marking and the syncretic plural marking of each class.

7.3 Deriving the classes

7.3.1 Class 1

In this section I will discuss the precise derivation per class. Let us start with class 1. Now recall that noun classes are defined by the NCM and the plural marker they select. The first noun class can then be defined as in (64).

(64) Class 1 is the class of roots which select ∅ as their NCM and *s* as their plural marker.

It thus contains roots which select ∅ if they are the non-head of a compound, as in (65), and which select *-s* as their plural marker, as in (66).

(65) a. keuken-∅-kast
kitchen-NCM-cupboard
'kitchen cupboard'

b. koper-∅-mijn
copper-NCM-mine
'copper mine'

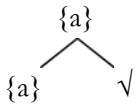
(66) a. twee keuken-s
two kitchen-PL
'two kitchens'

b. twee koper-s
two copper-PL
'two kinds of copper'

[24] This generalization follows from the fact that there is no plural marker -∅.

We observe the NCM ∅ in a compound, which is feature-wise the simplest morpheme. Let us therefore assume this class selects the simplest noun class marking possible, which is the feature set {a}. This derivation is shown in (67).

(67)

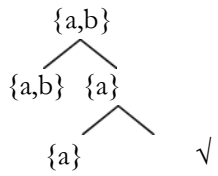


Given the inventory of vocabulary items in (63), the best candidate to realize this bare noun class marker is the one in (63)a, which is repeated in (68).

(68) /∅/ ↔ {a}

To derive the plural of this class, we merge yet another set of class features, as we have defined plural marking as a class extension above. Given that the plural of this class is expressed by the smallest vocabulary item which can express plurality, i.e. *-s*, I assume class is extended minimally. I therefore propose that the feature set {a,b} merges on top of the bare noun class marking. The result is shown in (69).

(69)



Let us now assume that two adjacent terminal nodes of which the features stand in a subset relation to one another are unified before vocabulary insertion. This stands to reason as noun class marking and plural marking are commonly subject to cumulative exponence cross-linguistically (Kihm 2005). Postulating that plural marking is a class extension which universally triggers unification with bare class marking in case of a subset relation may capture this observation. Such unification can be derived through head movement at syntax or a PF operation of morphological merger. In any case, what will be read by vocabulary insertion is the union (in set-theoretical terms) of the two feature sets. In other words, vocabulary insertion seeks for a vocabulary item to realize the feature set in (70).

(70) {a} U {a,b} = {a,b}

It will then insert the vocabulary item *-s*, which is given in (71).

(71) /s/ ↔ {a,b}

The merger of class and number thus absorbs the feature set of the bare class marking through the union of their features sets. Cumulative exponence is derived. We have now derived the bare noun class marking and the plural marking of class 1. Below we will derive the other classes in a similar fashion.

7.3.2 Class 2

Class 2 is defined in (72). An example of one of its members as the non-head in a compound is given in (73), (74) shows this root in a plural context.

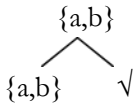
(72) Class 2 is the class of roots which select *s* as their NCM and *s* as their plural marker.

(73) dokter-s-briefje
doctor-NCM-note
'doctor's note'

(74) twee dokter-s
two doctor-PL
'two doctors'

Given that its bare noun class is realized by means of the vocabulary item *-s*, we have to assume it is marked by at least the features {a,b} according to the Subset Principle. The structure of the compound's non-head is given in (75). The terminal node will be realized by means of the vocabulary item in (76).

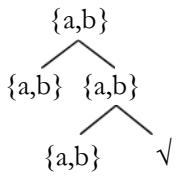
(75)



(76) /s/ ↔ {a,b}

The plural marker is identical to the bare noun class marker. I propose the exact same feature set merges to derive plurality, as in (77). Vocabulary insertion then seeks a vocabulary item to match the feature set in (78). The best candidate is again the vocabulary item in (79).

(77)



(78) {a,b} U {a,b} = {a,b}

(79) /s/ ↔ {a,b}

We have now derived class 2.

7.3.3 Class 3

The definition of class 3 is given in (80). Its members are *en*-plurals which refer to mass concepts. An examples of the bare noun class marking is given in (81), (82) shows an example of plural marking.

(80) Class 3 is the class of roots which select -∅ as their NCM and *-en* as their plural marker.

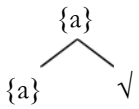
(81) wijn-∅-fles
wine-NCM-bottle
'wine bottle'

(82) twee wijn-en
two wine-PL

‘two kinds of wine’

I propose it selects the simplest feature set {a} as its bare class marking, on a par with the mass concepts of class 1. At the level of the bare noun class marking, mass concepts of class 1 and class 3 are thus structurally identical, which is a desirable result. The derivation is illustrated in (83).

(83)

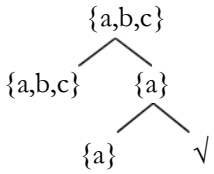


The vocabulary which will realize this node is given in (84).

(84) /∅/ ↔ {a}

The plural marking of this class is realized by means of the biggest vocabulary item feature-wise, i.e. *-en*, which is given in (87). I therefore assume that the terminal node of the plural class extension is rich structurally, as in (85). Recall that the vocabulary item in (87) does not realize the number projection directly, but the unified feature set of class and number, which is given in (86).[25]

(85)



(86) {a} U {a,b,c} = {a,b,c}

(87) /ən / ↔ {a,b,c}

We have now derived the cumulative exponence of class and number of class 3.

7.3.4 Class 4

The definition of class 4 and an example of its members are given below.

(88) Class 4 is the class of roots which select *-s* as their NCM and *-en* as their plural marker.

(89) dorp-s-café
village-NCM-pub
‘pub in a village’

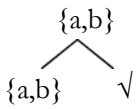
(90) twee dorp-en
two village-PL
‘two villages’

[25] One may wonder why syntactic plurality is derived through various features sets (e.g. {a,b} or {a,b,c}). Recall that plurality is defined above as class extension: syntactic plurality is defined as the mere merger of a second set of class features. The precise inventory of these features is class dependent. The features themselves are thus not the essence of syntactic plurality, the class extension itself is syntactic plurality.

The ingredients of its bare class marking are given in (91) and (92).

(92)

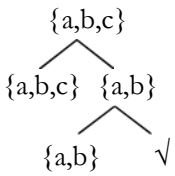
(91)



(92) /s/ ↔ {a,b}

Its cumulative exponence with the plural marker *-en* is derived as in (93) and (94). The vocabulary item which realizes this cumulative exponence is given in (95).

(93)



(94) {a,b} U {a,b,c} = {a,b,c}

(95) /ən / ↔ {a,b,c}

We have now derived class 4.

7.3.5 Class 5

Class 5 is defined in (96). (97) and (98)contain an example.

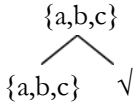
(96) Class 4 is the class of roots which select *-en* as their NCM and *-en* as their plural marker.

(97) kat-en-staart
cat-NCM-tail
'cat tail'

(98) twee kat-en
two cat-PL
'two cats'

Class 5 is the class with the richest feature set in its bare noun class marking. This is shown in (99). Resultatively, it is realized by means of the vocabulary item in (100).

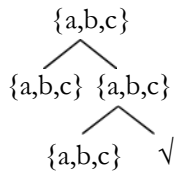
(99)



(100) /ən / ↔ {a,b,c}

Its plural marking is identical to its bare noun class marking. This is expressed below.

(101)



(102) {a,b,c} U {a,b,c} = {a,b,c}

(103) /ən / ↔ {a,b,c}

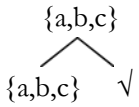
We have now derived all attested combinations of bare noun class marking and plural marking. In the next section I will demonstrate that the unattested ones are ruled out by the analysis.

7.3.6 The *s*-plural generalization

We have seen that not all combinations of noun class markers are possible. More specifically, the analysis should capture the *s*-plural generalization (see section 5): if a root takes *-s* as its plural marker, it will not take *-en* as its NCM in the same idiolect.

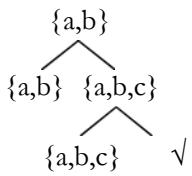
Let us assume first that the feature which are associated with the NCM *-en* merge as the bare noun class features on top of the root. This derivation is shown in (104).

(104)



Let us now consider what happens if we try to merge an *-s* plural marking feature on top of it. We have seen above that the plural marker *-s* realizes the feature set {*a,b*}, as in (105).

(105)



These two terminal nodes are merged morphologically, which we have described formally as the union of the two features sets, as illustrated in (106).

(106) {a,b,c} U {a,b} = {a,b,c}

In this case the union results in the set {a,b,c}. Vocabulary insertion will now seek an appropriate candidate to realize this set. It finds the vocabulary item *-en*, which is repeated in (107).

(107) /ən / ↔ {a,b,c}

We have now derived the fact that the NCM *-en* can only be associated with the plural marker *-en*, a desirable result.

7.4 The invisibility of noun class marking in singular nominal groups

The erroneous reference facts (see section 6.4) which were discussed in section 6.4 point at the presence of noun class marking in the singular DP. After all, a head can only be involved in agreement patterns if it is indeed present in the structure. Yet, no visible noun class marking is ever present in the singular DP. How to understand this fact?

Let us go back to what happens in the plural DP. In the plural DP, noun class marking is only observable indirectly: the plural number morpheme builds on the noun class marking. We could now assume that the singular number morpheme does exactly that as well: it adds a feature on top of the noun class marking. Let us call this feature [sg].

The reader will notice that I am treating singularity not on a par with plurality. I defined plurality as a class extension, whereas I am defining singularity as a feature. Firstly, it has been noted that plurality may have quite a lexical nature in languages: plurality may show word-dependent irregularities (Acquaviva 2008). It has further been noted in the literature that singularity functions differently than plurality syntactically. According to Borer (2005:111) the plural serves to divide mass but fails to count the resulting divisions. Indeed, plurality may refer to anything that is greater (or smaller!) than one. The singular, in contrast, is both a divider and an exact counter. Given these considerations, deriving the singular and the plural somewhat differently in the syntax is a desirable result.

I will assume again that the noun class head incorporates into the number head and they are spelled out together, just as is the case in the plural DP, resulting in the following possible sets: {a,sg}, {a,b,sg}, {a,b,c,sg}. According to the Subset Principle, the following Vocabulary Items would all be candidates to spell out these sets:

(108) ∅ ↔ {a}
∅ ↔ {sg}
/s /↔ {a,b}
/ən / ↔ {a,b,c}

For some sets, there would be competing subsets. For example, {a}, {sg} and {a,b} are all subsets of {a,b,sg}. Of all these subsets, {a,b} is the richest one. Yet, singularity is not spelled out a *-s* in Dutch, but by means of a zero affix. I am forced to assume that there is an underlying feature hierarchy that guarantees that the feature [singular] trumps the noun class features *a*, *b* and *c* (cf. Noyer 1992).

With the short proposal above I have hinted at a direction the analysis could take. I leave a more careful proposal to further research.

7.5 The values of the features *a*, *b* and *c*.

One may now wonder whether it is possible to derive what the features *a*, *b* and *c* stand for (cf. Harbour 2008 for Kiowa). I think, indeed, that it is possible to assign a core meaning to these features in the sense that prototypical countability seems to increase with the features *b* and *c:*

(109) *-en* is associated with concretes and animates (prototypical atoms)
-s is associated with abstracts and inanimates (prototypical non-atoms)
∅ is associated with items which are prototypically not pluralized (non-augmentable concepts)

It is well-known that a high degree of animacy is linked to a high degree of individuation: if something is alive, it cannot be grinded. The feature *a* is thus probably associated with a notion that expresses a lower degree of individuation, such as grouphood, masshood or non-atomicity. The feature *b* is the sole feature which is present in all plural derivations, even in the plural marking of the default group in class 1. It therefore stands to reason this feature expresses plurality or augmentedness (Harbour 2008). Feature *c* is associated with a high degree of individuation, concreteness and countability.

However, these properties are not consistently observable. Consider class 1, for example. This class contains various members, including mass concepts and non-human concepts. If we simply assigned a [mass] feature to the bare noun class marking of this class, we would falsely

derive the fact that all its members are syntactically mass. They are thus not functional features that compositionally force the interpretational module to assign a strict meaning to the referent.

One may wonder whether a single noun can flexibly be assigned to various classes. Some data indeed seem to point in that direction. Consider the lexical items *vis* 'fish' and *kip* 'chicken', which are as common in count readings (referring to the animal) as in mass readings (referring to the meat). They do show some interesting variation. Nouns that refer to body parts of the animal or that clearly refer to a concept associated with the animal seem to get the linking element *-en*:

(110) *vissenbek* 'fisk mouth', *vissenbloed* 'fish blood', *vissenhuid* 'fish skin', *vissenleer* 'fish leather', *vissenstaart* 'fish tail', *vissenoog* 'fish eye', *vissenkom* 'fish bowl', *vissenei* 'fish egg', *vissengeheugen* 'fish memory', *vissengeslacht* 'fish gender', *vissennaam* 'fish name'

(111) *kippenbout* 'chicken leg', *kippenborst* 'chicken breast', *kippenei* 'chicken egg', *kippenbot* 'chicken bone', *kippenbloed* 'chicken blood', *kippenhart* 'chicken heart', *kippenkarkas* 'chicken carcass', *kippenlever* 'chicken liver', *kippenkweek* 'chicken breeding', *kippenhok* 'henhouse', *kippenvoer* 'chicken feed'

Dishes that involve the meat seem to get no overt linking phoneme:

(112) *vissoep* 'fish soup', *vispaté* 'fish pâté', *visrestaurant* 'fish restaurant', *visschotel* 'fish dish', *viswijn* 'fish wine'

(113) *kipcurry* 'chicken curry', *kipfilet* 'chicken fillet', *kipnugget* 'chicken nugget', *kipcassoulet* 'chicken cassoulet', *kipfricassee* 'chicken fricassee', *kipgerecht* 'chicken dish', *kiphapje* 'chicken snack', *kipkroket* 'chicken croquette'

However, these tendencies are not exceptionless:

(114) *kippenfond* 'chicken stock', *kippensoep* 'chicken soup', *kippenmousse* 'chicken mousse'

Recall that we have two methodological problems. Firstly, I have pointed out that the vocabulary inherited compounds from the past which may have preserved irregularities that may not be part of a productive process in contemporary Dutch. It is thus hard to say what the status of the exceptions in (107) is. Secondly, it is difficult to distinguish between compounds of the root primary compound type and the nominal primary compound type with a null NCM, as discussed in section 4. The data are in line with the hypothesis that *vis* 'fish' and *kip* 'chicken' select a different class when referring to meat than when referring to the animal, but admittedly, they do not conclusively show it.[26] Experimental linguistics could probably shed light on this issue in the future.

I would like to point out that nothing contradicts the assumption that the feature *a* is the feature 'noun' (i.e. little n) itself. Readers who would like to adopt this conclusion are welcome to do so. It would be in line with Borer's (2005) proposal that the mass reading is the default reading for the nominal group.

To conclude, it is clear that the feature *a* is associated with a notion that is ranked low on a scale of individuation, whereas the feature *c* is to be associated with a notion ranked high on this scale. The feature *b* seems to be associated with plurality. However, one should keep in mind that these associations are rather loose. Whether lexical items can flexibly select various noun classes is an open question, but the data suggest it is a valid hypothesis.

8. Class and gender co-exist in Dutch

Dutch is usually not analyzed as a language with noun class marking, but it is well-known that it has gender marking. Northern Dutch has common and neuter gender and the Southern

[26] Erroneous reference strongly suggests that *vis* 'fish' is flexible when it comes to noun class: the erroneous reference is restricted to the mass (meat) reading.

Dutch-speaking regions have the older three-way distinction (masculine, feminine and neuter). In Standard Dutch the gender of the noun is only noticeable via agreement on the adjective and the definite determiner in singular nominal groups. There is thus no doubt that singular nominal groups contain a gender head, as it has noticeable syntactic effects. Plural nominal groups will get default common gender. Yet, one may assume the original lexical gender is also contained in the plural nominal group for the following reason.

As in many grammatical gender systems, Dutch gender is assigned to animates mostly in ways that make sense biologically, but stored as an arbitrary feature in the lexicon for most other nouns. However, certain semantic classes do select gender consistently. For example, all metals, colors and cities are neuter. All morphologically simplex names for vegetables and fish are common and so are names for French regions, rivers, etc.

(115) het ijzer/goud/zilver/kwik/lood/koper/tin/…
'the$_{\text{NEUTER}}$ iron/gold/silver/mercury/lead/cupper/tin/…'

(116) het rood/blauw/geel/groen/oranje/paars/wit/zwart/magenta/cyaan/scharlaken/ bordeaux
'the$_{\text{NEUTER}}$ red/blue/yellow/green/orange/purple/white/black/magenta/cyan/ scarlet/burgundy'

(117) de tomaat/spinazie/sla/kool/erwt/wortel/paprika/…
'the$_{\text{COMMON}}$ tomato/spinach/lettuce/cabbage/pea/carrot/bell pepper/…'

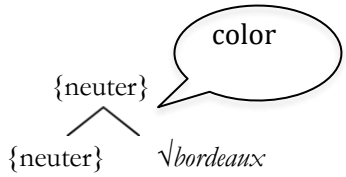
(118) de aal/rog/baars/paling/haring/ansjovis/kabeljauw/zalm/barbeel/ forel/haai/wijting/karper/leng/brasem/braam/sardine/…
'the$_{\text{COMMON}}$ eel/ray/perch/eel/herring/anchovy/cod/salmon/barbel/ trout/shark/whiting/carp/ling/bream/sea-bream/sardine/…'

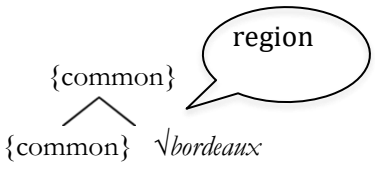
(119) de Loire/Beaujolais/Champagne/Bordeaux/Bourgogne/….
'the$_{\text{COMMON}}$ Loire/Beaujolais/Champagne/Bordeaux/Bourgogne/….'

Gender may facilitate the assignment of meaning in the Encyclopedia. In this way, gender is a classifying system in its own right. Interestingly, gender differences may correlate with meaning differences:

(120) a. het bordeaux
the$_{\text{NEUTER}}$ burgundy
(the color)

b. de Bordeaux
the$_{\text{COMMON}}$ Bordeaux
(the region)





The merger of various lexical genders may thus correspond to meaning differences. The meaning differences can be attested in plural nominal groups as well:

(121) Frankrijk heeft geen twee Bordeaux, hoor!
France has no two Bordeaux, PRT
'France really does not have two Bordeaux! There is only one region with that name.'

(122) De stylist combineerde twee verschillende bordeaux.
the stylist combined two different bordeaux
'The stylist combined two different shades of burgundy.'

Given that lexical gender is responsible for the meaning differences, it must be the case that the plural nominal groups projects lexical gender as well, even though it does not surface in the overt realization. Proposals in Distributed Morphology on other languages have proposed that gender may be subject to Impoverishment (Bonet 1991, Noyer 1992) through markedness

in plurals: gender features are banned in the marked context of plurality (Bobaljik 2002; Bailyn and Nevins 2008, Harley 2008; Nevins 2011, Kramer 2019).[27]

Finally, we may wonder whether gender is present in the compound's non-head next to gender marking. The West-Flemish compounds, which show feminine gender expressed overtly by means of an affix, suggest that this is indeed the case. We can now formulate an overview of which projections are projected in which context:

(123)

	singular DP	plural DP	compound's non-head
bare class	✓	✓	✓
extended class	✗	✓	✗
lexical gender	✓	✓	✓
Determiner-layer	✓	✓	✗

The projections that are present in the compound's non-head are those projections that serve to identify the concept the lexical item refers to: noun class marking and gender marking. The projections that are absent in the non-heads compound are those projections that connect to a referent: number marking and a determiner layer[28].

9. Conclusion

I started this contribution with pointing out that so-called linking elements may actually fulfil two very different roles: they may be phonotactic elements or they may realize a morphosyntactic head. In case they are merely phonotactic elements, the left-hand part of the compound may be a bare root, as pointed out by Nóbrega (2020), which is an interesting domain of study, as it is a rare context in which we observe a bare root (De Belder 2017). If they are morphosyntactic elements, the data are no less interesting: they tell us more about the functional heads that play a role in the language.

I presented a case study of linking elements in Dutch which do fulfil a morphosyntactic role. I started with pointing out that when 'linking elements' are of this type, the linguist should be aware of the fact that they may be null morphemes. I argued that, indeed, Dutch may have such a null affix in its inventory. Further research questions that are relevant for this type of linking elements are which category the linking element belongs to and which heads it realizes.

I argued that the Dutch linking elements are in fact noun class markers and as such, I derived the fact that two of them are identical to plural marking through cumulative exponence. The analysis shows that a careful study of such elements provides us with new insights into two domains simultaneously. Firstly, we learn more about the morphosyntax of the compound's left-hand part, the structure of the compound itself and the inventory of compounding types in the language. The importance of the left-hand part cannot be underestimated in my opinion. It is a unique domain: it shows how a category behaves functionally in the absence of functional material that guarantees reference, such as number and the D-layer. As such, we learn, secondly, something about the morphosyntax of a category. The Dutch nominal domain has

[27] Note that the mere fact that gender may be realized in the nominal compound (see the West-Flemish data in section 4) is then a further indication that the nominal compound does not contain a plural projection.

[28] I did not discuss the determiner layer in this contribution, but it is a well-known property of a compound's non-head that it does not contain a D-layer (see De Belder and Van Koppen 2016 and references therein).

nominal classes which are less visible in the nominal group as they are syncretic with number marking. Take away number marking and they suddenly become visible.

It would be interesting to learn whether, cross-linguistically, linking elements that fulfil a morphosyntactic role are restricted to the lower functional domain of the noun. Are there languages that allow adjectival, verbal or prepositional layers? Within the nominal domain, which projections exactly are identified in this context? I hope this case study has shown that linking elements fully deserve the attention of the theoretical linguist in collaboration with the experimental linguist.

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