Roots and Affixes

Eliminating Lexical Categories from Syntax

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Table of contents

List of abbreviations

COMMON	adjectival inflection agreeing with common (i.e. male or female) gender
DM	Distributed Morphology
DIM	diminutive
FTN	Functional Terminal Node
FVI	Functional Vocabulary Item
INFL	adjectival inflection
LP	Linking Phoneme
LVI	Lexical Vocabulary Item
NEUTER	adjectival inflection agreeing with neuter gender
NUM	number marking, i.e. singular and plural
PL	plural
RSP	Revised Subset Principle
RTN	Root Terminal Node
SG	singular
TN	Terminal Node
VI	Vocabulary Item
XSM	Exo-Skeletal Model

1. *Introduction*

1.1 The scope of the proposal

This thesis is an investigation into the primitives of syntax. More specifically, it focuses on two domains: the lexical projection and categorial features. It seeks to formulate an answer to the following questions:

(1) Main research question: What are the atoms of syntax?
Subquestion #1: Are the features of lexical vocabulary items (such as *light* and *kiss*) an active part of narrow syntax?
Subquestion #2: Are categorial heads (such as v°, n° and a°) an active part of narrow syntax?

As can be deduced from (1), this thesis consists of two parts. Each part corresponds to one of the two subquestions. The first part of the thesis thus concerns the syntax of lexical vocabulary items and roots[1], the second one the syntax of categorial heads and derivational affixes. I will present each in turn below.

The first part of the thesis concerns the question of whether phonological, semantic or formal features (see Chomsky 1995:230) of lexical vocabulary items[2] are active in syntax. I answer this question negatively. As an illustration, consider the example in (2).

[1] The root is the syntactic terminal node that is realized by means of a lexical vocabulary item. The sentence *The boy eats cookies* contains three roots. They are realized by the lexical vocabulary items *boy*, *eat* and *cookie*.

[2] Lexical vocabulary items are vocabulary items which have a contentful meaning. In other words, their meaning is not determined by syntactic features. Examples are *cat*, *light* and *calcul-* as in *calculate* and *calculable*.

(2) three dogs

A traditional analysis of the example in (2) would involve the assumption that the Lexicon contains a count noun *dog* which enters the syntax, which defines the node at which it merges as a lexical node and which defines the structure as a count NP, i.e. it defines the (sub)category of the projection. I argue against this analysis. I provide empirical support for the claim that vocabulary items are not present in syntax. Consequently, lexical nodes canot be defined through the merger of a lexical vocabulary item. Furthermore, lexical vocabulary items cannot determine the (sub)category of the projection. Instead, this dissertation adopts the view that syntax operates on UG-features only. It argues that the root terminal node is a by-product of the operation Merge that is characterized by the mere absence of features. It further show that functional structure determines subcategories. For example, in (2) the lexical item *dog* is not present in syntax and hence, does not define the structure as a count NP. Rather, it works the opposite way: functional structure determines that *dog* in this example should be interpreted as a count noun. Consequently, the lexical vocabulary item *dog* is malleable and is interpreted according to the functional structure. Hence, in (3) it receives a mass reading as the syntactic structure is mass.

(3) There is dog in the soup.

In sum, the first part of the thesis argues that the features of lexical vocabulary items are not an active part of the syntactic derivation.

In the second part of the thesis I argue against the existence of categorial heads. It is generally assumed that derivational affixes realize categorial heads (see for example Marchand 1969, Williams 1981, Selkirk 1982 and Halle and Marantz 1993, amongst many others). For example, *-ery* in (4) is seen as a nominalizing head.

(4) bake-ery$_N$

I argue against this view and propose instead that derivational affixes realize root positions. I show that the meaning of derivational affixes is lexical and hence propose to treat them as lexical rather than functional vocabulary items. Furthermore, I show that the same descriptive and explanatory adequacy can be obtained without postulating categorial heads.

In both parts of the thesis the goal is to examine well-studied data in a new theoretical light. It therefore focuses on data from a well described language, viz. Dutch.[3] This choice is essentially arbitrary, but what is important for this study is the fact that the morphology of Dutch is particularly well described in the literature (see for example Haeseryn et al. 1997, de Haas and Trommelen 1993, Booij & Van Santen 1998, Booij 2002). As a result, I can make use of detailed inventories of derivational affixes.

In sum, the first part of this thesis presents a theory of the syntax of roots. It supports the claim that functional structure determines categories. Lexical vocabulary items are not part of syntax, and as such they are irrelevant for the syntactic derivation. The second part argues against the existence of categorial heads.

1.2 Theoretical aim of the proposal

Traditionally, it is assumed that lexical categories are projected from a lexical vocabulary item (LVI). In other words, syntactic structure starts from the projection of an LVI which defines the category of the (extended) projection (Chomsky 1970, Muysken and van Riemsdijk 1986, Grimshaw 2009). For example, if the LVI *swim* enters the derivation, a VP is projected because *swim* has verbal features. Similarly, the merger of the LVI *elephant* defines an NP.

The basic principle that categories originate low in the structure is adopted by proponents of Distributed Morphology (henceforth DM). They develop a model with one, unique root which is not marked with categorial features. In this framework the featureless root first merges with a categorial head. This

[3] Each example in this thesis which is not English and for which I do not explicitly indicate the language is Dutch in this thesis.

head then defines the category of the (extended) projection (Halle & Marantz 1993, Harley & Noyer 1999).

Categorial features are an essential part of syntax both in traditional approaches and in Distributed Morphology. They determine the category of the functional structure above them. Regardless of whether these features are situated on the LVI, on a categorial head, or on both -in case of conversion-, the lexical category is a primitive of syntax.

The Exo-Skeletal Model (Borer 2005a,b, 2009a,b,c, henceforth XSM) points out that the projection of categorial features proceeds in an essentially redundant way. Both traditional approaches and DM require a match between the categorial features, whether they originate on the LVI or in a head and those of the functional structure merged on top of these features (see for example Doetjes 1997 and Grimshaw 2009). This implies that categorial information is encoded twice in the structure; once on the LVI or the categorial head and once in the functional structure. In order to avoid this redundancy, the XSM therefore proposes an alternative view in which functional structure suffices to determine the category of the projection (see also Myers 1984). The XSM thus fully subscribes to the idea that roots are categoriless. At the same time, however, this model does not eliminate categorial heads. Although it is acknowledged that they are in principle superfluous, the XSM assumes that overt derivational affixes are the spell-out of categorial heads.

In sum, the XSM has brought us closer to eliminating lexical categorial features from syntax altogether. Doing so would result in a reduction of the set of syntactic primitives. Occam's razor dictates that such a reduction is to be preferred if the empirical coverage of the proposal remains unaffected. However, the distribution of derivational affixes is commonly assumed to be based on the presence of categorial heads in the structure (seem for example Marchand 1969, Williams 1981, Halle and Marantz 1993, Borer 2003 amongst many others). For example, if the syntactic structure contains a nominalizing head it can be spelled out by means of a nominal derivational affix. Derivational word formation therefore proved to be the last obstacle to eliminating categorial heads from the structure. This work tackles this final

hurdle. The result is that lexical categorial features are no longer a primitive of syntax.

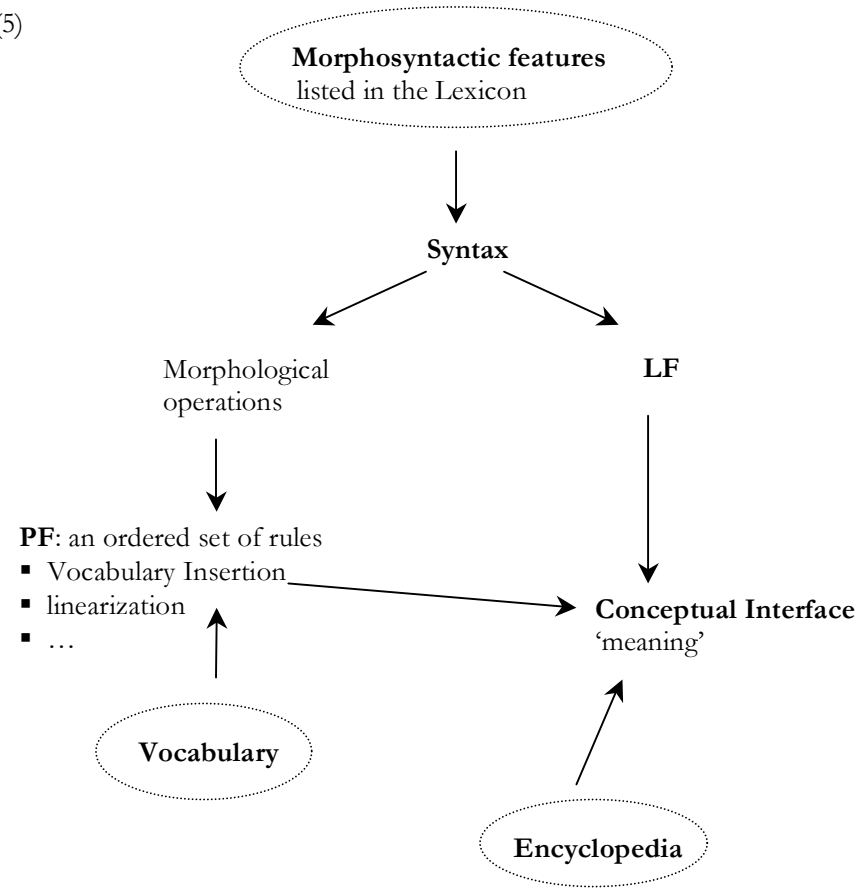
1.3 Theoretical background

1.3.1 The Y-model of Distributed Morphology

In this work I argue that vocabulary items, such as *light*, *kiss* and *the* are inserted post-syntactically. As such, this work is embedded in Distributed Morphology, a model of the grammar which proposes late insertion of vocabulary items. I therefore adopt the Y-model as specifically put forward by Halle and Marantz (1993), Harley and Noyer (1999) and references mentioned there. It is illustrated in (5) (which draws heavily upon the picture in Harley and Noyer 1999:4).[4]

[4] The dotted ovals indicate lists (as opposed to operations).

(5)



In what follows I discuss the properties of this Y-model. I limit myself to those which are most relevant to the present proposal.

To begin with, there are no vocabulary items, such as *light*, *kiss* or *the*, in syntax. Instead, syntax operates on morphosyntactic features. These features are functional and provided by UG. Examples are [sg], [1st], [past], [focus], [distal], [Voice], etc. The complete feature set on one terminal node is called a morpheme. In other words, in DM the term morpheme refers to an abstract syntactic notion, not to the phonological expression of a terminal node. I

define a terminal node as a set of features that is a building block for Merge. It will become clear in chapter 2 that this set can be empty.

The list which contains the syntactic features is called the Lexicon. Note that all inflectional features and all features relevant to derivational word formation also belong to this set of morphosyntactic features. As such, inflection and derivation are part of syntax. I come back to this in section 1.3.1.

Syntax spells out cyclic domains. They are sent to PF and LF. As such, the DM model is a Y-model as proposed in the Minimalist Program (Chomsky 1995). As the structure is sent to LF, the morphosyntactic features present at Spell-Out are interpreted compositionally, regardless of further operations on the PF side.

Before PF proper, morphological operations on the syntactic structure may take place, such as fission and impoverishment (see Bonet 1991, Halle & Marantz 1993 and Noyer 1997 for a detailed discussion). These operations may alter the feature set on a terminal node. For example, impoverishment deletes certain features from a terminal node. Sauerland (1995), for example, accounts for the fact that Norwegian weak adjectival inflection does not show any gender distinctions on the basis of this operation. He proposes that the gender features are deleted post-syntactically. As these morphological operations take place post-Spell-Out, they do not affect the syntax or meaning of the structure.

PF is conceived of as an ordered set of rules (Embick 2007, Schoorlemmer 2011). Amongst other things, it is the domain of Vocabulary Insertion and linearization. The phonological exponent of a vocabulary item is thus inserted post-syntactically, a process known as late insertion. Vocabulary items are stored in a learned list which is called Vocabulary. Vocabulary insertion is an operation which searches Vocabulary for an appropriate vocabulary item and inserts it into the structure (see chapter 2 for a detailed discussion).

A vocabulary item (henceforth a VI) consists of a phonological exponent and information on the feature set it can realize.[5] An example is given in (6).

[5] For expository reasons I use the term 'vocabulary item' generically to refer to a listed item, regardless of the framework I am describing. The term is used differently in the Exo-Skeletal Model (XSM) or in DM. In the XSM a vocabulary item refers to the pairing of a phonological index and its meaning. In DM the term refers to a phonological string and the information about the structural context in which this string may be inserted.

(6) that ↔ [def, distal, sg]

Example (6) shows a demonstrative pronoun. The lefthand part of the VI in (6) specifies its phonological form. This called the phonological exponent of the VI. The righthand part specifies the context in which it can be inserted. The context of insertion lists the features of the morpheme that the vocabulary item realizes. In this work I will often refer to VIs by mentioning their phonological form. For example, I will call the VI in (6) 'the VI *that*'. The reader should keep in mind that this is but a shorthand for the unit of the phonological form and featural specifications, as in (6).

Interestingly, the features for which the VI is specified only come into play at PF. As a result, the exact set of features for which the VI is marked is irrelevant for syntax and LF. For this reason no one-to-one correspondence is required between the feature set of a syntactic node and that of the VI which will realize this node. All that is needed is that the VI is the best possible candidate to realize this node. In other words, late insertion allows in principle for certain mismatches between the feature set of the terminal node and that of the VI (see chapter 2 section 2.4.2 for a discussion on the Subset Principle). This is an important advantage over early insertion models for which it is difficult to implement such a mismatch. As such, it motivates the postulation of late insertion.

The conceptual interface receives input from three different modules in order to assign a meaning to the derivation. Firstly, it interprets the output of LF. LF is the interface which takes the syntactic structure as its input. It interprets the morphosyntactic features compositionally. This ensures that all interpretable features which were present in the syntax will be interpreted. Secondly, it receives the structure with vocabulary items from PF. Thirdly, it can access information from Encyclopedia. Encyclopedia is a learned list which matches constituents and the vocabulary items that may realize them to an interpretation. It contains the information that a VP realized as *kick the bucket* should be understood as 'die', but it also provides the information that the root *milk* when merged under a nominal structure refers to a white, nutritious liquid.

The relation between the structure realized by VIs and the meaning which is attached to it is learned and arbitrary. As such, any meaning can in principle be attached to any structure. However, there is one important restriction. The compositional meaning which is computed at LF on the basis of morphosyntactic features can never be overridden (see McGinnis 2002 and chapter 5 section 5.4.4.2). The semantics of the morphosyntactic features which were merged in syntax is thus preserved throughout the derivation.

In sum, DM assumes the Y-model of the Minimalist Program: syntax spells out cyclic domains which are shipped off to PF and LF. Nevertheless, DM has some idiosyncrasies as well. Most notably, it postulates a syntax which exclusively operates with abstract features. Consequently, the PF side of the model is richer. It is conceived as an ordered set of operations, one of which is Vocabulary Insertion. In other words, vocabulary items are inserted post-syntactically. An important consequence of late insertion is that there does not need to be a one-to-one correspondence between the features in syntax and the features of the vocabulary items realizing them. It further does not assume a specific module responsible for word formation. Morphology is distributed over syntax and a set of post-syntactic operations. In the next section I discuss this view in detail.

1.3.2 Morphology is syntax

In the previous section I have introduced the DM claim that inflection and derivational word formation are part of syntax. In other words, there is no separate word-generating module. In this respect DM deviates substantially from earlier lexicalist approaches. The Strong Lexicalist Hypothesis claims that both inflection and derivation belong to a module separate from syntax called the lexicon[6] (Halle 1973, Lieber 1980, Williams 1981, Selkirk 1982, Kiparsky 1982, Levin and Rappaport 1986, Williams and Di Sciullo 1987 and many others). The lexicon obeys different rules than syntax. For example, Williams's (1981) Righthand Head Rule is specific for the lexicon. Derived words enter

[6] Note that the term 'lexicon' receives a different meaning in lexicalist approaches than in DM. In lexicalist approaches it is a word-generating module, in DM it is a list of morphosyntactic features.

syntax as atoms. The Weak Lexicalist Hypothesis, on the other hand, holds that derivation is part of the lexicon, whereas inflection belongs to syntax (Siegel 1974, Aronoff 1976, Wasow 1977, Anderson 1982, Baker 1988, Dubinsky and Simango 1996, etc.) In contrast with both lexicalist views, DM postulates one, single structure building module, viz. narrow syntax. The reasons to do so, are discussed below.

There are good reasons to doubt the lexicalist view. Given that a full discussion of this issue would take us too far afield, I limit the discussion to two of them. Firstly, lexicalist morphologist emphasized that words are idiomatic atoms. In this respect they contrasted words with the supposed transparency and compositionality of syntactic structures. DM pointed out, however, that the boundary between idiomatic and non-idiomatic meaning does not coincide with that between words and phrases (see Marantz 1997 for a detailed discussion). Idiomatic units can both be smaller and bigger than the word. (8) is an example of an idiom which is smaller than a word. For example, although the Dutch adjective *achterlijk* 'retarded' gets an idiomatic reading, cf. (7), the meaning of *achterlijkheid* 'retardness' in (8) is a fully transparent and compositional combination of *achterlijk* and *heid* '-ness'. The sentential idiom in (9), on the other hand, is an example of idiomatic meaning above the word-level.

(7) achter-lijk
behind-LIJK
'retarded'

(8) achterlijkheid
behind-LIJK-HEID
'retardedness'

(9) The shit hits the fan.

Given that the boundary between idiomatic and compositional meaning does not necessarily coincide with the word-phrase boundary, positing a separate lexicon as the domain of idiomaticity is redundant.

Secondly, there is evidence that morphology and syntax interact, suggesting that they are part of the same module. Harley (2006) gives one example of such interaction. Lexicalists claim that words are units of which the parts are invisible to syntax. Consequently, syntax treats, for example, a verb which contains a causative morpheme as a causative verb[7], but it cannot see the causative affix or manipulate it in any way. However, Harley (2006) observes that in Japanese two VPs can be coordinated under one single causative morpheme, as in (10).

(10) Hanako-ga [[Masao-ni uti-o soozisuru]-ka
Hanako-N [[Masao-D house-A clean]-or
[heya-dai-o haraw]]-aseru koto ni sita
[room-rent-A pay]]-CAUSATIVE that D do
'Hanako decided to make Masao clean the house or pay room rent'.
Reading: the causative scopes over OR; Masao has a choice.

Under the lexicalist view, the example in (10) should be illicit, contrary to fact. Given that a syntactic operation (here, coordination) is able to scope under a morpheme, this morpheme is part of the syntactic structure. Thus, words do not enter syntax as an atom.

In sum, DM proposes that morphology is syntax. This point of view allows one to capture interactions between syntax and parts of words.

1.3.3 Category-assignment and the Exo-Skeletal Model

Although this work assumes the DM Y-model, it adopts and extends three insights from Borer's Exo-Skeletal model (henceforth XSM) on category-assignment, which I will present below.

[7] The features of individual parts of words can percolate to the head of this word in the lexicon. As such, features of morphemes will become features of the whole and will be interpreted by syntax (see Williams 1981).

Firstly, Borer argues that lexical vocabulary items do not project any categorial features. She points to the fact that lexical and functional vocabulary items, which correspond to open- and closed-class VIs, differ considerably in the degree of flexibility they allow in their interpretation. For example, a VI such as the English word *stone* can be used in a wide variety of contexts, some nominal and some verbal. A handful of them is illustrated in (11).

(11) a. I've got a stone in my hand.
b. There's too much stone and metal in this room.
c. They want to stone this man.

The first two examples show that *stone* can be used both as a count noun (11)a and as a mass noun (11)b, while in (11)c it is a transitive verb. As soon as functional material is added to this root, however, the interpretation becomes completely fixed. A structure such as *three stones* is always and only interpreted as a count nominal expression due to the presence of plural marking and a cardinal;[8] it can function neither as a mass nominal expression nor as a verbal element. More generally, while lexical vocabulary items are extremely malleable and can be coerced any which way subject only to the extent of our imagination, functional ones are very rigid in their denotation and any attempt to tweak this meaning leads to ungrammaticality rather than uninterpretability. For example, **three much stones* is illicit as it is marked both as a mass nominal expression by the functional vocabulary item *much* and as a count nominal expression by the functional vocabulary item *three* and via plural marking. There is thus a fundamental difference between closed-class and open-class items. The former are always of the same category, the latter are not. The easiest way to account for that observation is by assuming that closed-class items belong to a category, whereas open-class items do not.

This point of view is further corroborated by two lines of reasoning. First of all, it is becoming increasingly clear that a large number of tasks—if not all—traditionally ascribed to (the categorial characterization of) lexical vocabulary items, in particular in terms of argument licensing, is in fact performed by

[8] See Borer (2005a:119) on the functional nature of cardinals.

(temporal, aspectual, event-introducing, etc.) functional projections (cf. Marantz 1997, Borer 2005a,b, see chapter 3 for discussion). The sole remaining function of lexical vocabulary items is to add conceptual meaning to the structures built up by syntax, but for this they do not need to have a syntactic category.

The second reason for not assigning category labels to lexical vocabulary items is that such a move would introduce a large degree of redundancy into the system (Borer 2005a:20). Suppose the word *stone* had a double lexical entry, once as a N and once as a V. One would then still have to stipulate that the noun *stone* can only merge with D, while the verb *stone* only merges with T.[9] In more technical terminology, D selects for (or checks the categorial features of) N(P) and similarly for T and V(P), thus effectively leading to a reduplication of the nominal/verbal characterization of this projection (see Doetjes 1997 for approaches in which a category-labeled VI checks its category against a rich functional projection line). In the XSM-approach, however, an acategorial root that merges with D is interpreted as nominal and one that merges with T is interpreted as verbal.[10]

Summing up, there are good reasons, both empirical and theoretical, for adopting the idea that roots are acategorial. In this thesis I will develop a theory on the syntax of roots. One of the main points in this theory is the fact that roots do not project any features. As such, Borer's proposal is a core theme in this thesis.

It was pointed out above that functional structure contrasts sharply with lexical projections. Whereas *stone* is malleable, past tense is not. This brings us the second point which is proposed in the XSM and which will be adopted in this thesis. The XSM posits that functional structure derives categories and subcategories. In other words, Borer postulates that grammatical properties which are traditionally associated with lexical vocabulary items can be reduced to properties of syntax. All categories and subcategories are defined by functional projections. For example, if *milk* merges below Tense, as in (12), it

[9] Alternatively, one could postulate one single VI *stone* which is either a verb or an noun and derive the other one via conversion. This leads to the same degree of redundancy, though (see chapter 4 section 4.4 for discussion).

[10] In DM, an acategorial root always merges with a categorial head (e.g. n°, v°, a°).

will be interpreted as a verb. If, on the other hand, it combines with a determiner as in (13), it is interpreted as a noun (see chapters 2 and 3 for discussion and elaboration). In this work I adopt this view.

(12) $[_T[\sqrt{}\text{milk}]\text{ed}_T]$
(13) $[_D\text{the } _D[\sqrt{}\text{milk}]]$

A third point of the XSM of which the consequences will be of main interest in this work is the view that there are no productive zero derivational affixes (Borer 2005a,b, 2009a,b,c, see also Myers 1984). Borer only postulates categorial heads when they are realized overtly. For example, the DP *the cat*, as in (14), does not contain a nominalizing head, but solely a root and nominal functional structure. The DP *the politeness*, on the other hand, does have a categorial head, viz. the nominalizer *-ness*, as in (15).

(14) $[_D\text{the } _D[\sqrt{}\text{cat}]]$
(15) $[_D\text{the } _D[[_N\sqrt{}\text{polite}]\text{ness}_N]]$

The XSM thus refutes categorial heads that are realized by means of zero derivational affixes. They are superfluous as functional structure assigns a category. Given that the functional structure in (14) suffices to determine that the structure is nominal a nominalizing head would be redundant. In sum, categorial heads are superfluous in the XSM. It follows that there is no motivation to assume a categorial heads which is realized by means of a zero derivational affix.

However, according to the same line of reasoning categorial heads are superfluous in syntax altogether. In other words, the XSM allows for the more radical view that categorial heads do not exist at all. From a minimalist perspective, this is a desirable alternative. It would lead to less syntactic tools. I therefore propose it in this thesis. In other words, I take Borer's line of reasoning one step further.

In sum, this thesis adopts and extends three points from the XSM. Firstly, it adopts the view that roots do not project any categorial features. It derives this

property from a new theory on the syntax of roots. Secondly, it adopts the view that functional structures defines the (sub)category of a syntactic derivation. Thirdly, it questions the existence of categorial heads as an extension of a line of reasoning proposed in the XSM.

1.4 Outline of the dissertation

Chapter 2

In the next chapter I develop a theory on the syntax of roots. I first provide empirical evidence for late insertion of vocabulary items. I then argue that the root is a structural position. It is not defined by the lexical element that merges in this position, it is structurally defined. More specifically, it is a specific syntactic position devoid of any features which is a by-product of the way Merge is defined in this model. The theoretical contribution on the primitives of syntax of this chapter is thus twofold. Firstly, it shows that vocabulary items are not present at syntax; they are inserted post-syntactically. Secondly, a root position is defined by the absence of features.

Chapter 3

In chapter 3 I show how functional structure suffices to define subcategories. I do so by presenting a case study on subcategories in the nominal domain. I further demonstrate that structure prevails over the properties of vocabulary items that realize it by means of two other case studies on semi-lexical vocabulary items. This chapter is the final part on roots.

Chapter 4

Chapter 4 is the first chapter of the second part of the thesis. In this chapter I question the existence of categorial heads and I explore the consequences of the assumption that they do not exist. In other words, I examine the possibility that derivational affixes do not realize categorial heads, but something else. It appears that doing away with categorial heads is advantageous from an empirical point of view. I point out that the new proposal is as adequate as previous proposals when it comes to capturing the distribution of affixes.

Moreover, it has a better empirical coverage when it comes to multicategorial affixes, i.e. affixes that are associated with more than one category. I conclude that derivational affixes do not realize categorial heads. In other words, I argue that categorial heads are not a primitive of syntax.

Chapter 5

In chapter 5 I present an alternative view on derivational word formation. I first show that the meaning of derivational affixes is lexical. I therefore argue that they realize a lexical position, i.e. a root, by default. However, it became clear in chapter 3 that vocabulary items with lexical meaning may be semi-lexical vocabulary items too. I argue for this possibility for derivational affixes by presenting a case study on collective mass nouns. These nouns contain a semi-lexical derivational affix. In a final part I discuss the technical details of the structure of a derivational word form[11] under the present view.

Chapter 6

Chapter 6 sums up and concludes. It will have become clear that the present model defines roots structurally and that syntax does not operate with vocabulary items or categorial heads. It further addresses some consequences of the proposal and it formulates suggestions for further research.

Appendix: A note on the presentation of examples in this thesis

The orthography used to represent examples

When I give Dutch examples, I consistently separate the base vocabulary item[12] from its affixes by means of hyphens in order to present the internal make-up of the word. I thereby spell the base vocabulary items as if they would stand in isolation, i.e. as if they were not followed by any affixes.

[11] I use the word 'word form' to refer to the product of derivational word formation.

[12] Base vocabulary items are all vocabulary items which are not affixes. They can be either free or bound. Examples of free base VIs are *cat*, *elephant*, *light* and *jump*. Examples of bound base VIs are *calcul-* (as in *calculable*) and *menstru-* (as in *menstruate*).

There is one complication, however. Dutch has final devoicing and this is reflected in the official orthography when the underlying phoneme realizing the coda is a /z/ or a /v/. For example, the devoiced word-final sibilant in (16) is represented by an *s*. Its word-internal, voiced alternant in (17) is represented by a *z*.

(16) ik bloos
I blush
'I blush'

(17) blozen
blush.INFINITIVE
'to blush'

Because I separate morphemes by means of hyphens, the official spelling rules fail to determine which grapheme should be used in some cases. I therefore simply spell the surface consonant in these cases. For example, if one hears an *s* I spell an *s*, if one hears a *z* I represent it.

The glosses

When I gloss examples, I do not translate the affixes, despite the fact that there is often an etymological relation between Dutch and English affixes. For example, the affix *-schap* is related to *-ship* and *-loos* to *-less*. Although there is often a close similarity between Dutch and English affixes, there is absolutely no one-to-one correspondence between the two. As such, translating all Dutch affixes into English would give rise to many translational complications. I have therefore decided not to translate them. I simply gloss them by means of small caps. An example is given in (18). Note that inflectional affixes, such as the infinitival affix in (18), are glossed by their names in small caps.

(18) ont-moed-ig-en
ONT-courage-IG-INFINITIVE
'discourage'

The example above shows that I do translate the base VI. I also do so when the base VI is a bound base VI, as in (19).

(19) compon-ist
compose-IST
'composer'

In the example above the bound base VIs *compon-* is translatable into an English bound base VI. Sporadically a bound base VI does not correspond to an English one. In these rare cases I have not translated the base VI. This is again indicated by means of small caps in the gloss. An example is given in (20).

(20) er-barm-en
ER-BARM-INFINITIVE
'to have mercy on'

Some Dutch derivational word forms show linking phonemes in between the base vocabulary item and the affix. In this work I mostly wish to remain agnostic about the precise nature of these phonemes (see Di Sciullo 2009, Booij 2002, De Belder 2010 and chapter 5 section 5.4.2 for discussion). I have therefore glossed them as LP, which is short for linking phoneme. An example is given below.

(21) kind-er-loos
child-LP-LOOS
'childless'

In sum, affixes are not translated, base VIs are translated as much as possible.

2. *The syntax of roots*

2.1 Introduction[13]

In this work I adopt Borer's (2005a,b) view that roots do not carry any syntactic features (see chapter 1 section 1.3.3). As a result, a root does not select the category of the functional structure that dominates it. On the contrary, the functional structure determines the interpretation of the root. For example, the lexical vocabulary item √*milk* is not listed as a verb or a noun in Vocabulary. Its category depends entirely on the functional structure it is merged with. A T° head verbalizes it, as in (1), a D° head nominalizes it, as in (2) (see chapter 6 section 6.2.1).

(1) [$_T$ [milk]-ed$_T$]
(2) [$_D$ the$_D$ [milk]]

The view that roots are featureless is found in the Exo-Skeletal Model (Borer 2005a,b, 2009a,b,c) and is compatible with most proposals within the framework of Distributed Morphology (Halle & Marantz 1993, Harley & Noyer 1999).

In this chapter we point out that there are (at least) two ways to account for the precise source of the featurelessness of roots. Firstly, one can postulate that a root is defined lexically. It then results from the merger of a featureless lexical vocabulary item. The second option would be to assume that a root is defined structurally. In this case the root is defined by syntax (Halle & Marantz 1993), not by the vocabulary item (henceforth VI) that will eventually realize it. In

[13] This chapter is based on joint work with Jeroen van Craenenbroeck, i.e. De Belder & van Craenenbroeck (2011). I am particularly indebted to Jeroen van Craenenbroeck for the ideas presented in section 2.3 .

sum, there are two ways to characterize roots. This chapter compares the two proposals in detail. Its aim is to show that roots are defined structurally. More specifically, we argue that a root terminal node is derived in a principled way from the operation Merge. Finlly, the present proposal argues for a different vocabulary insertion mechanism than the one which is assumed in DM. We propose that all VIs are inserted through competition.

This chapter is structured as follows. Section 2.2 compares the lexical definition of the root to the structural one and concludes that the latter is superior. Section 2.3 provides a principled way to derive the featurelessness of roots from the operation Merge. A unified mode of insertion for functional vocabulary items and lexical vocabulary items is presented in section 2.4. Section 2.5 presents results from previous literature which may contradict the findings presented here and reconciles them with the present view. Section 2.6 sums up and concludes.

2.2 Roots are defined structurally, not lexically

2.2.1 Introduction

In this section we compare the lexical definition of roots with the structural one. We thereby capitalize on the previously unnoticed fact that the lexical definition goes hand in hand with early insertion of VIs, whereas the structural definition is only compatible with late insertion. This section introduces both positions and provides new evidence from Dutch in support of the late insertion approach. The conclusion will be that roots are not marked as such in Vocabulary, but that they correspond to a particular position in the syntactic structure.

2.2.2 Lexically defined roots

Suppose the vocabulary item *stone* was inserted at the very start of the syntactic derivation. In that case, one can capture its extreme malleability (see chapter section 1.3.3) by stipulating that this vocabulary item itself has no syntactic features. In this respect it would differ from functional items such as *many* or

the, which are inherently marked for [+count] and [+definite] respectively. More generally, the distinction between roots and non-roots is one that is made in Vocabulary: roots are VIs without syntactic features, whereas non-roots are VIs with syntactic features. Whenever a root is merged into the derivation, its (conceptual) meaning can be coerced any which way by the syntactic context, but when a non-root is merged, its syntactic features determine whether it can be legitimately inserted or not—and if not, the result is ungrammaticality, not uninterpretability.

The most consistent proposal on a lexical definition of roots is Borer's (2005a,b, 2009a,b,c) Exo-Skeletal Model (henceforth XSM). In her theory vocabulary items come in two varieties: lexical vocabulary items (henceforth LVIs)[14] and functional vocabulary items (henceforth FVIs). The former correspond to open-class items, the latter to closed-class ones. LVIs do not bear any morphosyntactic features and their semantics is malleable and dependent on the syntactic structure in which they are inserted. FVIs on the other hand are marked for syntactic features and have a rigid and fixed denotation.

Borer proposes that phonological indices of VIs[15] are inserted early, i.e. in narrow syntax. As a result, an FVI interacts with the syntactic derivation via its syntactic features, whereas an LVI does not bring any such features into the structure. Each time such a featureless VI—i.e. an LVI—is merged, a root position is created. This means that roots are defined lexically in the XSM; it is the absence of syntactic features on the LVIs that makes them into roots. The lexical definition of roots can be formulated as in (3).

(3) Lexical definition of roots

A root is defined lexically by the merger of a vocabulary item that does not contain any syntactic features.

[14] LVIs are called *listemes* in Borer 2005a,b and *roots* in Borer 2009a,b,c. They correspond to what we have been calling roots.

[15] A phonological index of a VI is an abstract means to refer to various surface instantiations of one VI. For example, one single index will refer to both *thought* and *think*.

Summing up, according to the lexical definition the relevant dividing line between roots and non-roots is situated in Vocabulary. What distinguishes a root from functional structure is a lexical property; a root position is the result of merging a featureless VI, functional structure results from merging a VI with syntactic features. As such, there is a strict division between the two classes of VIs.

2.2.3 Structurally defined roots

A key innovation of Distributed Morphology compared to preceding morphological theories is the so-called Late Insertion Hypothesis (cf. Harley & Noyer 2003 and chapter 1 section 1.3.1). It concerns the idea that the phonological expression of syntactic terminals is only provided post-syntactically, in the mapping to PF. In other words, syntax only manipulates abstract bundles of syntactic features, not actual VIs. For example, syntax may merge the syntactic feature set [Def, Sg, Distal], but it does not merge the VI *that* as VIs are only inserted post-syntactically. However, given that roots do not introduce any such syntactic features, the syntactic module cannot make use of such features in order to introduce a root into the syntactic derivation.

Rather than distinguishing between roots and non-roots in Vocabulary, Late Insertion-based models make a distinction between root and non-root (or functional) *terminal nodes* (henceforth TNs). That is, there are specific positions in the syntactic structure that will serve as the insertion site for LVIs at the level of Vocabulary Insertion. These positions are characterized by the absence of syntactic features and as such they do not play any active role in the syntactic derivation. Such a structural definition of roots is given in (4).

(4) Structural definition of roots
    A root is defined structurally if it is a terminal node which does not contain any category-specific syntactic features.

The way in which this definition is usually implemented is by merging the feature [Root] into the structure (see Halle & Marantz 1993. Harley & Noyer 1999). This feature can be seen as a (syntactically inactive) placeholder or

diacritic that signals to the relevant post-syntactic mechanism that a root should be inserted in this position. Technical details aside, though, it should be clear that late insertion of vocabulary items forces one to define roots structurally rather than lexically.

2.2.4 Supporting evidence for the structural account: FVIs in root position

In the previous two sections we have outlined the differences between the lexical definition of roots in early insertion models and the structural one in theories adopting late insertion. The question now is to what extent these two accounts can be empirically distinguished. It is clear that in the standard scenario, i.e. FVIs (such as *the*) being merged in functional terminal nodes (henceforth FTNs) and LVIs (e.g. *book*) in RTNs, the two theories make the same predictions (albeit with different theoretical machinery). As soon as we diverge from this simple picture, however, differences emerge. Suppose we want to use an FVI as a root. In an early insertion model this state of affairs is unformulable. The mere presence of syntactic features on a VI will cause the projection headed by this VI to be recognized as functional rather than lexical. As a result, FVIs can never head lexical projections. Under late insertion, however, there is no *a priori* ban on merging a particular type of VI in a root terminal node (henceforthRTN).[16] Given that this position itself is defined structurally, it is irrelevant whether the VI realizing this position carries any syntactic features. Even if it does, those features will never enter into the syntactic derivation, for the simple reason that VIs are inserted post-syntactically. The use of FVIs as roots thus constitutes a potential testing ground for distinguishing between the lexical and the structural definition of roots.[17] Consider in this respect the following examples from Dutch:

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16 Needless to say, a lot will depend on the precise insertion mechanism for VIs. This is an issue we return to in section 2.4.

17 It will become clear later in this chapter that the opposite state of affairs, i.e. LVIs that are merged in functional nodes, is theoretically excluded (see section 2.4).

(5) Ik heb het **waarom** van de zaak nooit begrepen.
I have the why of the case never understood
'I have never understood the motivation behind the case.'

(6) In een krantenartikel komt het **wat/hoe/wie/waar**
in a newspaper.article comes the what/how/who/where
altijd voor het **waarom**.
always before the why
'In an article in a newspaper the what/how/who/where always precede the why.'

(7) Martha is mijn tweede **ik**.
Martha is my second I
'Martha is my best friend.'

(8) De studenten **jij**-en onderling.
the students you- INFINITIVE mutually
'The students are on a first-name basis with one another.'

(9) Niets te **maar**-en!
nothing to but-INFINITIVE
'Don't object!'

(10) *Paard* is een **het**-woord.
Horse is a the$_{\text{NEUTER.DEF}}$-word
'The word 'horse' takes a neuter article.'

Each of these examples exemplifies the use of an FVI in a root position. In (5) and (6) a *wh*-word merges under a nominal structure, while in (7) the personal pronoun *ik* 'I' does. In (8) a pronoun is used as a verb. Example (9) illustrates that a conjunction can be inserted under a verbal structure. (10) shows the use of a definite article as the left-hand part in a compound. One could of course argue that these are exceptions, and that what is inserted in the data above is

not an FVI, but an LVI which is homophonous with an FVI. As it turns out, however, the use of FVIs in root position is productive. Consider first the data in (11).

(11) a. het getik van de klok
the GE-tick of the clock
'the ticking of the clock.'

b. het gefluit van de vogeltjes
the GE-whistle of the birds
'the whistling of the birds.'

Dutch has a derivational word formation process to form words which refer to a pluractional event by means of *ge*-prefixation. As is illustrated in (12), this type of word formation productively allows FVIs to occur in root position.[18]

(12) a. Ik hoef al dat ge-**maar** niet.
I need all that GE-but not
'I don't like those constant objections.'

b. Ik hoef al dat ge-**alhoewel** niet.
I need all that GE-although not
'I don't like those constant considerations.'

c. Ik hoef al dat ge-**of** niet.
I need all that GE-or not
'I don't like those constant alternatives.'

d. Ik hoef al dat ge-**hé** niet.[19]
I need all that GE-SENTENTIAL.PARTICLE not
'I don't like the constant need for confirmation.'

[18] The translations given here are only indicative. The precise interpretation of these examples may vary according to the context.
[19] We assume that sentential particles are FVIs which realize a C° head (see Munaro and Poletto 2003, among many others).

e. Ik hoef al dat ge-**waarom** niet
I need all that GE-why not
'I don't like the constant need for justification.'

f. Ik hoef al dat ge-**nooit** niet
I need all that GE-never not
'I don't like the constant unwillingness.'

f. Ik hoef al dat ge-**ik** niet
I need all that GE-I not
'I don't like the constant egocentrism.'

Rather than assume that FVIs are systematically ambiguous between a functional and a root reading—clearly an undesirable move—we take the data in (5)-(10) and in (12) to show that FVIs can be used as roots. This finding argues against a lexical definition of roots and in favor of the structural approach. Simply put, whether or not a vocabulary item is a root is not due to certain inherent characteristics or properties of that vocabulary item, but depends solely on the structural position in which this element is merged. Certain positions in the syntactic structure turn whatever is merged in that position into a root.

This conclusion supports the observation that a structural definition of roots and late insertion theoretically go hand in hand. This becomes clear through an aspect of the data in (5)-(10) left undiscussed so far. Recall that a structural definition of roots and late insertion offer the possibility that nodes can be defined as roots independently of the VI which realizes that node. This predicts that the syntactic features of FVIs used as roots will not have any syntactic effect: at the point of Vocabulary Insertion, the syntactic derivation (of the relevant cyclic domain) is already over. This is indeed what we see in (5)-(10). For example, the FVI *waarom* 'why' in (5) does not type the sentence as a *wh*-question (in the sense of Cheng 1997), nor is it subject to (otherwise obligatory) *wh*-movement. In other words, the syntactic derivation does not

take the syntactic features of an FVI into account when this FVI is used as a root. Similarly, the personal pronoun *ik* 'I' in (7) does not trigger first person singular agreement when used as a subject, but rather (default) third person singular (see (13)), suggesting that its inherent [ϕ]-features are not seen by the syntactic derivation.

(13) Mijn tweede ik {* ben/is} ongelukkig.
my second I am/is unhappy
'My best friend is unhappy.'

In short, regardless of which element is inserted in a root position or what its feature specification is, it will not affect the course of the syntactic derivation in any way. This empirically supports the theoretical claim that roots are defined structurally.

2.2.5 Conclusion

The possibility of using FVIs in a root position shows that it is not the VI itself which defines a root. Roots are a structural notion. Such a structural definition goes hand in hand with late insertion.

2.3 The merger of a root

2.3.1 Introduction

This section introduces a theory of Merge which immediately derives the featurelessness of roots outlined above. Before presenting the analysis, we give an overview of the desiderata for a(n explanatorily adequate) theory of roots in section 2.3.2. We then present the analysis in two steps. Section 2.3.3 argues, following Jaspers (1998), Langendoen (2003), Zwart (2009a, 2009b, 2010) and others, that Merge is inherently asymmetric and that pair merge rather than set merge is the default—and arguably the only—structure-building mechanism in natural language. In section 2.3.4 we focus on the very first Merge operation in a derivation—termed Primary Merge here—and show that it involves merger

with the null derivation. Section 2.3.5 is an intermediate summary of the analysis. Section 2.3.6 presents a sample derivation as an illustration and section 2.3.7 points out how the analysis successfully derives the desiderata presented in section 2.3.2.

2.3.2 Desiderata for a theory of roots

Above we have presented properties of roots. They are featureless, acategorial and structurally defined. Existing proposals define the root structurally by merging a [Root]-feature (see section 2.2.3). However, the root's featureless and acategorial nature does not follow from this technical implementation. It were desirable to define the root position such that its properties follow from the definition.

There is a fourth and final property of roots we want to discuss here. It is perhaps the most basic of the four, in part also because it long predates the XSM- or DM-perspective on lexical categories. It concerns the fact that lexical categories are dominated by functional ones, rather than the other way around: DP dominates NP, but NP does not dominate DP, TP dominates VP, but VP doesn't dominate TP, etc.[20] In traditional, pre-DM/XSM-days, this hierarchical asymmetry could be made sense of by arguing that in a bottom-up derivation, the lexical projections first introduced the conceptual notions which the functional material then subsequently tied to a particular speech-act (by situating the event in space and time, identifying its referents, adding information-structural distinctions, etc.). In the perspective on roots outlined above, however, this simple account breaks down. We have shown that roots are nothing but structural black holes for features that play no role whatsoever in the syntactic derivation. With this in mind, it is unclear why they should necessarily be merged as the first/lowest element in a cyclic domain. Worse still, given that roots are acategorial and featureless (see chapter 1 section 1.3.3), how can any functional head select for (and hence be merged with) a root?

In sum, the desiderata for roots are the following:

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[20] This statement should of course be relativized to cyclic domains: within one cyclic domain functional projections dominate lexical ones. See De Belder & van Craenenbroeck (2011) for more details.

(14) a. Roots have no syntactic features.
b. Roots have no grammatical category.
c. Roots are defined structurally, not lexically.
d. Roots are merged lower than functional material.

In the next section we propose that not only the fact that roots merge at the 'bottom' of the tree, but also the featureless, acategorial and structurally defined nature of roots follow straightforwardly from the mechanics of Merge.

2.3.3 Asymmetric Merge

The standard technical implementation of the structure-building operation Merge in present-day minimalist theorizing is so-called set Merge. That is, Merge combines two (possibly complex) syntactic objects α and β into the set containing (precisely) these two elements, i.e. $\{\alpha, \beta\}$ (see e.g. Chomsky 1995:243). When considering only this bare minimum, Merge seems to be a completely symmetric operation, which takes two elements of equal stature and yields a new object that is neither linearized nor hierarchically organized.[21] More generally, Merge (α, β) = Merge (β, α). However, we present a number of arguments—taken from Chomsky (1995), Jaspers (1998), Langendoen (2005), and Zwart (2009a, 2009b, 2010)—suggesting that the picture just sketched is too simple, and that there is an inherent asymmetry to Merge. Accordingly, we adopt Zwart's (2010:7) conclusion that pair Merge rather than set Merge is the basic structure-building principle of natural language. This is presented in the remainder of this section.

The first complication is highlighted by Chomsky himself. After introducing the definition given above, he points out that output conditions dictate that mere set formation does not suffice (Chomsky 1995:243). Given that different types of constituents (e.g. verbal and nominal ones) are interpreted differently at LF and PF, the distinction between them should somehow be encoded in syntax. Put differently, Merge (α, β) is not symmetric because either α or β is

[21] Recursive operations of set Merge obviously do yield hierarchical structure, but we are focusing on the output of a single Merge operation here.

the head of the newly formed constituent and as a result projects its category label onto that constituent. Chomsky implements this insight by assuming that either α or β functions as the label of the newly formed constituent, i.e. Merge $(\alpha, \beta) = \{\alpha, \{\alpha, \beta\}\}$ (with α the label of the complex constituent). As pointed out by Langendoen (2003:3), however, $\{\alpha, \{\alpha, \beta\}\}$ is set-theoretically equivalent to the ordered pair $<\alpha, \beta>$.[22] In other words, by admitting that one of the two elements combined by Merge projects, we are led to the conclusion that the proper characterization of this operation involves pair Merge rather than set Merge.

A second form of asymmetry was first observed by Jaspers (1998). He draws attention to what he calls Derivational Asymmetry, i.e. the fact that for every Merge operation, one element is derivationally prior to the other. Put differently, one element was already part of the derivational workspace before Merge took place, while the other is newly added to that workspace as a result of the operation—more specifically, as a result of the application of Select preceding Merge, see section 2.3.4 for discussion. Derivational Asymmetry is also appealed to—though in a slightly different form—by Epstein (1999:337), who rules out c-command from a head to its specifier on the grounds that at the point in the derivation when the c-command domain of the head is determined, the specifier is not yet a member of the derivational workspace. It is clear that an implementation of Merge in terms of pure set formation does not succeed in capturing Derivational Asymmetry.

Thirdly and finally, Zwart (2009b:163) raises the following conceptual argument against set Merge. The fact that this operation takes precisely two elements as its input remains a stipulation—necessary though it may be to derive binary branching. Chomsky (2006:5) calls this "the simplest case", but as one is the absolute minimum of elements an operation can manipulate, an implementation of Merge that can reach this minimum is to be preferred over

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[22] The most standard definition of ordered pairs is that of Kuratowski (1921) given in (i) below (see also Partee, Ter Meulen & Wall 1987:27). The definition referred to by Langendoen (2003) is the so-called short definition, see e.g. Enderton (1972). For a formal proof that the short definition satisfies the characteristic property of ordered pairs—i.e. $<a, b> = <c, d>$ if and only if $a=c$ and $c=d$—see http://us.metamath.org/mpegif/opthreg.html.

(i) $<a, b> =_{def} \{\{a\}, \{a, b\}\}$

one that uses two syntactic objects as its input. As I discuss below, Asymmetric Merge achieves this goal.

Summing up, there are good reasons to assume that Merge is asymmetric and as a result, that this asymmetry should be built into the technical implementation of this operation. In this chapter we adopt and adapt Zwart's (2009a, 2010) definition. It is given in (15).

(15) *Unary Merge* (pre-final version)
Merge selects a single element from a numeration[23] and includes it in the object under construction.

Implicit in this definition—but made explicit by Zwart 2009a:62, 2010:7—is the fact that the output of this operation yields an ordered pair, so that when an element α is taken from the numeration and added to δ, the derivation currently under construction, the result is $<\alpha, \delta>$.

Before we can proceed, there is one aspect of the definition in (15) that needs further clarification. In particular, we want to make explicit what the notion "element" refers to in this definition. It is an assumption rarely made explicit in current (morpho)syntactic literature (though see Chomsky 1995:383n27, Drury 1998:76n20, Fortuny 2008:18) that the objects combined by Merge are *sets* of features.[24] For example, under the (common) assumption that T^o is a combination of person, number, gender en tense features, it follows that the set consisting of these four features act as a single atomic element for the operation Merge (Marantz 1997:2). Accordingly, we refine the definition of Unary Merge as follows:

[23] Zwart uses the term 'resource', rather than Numeration, lexicon, lexical (sub)array or any of the other alternatives available in the literature. As far as we can tell, our proposal is compatible with all these implementations.

[24] In DM the operation the operation responsible for creating these sets is called fusion or bundling, see Marantz 2006, Bobaljik & Thraínsson 1998, Pylkkänen 2008, De Belder to appear for discussion and examples.

(16) *Unary Merge* (final version)

Merge selects a single subset from a numeration (e.g. {α}), includes it in the derivation under construction (δ), and yields an ordered pair (e.g. <{α}, δ>, assuming {α} projects).

With this discussion as background, we are now ready to turn to the first application of Merge.

2.3.4 Primary Merge

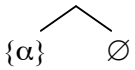
An application of Merge that usually does not get a lot of attention in the literature is the very first operation in a derivation, which we call Primary Merge here. In a system based on symmetric set Merge, Primary Merge introduces a complication. Normally, Select takes an element from the numeration and combines it with (the root of) the current derivation via Merge. In the case of Primary Merge, however, there is no such derivation. This leaves one of two options for Select. The first is to assume that in the case of Primary Merge, Select can exceptionally take two objects from the numeration rather than one (see also Zwart 2010:8). It is clear that this is not a very desirable move. By allowing Select to target either one or two objects, we introduce a degree of arbitrariness into the system that can only be maintained by pure stipulation—if 1 or 2, why not 3 or 4 or 25?—thus straying from the Strong Minimalist Thesis (Chomsky 2000). Moreover, if Merge can select 2 items ternary Merge is no longer excluded. The second option is to assume that Select always targets precisely one element from the numeration, but that in the case of Primary Merge, the first application of Select does not immediately feed Merge. Put differently, Select takes the first element from the numeration in anticipation of the merger operation that will take place after it has applied a second time. Just like the first scenario, this one has little appeal to it, as we are now introducing into the system a substantial degree of look-ahead and a concomitant increase in computational workload.

Part of this problem is alleviated under the perspective sketched in the previous section. As is clear from the definition of Unary Merge in (16), this operation always and without exception targets a single element from the

numeration. What remains to be determined, then, is what it means to be 'included in the object under construction' when in fact there is no such object yet. We propose to take the definition in (16) as literally as possible. When an element {α} is the first one to be taken from the numeration by Unary Merge, it is included into an empty derivation, i.e. the object under construction is the empty set ∅ (see also Zwart 2010:8). The output of this instance of Merge is no different from any other: it yields an ordered pair, in this case <{α}, ∅>. In other words, Primary Merge is identical to all other Merge operations. All of them yield an ordered pair, the only difference being that in the case of Primary Merge the right-hand member of this ordered pair is the empty set.

Let us consider how a(n abstract) derivation would proceed under the assumptions outlined above. Suppose we use the numeration N = {α, β} as the input for a derivation. The first instance of Unary Merge takes a subset from N, say {α}, and includes it in the object under construction, i.e. ∅, yielding the structure in (17).

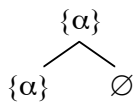
(17)



The question at this point is what the label of this complex constituent is. So far we have been proceeding under the assumption that merging an element from the numeration to the derivation under construction yields an ordered pair of which that newly-merged element is the left-hand member. However, recall that in the previous section we converted Chomsky's labeled structure {α, {α, β}} into the ordered pair <α, β>. This means that being the left-hand member of an ordered pair correlates with projection, not with being the most recently merged element. When discussing projection/labeling, Chomsky (1995:244f) discerns two classes of situations. In the first, the structural configuration unambiguously identifies one of the two elements undergoing merge as the projecting member. These configurations include a head merging with a complex constituent (the head projects) and movement/internal Merge (the moving element does not project—though see Donati 2006 for a different view). In the other case—i.e. a head merging with a head or an XP externally

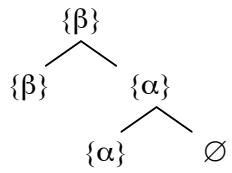
merging with an XP—it is the featural specification (and possibly the concomitant checking relation) that determines which of the two will project. With respect to the structure in (17), we contend that it falls into the first category. That is, it is always unambiguously clear that {α} will project, regardless of its feature specification. The reason for this is twofold. First of all, ∅ is completely and radically empty: it has no category, no syntactic features, no specification of any kind. Under the uncontroversial assumption that projection involves passing on or copying information from a daughter node onto its mother, this radical emptiness makes ∅ inherently incapable of projecting. Secondly, if Ø were to project, this would incorrectly identify the constituent in (17) as an empty derivation, thus obscuring the fact that (the non-empty element) {α} has already been merged into that derivation. Summing up, then, the complete representation of the Primary Merge operation described above is as in (18).

(18)



At this point, Unary Merge takes {β} from R and merges it with the structure in (18). Supposing that {β} is the projecting element, this Merge operation yields the ordered pair <{β}, <{α}, ∅>>, which can be graphically represented as in (19).

(19)



In short, the theory of Merge developed in this and the preceding section entails that every derivation begins with the merger of a radically empty element, which accordingly sits at the very bottom of the syntactic structure.

While representations such as the one in (19) might seem unorthodox at first, they are certainly not unprecedented. For instance, Zwart (2009b, 2010) also assumes that Primary Merge involves "merger with nothing/the empty set" (Zwart 2010:10). His implementation, however, differs from ours in two ways. Firstly, his system is strictly top down—or rather, left-to-right. What Merge does, is split the numeration into an ordered pair consisting of one item from the numeration as left-hand member and the remainder of the numeration on the right. When the last member of the numeration is thus split off, what remains as the right-hand member is the empty set. A second—more important—difference is that Zwart does not assume this empty set to occupy a structural position in the phrase structure representation (see e.g. Zwart 2009b:164). As has become clear from the above discussion (and see also the next section), in our proposal the position created by merger with the empty set is real and plays a central role in natural language.[25]

The idea that Primary Merge involves merger with the empty set is also found in Fortuny (2008). He starts out from a particular implementation of set Merge, whereby this operation takes two subsets from the numeration and yields the union of those subsets (Fortuny 2008:18). Moreover, in order for Merge to be successive, at least one of the two subsets must be the output of an immediately preceding application of Merge. For Primary Merge, this entails that one of the two elements targeted by Merge must be the empty set Ø. When Ø is merged with a first subset from the numeration, e.g. {a}, the output is the union of those two sets, i.e. the singleton {a}. This singleton can then be used as input for the second application of Merge, e.g. {b}, to yield the union of those sets, i.e. {a, b}, and so on. Note that, just as was the case in Zwart's system, the impact of the initial empty set on the remaining derivation is non-

[25] As Zwart (2010:6) points out, the LCA might necessitate positing an empty position independently of any considerations related to Merge. Given that this principle depends on asymmetric c-command in order to convert hierarchical structure into linear order, the merger of two non-branching nodes, i.e. precisely the kind of structure that is created by Primary Merge, yields a non-linearizable structure. Chomsky proposes that such configurations must be rendered asymmetric (e.g. via movement) before they reach the PF-interface (see also Moro 2000 for related discussion), but more generally, one might require that every right-branching structure ends in an empty position. The fact that the perspective on Merge developed in this section yields precisely this result on independent grounds thus serves as additional support for our proposal.

existent. This is exactly where Fortuny's analysis differs from ours: while we agree that Primary Merge involves the null set as one of its members, we contend that this empty position is a syntactic terminal that receives a phonological exponence in the post-syntactic morphological module (see below, section 2.3.7).

2.3.5 Interim summary

In this section we have introduced and discussed our theory of Merge. Following Jaspers (1998), Langendoen (2005), Zwart (2009a, 2009b, 2010) and others, we have argued that this operation is asymmetric and that it yields ordered pairs rather than unordered two-membered sets. We then focused on the very first instance of Merge in a derivation (Primary Merge) and concluded that it involves the empty set as one of its members. This implies that every derivation begins with a radically empty and featureless slot at the most deeply embedded position in the structure. In section 2.3.7 we argue that this is where roots are inserted in the post-syntactic module. However, we will first present a sample derivation as an illustration.

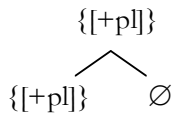
2.3.6 Asymmetric Primary Merge of roots: a sample derivation

This section presents a sample derivation of the nominal constituent *the books* as an illustration of how our view on Merge meshes with the syntax of roots. Recall that we adopt Late Insertion of VIs. This implies that the numeration from which Merge draws contains only syntactic features. Moreover, roots play no role in the syntactic derivation and they are defined structurally. As a result, there are no features in the numeration that refer to or anticipate the merger of a root. For the example at hand, this means that the numeration is a set containing a definiteness feature and a plural feature, i.e. N = {[+def], [+pl]}.[26] Based on this numeration, the derivation proceeds as follows. Unary Merge first selects the singleton containing the plural feature from N and merges it

[26] For the sake of exposition, we are abstracting away from any other syntactic features that might underlie the DP *the books*. For example, most DM-analyses would include a *n*-head in N.

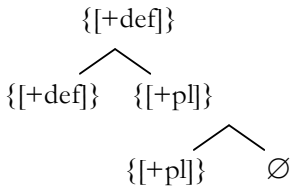
with the empty set. Given that the latter is featureless, it is the plural feature that projects (see section 2.3.4 for discussion). This is shown in (20).

(20)



Next, the definiteness feature is targeted by Merge. It too projects its own structure, thus yielding the representation in (21).

(21)



At this point, the syntactic derivation is finished (the numeration is empty) and the structure is handed over to PF. One of the operations on the way to the interface with the articulatory-perceptual system is Vocabulary Insertion (see Harley & Noyer 1999 and chapter 1 section 1.3.3 for discussion). When confronted with the structure in (21) the grammar searches its Vocabulary for matching vocabulary items and it encounters the following VIs:[27]

(22) a. /ðə/ ↔ [+def]
b. /s/ ↔ [+pl]
c. /buk/ ↔ ∅

The phonological exponents on the left-hand side of the equivalences in (22) are inserted into the terminal nodes of the structure in (21), and the derivation converges as the nominal constituent *the books*.[28]

[27] We return in detail to the properties of the vocabulary insertion mechanism in section 2.4.3.
[28] Note that the plural morpheme is spelled out to the right of the root whereas the tree in (21) suggests it is linearized to its left. See Embick & Noyer (2001) for extensive discussion of the

2.3.7 Returning to the four desiderata for roots

The derivation in (20)-(22) demonstrates how the empty position created by asymmetric Primary Merge can serve as an insertion site for roots. This section returns to the four root axioms introduced in section 2.3.2 and shows how they follow straightforwardly from the theory developed so far. Recall that the properties of roots under discussion here can be summarized as in (23).

(23) a. Roots have no syntactic features.
b. Roots have no grammatical category.
c. Roots are defined structurally, not lexically.
d. Roots are merged lower than functional material.

The property in (23)c is the one that has featured most prominently in the preceding discussion. We follow Late Insertion-based theories in assuming that roots should be defined as designated positions in the structure rather than as a special marking (featural or otherwise) on a specific subset of VIs. This conclusion follows directly from our theory of asymmetric Primary Merge. By merging an element from the numeration to the empty set, the basic structure building mechanism creates just the required syntactic terminal. Moreover, given that this terminal is the empty set, it also follows that this position is completely featureless (cf. (23)a). Regardless of which VI is inserted in this position in the morphological component (and see below, section 2.4 for extensive discussion of the insertion mechanism), during the syntactic derivation this position will be completely inert.

The fact that roots are acategorial also follows from our theory. Recall that ∅ never projects. Given that it is radically featureless, it cannot pass on or copy its features onto a higher node. It is always the set that merges with ∅ that projects and thus determines the category of the whole. If that set contains nominal features (as in (20)), then the vocabulary item inserted in ∅ is interpreted as a noun; if it is verbal, then the root is interpreted as a verb, etc.

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various ways in which this inversion can come about. Given that this issue is orthogonal to the reasoning developed in the main text, we have glossed over it for expository purposes.

Finally, the fact that roots are merged lower than functional material is also an integral part of our analysis. The only stage at which the derivation is null is the very beginning and so the only Merge operation that can involve ∅ as one of its members is Primary Merge. Given that the occurrence of roots is directly dependent on merger with ∅, this implies that roots are never inserted in mid-derivation, i.e. dominating previously merged functional material (see De Belder & van Craenenbroeck (2011) for detailed discssion). Given that each new root implies a new derivation the reader may wonder how multiple roots can be merged in a single, syntactic structure. A sample derivation is presented in chapter 5 section 5.4.3. For more detailed discussion see De Belder and van Craenenbroeck (2011).

Summing up, then, the theory of asymmetric Primary Merge outlined in section 2.3.4 derives the four properties of roots discussed in section 2.3.2, thus reducing them to theorems of this theory. Given that these properties are empirically well motivated (see section 2.2 for discussion and references), we take this to be additional support for our theory of Merge.

2.4 The insertion mechanism: competition for root positions

2.4.1 Introduction

An aspect of our theory we have said very little about so far concerns the precise mechanism that matches up syntactic terminals with the appropriate vocabulary items (VIs). This issue is complicated by the fact that unlike previous Late Insertion models, we have claimed that FVIs can be inserted in root positions (cf. the data in (5)-(12)). Most DM-accounts of Vocabulary Insertion assume a radically different insertion mechanism for FVIs and LVIs. While FVIs are subject to competition (the VI most closely matching the syntactic terminal in features being the preferred insertion candidate), insertion of LVIs is determined by free choice. It should be clear that this dual insertion mechanism presupposes a strict division of labor between the functional and the lexical domain: FVIs always and only spell out FTNs, whereas LVIs always

and only spell out RTNs. As such, we cannot adopt it here. What we propose instead is a single, unified insertion mechanism in which all Vocabulary Insertion is regulated by competition.

2.4.2 Vocabulary Insertion in Distributed Morphology

As was pointed out above, DM assumes different modes of insertion for FVIs and LVIs. The insertion of FVIs is regulated by competition. More specifically, they are inserted into FTNs along the lines of the Subset Principle in (24) (Halle 1997, Kiparsky 1973, Anderson 1986).

(24) The Subset Principle

> The phonological exponent[29] 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).[30]

The Subset Principle proceeds in two steps. First, it selects all possible candidates, i.e. those VIs of which the features are a subset of the features of the TN. Secondly, the most optimal candidate is selected from this group. This VI is the closest match; it has the most features in common with the TN.

As an illustration, suppose an FTN contains the features a and b. We will call this set F_0, as in (25).

(25) $F_0 = \{a,b\}$

[29] Recall that 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.

[30] Note that Halle uses the term '(terminal) morpheme' for what we have been calling—and will continue to call—'(syntactic) terminal node'.

Now imagine a toy vocabulary which contains only three VIs. All of these VIs come with a set of features, as in (26).

(26) a. /ta/ ↔ {a}
b. /plo/ ↔ {a,b}
c. /stu/ ↔ {a,b,c}

The Subset Principle will identify /plo/ as the winner. It will first select /ta/ and /plo/ as possible candidates as their feature sets are both subsets of F_0. It will then select /plo/ as the winner as its feature set is the closest match.

When the Subset Principle does not determine a winner, one can simply stipulate one (aka extrinsic ordering, see section 2.4.3 for discussion) (Halle and Marantz 1993). For example, imagine the toy vocabulary in (27) and the TN in (25).

(27) a. /ta/ ↔ {a}
b. /fes/ ↔ {b}
c. /stu/ ↔ {a,b,c}

The Subset Principle will select both /ta/ and /fes/ as possible realizations of (25). In such cases convention might stipulate that /ta/ is to be preferred over /fes/. Alternatively, one could rely on a Universal Feature Hierarchy according to which certain features -such as [person]- are more important than others -such as [gender]- on a universal basis (Harley 1994, Harley & Ritter 2002). In the example above, the feature a may be higher in the hierarchy than the feature b. If so, [ta] will be the winner. In sum, FVIs are in competition for insertion.

LVIs on the other hand do not compete. Their insertion is based on free choice. That said, the precise way in which this free choice is implemented tends to vary. For example, Harley and Noyer (1997) propose that LVIs carry selectional features or at least a specification of the context in which they can be inserted. They may further be endowed with the feature [Root] or with an index (Harley and Noyer 1999, Harley 2009b). What all of these options have in common however, is that all LVIs have some sort of marking that they share

with RTNs, and it is this marking that allows all of them to be inserted freely in such positions.

From the point of view of the current chapter, this double insertion mechanism is problematic for three reasons. First of all, we have shown, based on the data in (5)-(12), that FVIs can be inserted in root terminal nodes. This implies that whatever the diacritic that allows LVIs to be inserted in such positions—say, a [Root]-feature— it should be present on FVIs as well. Such a move, however, would render this diacritic meaningless, as it would now be present on *all*[31] VIs and as such would no longer distinguish roots from non-roots. Secondly, the use of FVIs as roots also seriously complicates the insertion mechanism itself. Note that the feature specification of an FVI—even if it were endowed with a [Root]-feature or other such diacritic—would never be a subset of the set of features present on RTNs. These positions do not contain any syntactic features, whereas FVIs do by definition. Thirdly, if FVIs were endowed with a [Root]-feature, then by the Subset Principle this feature should be present on FTNs as well (thus further voiding the concept of a [Root]-feature of its content).

It is worth pointing out that Caha's (2009) Superset Principle does not fare any better in this respect. This principle chooses the insertion candidate from those VIs whose feature set is a *super*set of the features present on the TN. In the hypothetical situation discussed in the main text, this would mean all VIs are possible candidates for insertion in RTNs. However, LVIs are by definition a closer match for RTNs than FVIs. LVIs do not contain any syntactic features. As such, they are by definition the best match for a featureless RTN according to a Superset Principle. Hence, FVIs will never surface in root position, contrary to fact.

Summing up, while the DM-approach to Vocabulary Insertion works well in a world where the functional and the lexical realm are strictly separate, it faces considerable problems in light of data such as (5)-(12), where a functional element shows up in a typically lexical context. The next section shows how a unified insertion mechanism based on competition can overcome these problems.

[31] VIs which are bound affixes can presumably not function as a root for phonological reasons.

2.4.3 Unified insertion through competition

This section introduces a mechanism of Vocabulary Insertion that applies both to FVIs and to LVIs. The key ingredient will be the assumption that all insertion—whether it be in functional or root terminal nodes—is driven by competition. In a nutshell, what we will propose is that in FTNs, Vocabulary Insertion proceeds much as in DM, while for RTNs, all VIs (both FVIs and LVIs) will prove to be an equally close match, thus creating the illusion of free choice.

Let us take as our starting point the Subset Principle in (24) and see how it fares when applied to *all* cases of Vocabulary Insertion (rather than just the insertion of FVIs in functional terminal nodes). As far as insertion in FTNs is concerned, this mechanism yields the correct results, even if we include LVIs in the list of possible insertion candidates. A concrete example can serve to illustrate this. Suppose a functional terminal node F bears the following feature specification: {a, b, c, d}. If LVIs are possible competitors for insertion, then, not only the -hypothetical- FVIs such as the ones in (28)a-c should be considered, but also featureless LVIs such as the -hypothetical- ones in (28)d-e. In fact, given that all LVIs are featureless, they are all potential realizations of F. When it comes to selecting the actual vocabulary item to spell out F, however, all FVIs in the candidate set will be closer matches for F's feature set than the featureless LVIs. As a result, no LVIs are (correctly) predicted to surface in functional terminal nodes.

(28) a. /ta/ ↔ {a} (FVI)
b. /fes/ ↔ {b} (FVI)
c. /stu/ ↔ {a,b,c} (FVI)
d. /smœrf/ ↔ ∅ (LVI)
e. /bik/ ↔ ∅ (LVI)

In short, the Subset Principle as outlined in (24) straightforwardly yields the correct result for Vocabulary Insertion in FTNs, even if both FVIs and LVIs are taken to be potential insertion candidates.

In RTNs, however, the principle is less successful. Recall that such positions are radically empty—they are the result of asymmetric Primary Merge with the null state of the derivation. This means that the only insertion candidates allowed by the Subset Principle are featureless LVIs (only the empty set is a subset of the empty set). As such, the principle correctly predicts that LVIs like (28)d-e can be inserted under RTNs. However, it also incorrectly predicts that FVIs like (28)a-c are not insertable under RTNs. As a result, the data such as those in (5)-(12), where FVIs occur under RTNs, are not accounted for.

What we need, then, is an insertion mechanism that retains the effects of the Subset Principle for FTNs, but yields different results in the case of RTNs. More specifically, the (possibly empty) set of features present on a TN should act as a *filter* for the VIs that can be inserted in that position: if the TN contains features (i.e. in the case of functional terminal nodes), only VIs matching those features are retained by the filter, while if the terminal is featureless (i.e. is an RTN), it imposes no restrictions on the VI that can be inserted there—the filter is vacuous—and any VI is a possible insertion candidate. We therefore propose the Revised Subset Principle in (29), which has precisely this effect:

(29) The Revised Subset Principle

Given a terminal node A with feature set F_0 and vocabulary items (VIs) $/B_{1,2,\ldots,n}/ \leftrightarrow F_{1,2,\ldots,n}$:

$/B_i/$ is inserted in A if $F_0 \times F_i \subseteq F_0 \times F_0$. When several VIs meet this condition, the one for which $F_0 \times F_i$ most closely matches $F_0 \times F_0$ is chosen.

This principle states that the phonological exponent of a VI is inserted in a terminal node if the Cartesian product of the feature set of the VI and the feature set of the terminal node matches all or a subset of the ordered pairs of the Cartesian product of the feature set of the terminal node with itself. Insertion does not take place if the Cartesian product of the feature set of the VI and the terminal node contains ordered pairs not present in the Cartesian product of the feature set of the terminal node with itself. Where several VIs meet the condition for insertion, the VI that yields the greatest number of

matching pairs must be chosen.[32] As we will now illustrate, this principle selects the same VI in the case of FTNs as the traditional Subset Principle, but leads to a universal tie in the case of RTNs. Suppose A is an FTN with the (abstract) feature specification F_0 = {a, b}, as in (30), and suppose furthermore that the Vocabulary of this hypothetical language contains only the four VIs listed in (31). As is clear from their feature specification, the first is an LVI, while the latter three are FVIs.

(30) F_0 = {a, b}

(31)	a.	/bik/	↔	∅	(LVI)
	b.	/ta/	↔	{a}	(FVI)
	c.	/plo/	↔	{a, b}	(FVI)
	d.	/stu/	↔	{a, b, c}	(FVI)

Recall from the highly parallel example in (26) that the Subset Principle would select /plo/ as the VI that realizes the FTN A, as this is the VI whose feature set is the most closely matching subset of the feature set of A.

The Revised Subset Principle yields the same result. Given that it involves not just first-order sets, but Cartesian products of such sets, let us first make explicit what the terms of the comparison are. They are listed in (32) and (33).

(32) $F_0 \times F_0$ = {a, b}×{a, b} = {<a,a>, <a,b>, <b,a>, <b,b>}

(33)	a.	$F_0 \times F_{/bik/}$ = {a, b}×∅	=	∅
	b.	$F_0 \times F_{/ta/}$ = {a, b}×{a}	=	{<a,a>, <b,a>}
	c.	$F_0 \times F_{/plo/}$ = {a, b}×{a, b}	=	{<a,a>, <a,b>, <b,a>, <b,b>}
	d.	$F_0 \times F_{/stu/}$ = {a, b}×{a, b, c}	=	{<a,a>, <a,b>, <b,a>, <b,b>, <a,c>, b,c>}

[32] Note that the main claim of the proposal is that all VIs are suitable candidates to realize an RTN. The Cartesian products are a means to formalize this claim. Any other definition which derives the same results would work equally well.

The sets in (33) each have to be compared with the one in (32). In a first step, only those that form a subset of $F_0 \times F_0$ are retained as possible insertion candidates. This procedure eliminates set $F_0 \times F_{/stu/}$ in (33)d. Secondly, the set matching $F_0 \times F_0$ most closely is chosen as the actual realization of F. Given that $F_0 \times F_0$ is identical to $F_0 \times F_{/plo/}$ in (33)c, this VI wins the competition. More generally, in the case of Vocabulary Insertion in FTNs the Subset Principle and the Revised Subset Principle yield the same output.

RTNs are a different story altogether, however. Recall that they are radically featureless. This means that in this case $F_0 = \varnothing$. The sets that are being compared by the Revised Subset Principle are listed in (35).

(34) $F_0 \times F_0 = \varnothing \times \varnothing = \varnothing$

(35)
a. $F_0 \times F_{/bik/} = \varnothing \times \varnothing = \varnothing$
b. $F_0 \times F_{/ta/} = \varnothing \times \{a\} = \varnothing$
c. $F_0 \times F_{/plo/} = \varnothing \times \{a, b\} = \varnothing$
d. $F_0 \times F_{/stu/} = \varnothing \times \{a, b, c\} = \varnothing$

Given that the Cartesian product of any set with the empty set yields the empty set, all sets in (34)/(35) are identical and more importantly, all sets in (34) are not only (trivially) subsets of the one in (35), they are also all the most closely matching subset. In other words, the Revised Subset Principle predicts that in the case of RTNs there is a universal tie between VIs, and all of them—LVIs and FVIs alike—are potential candidates for insertion, exactly as required.

Recall that DM assumes that in case of a tie convention may stipulate a winner. This is called extrinsic ordering (Halle & Marantz 1993). However, stipulating a winner is not a desirable solution in this case. To see this, consider a toy vocabulary in which LVIs are ranked by convention, as in (36).

(36) /smœrf/ ↔ ∅
/bik/ ↔ ∅
/ʃrødɪŋər/ ↔ ∅

According to this ranking Vocabulary Insertion will first consider *smurf*. Hypothetically, if this VI is not suitable to realize the TN, it will consider the following candidate in the ranking, viz. *bik*, and soforth untill it has found a possible candidate. However, *smurf* is a suitable candidate to realize a root. It is even an exact match; it is not marked for any features. Hence, it can realize the featureless root. As such, *smurf* will invariably win the competition. Vocabulary insertion thus will never consider any other VI to realize an RTN. Consequently, the VI *smurf* will realize all RTNs without exception. All sentences then sound like Smurf language, as in (37).

(37) Smurf's smurf smurfs the smurf.

We therefore suggest that when all VIs are equal winners, there is free choice.

Summing up, I have proposed a unified insertion mechanism for both LVIs and FVIs that is based on competition. In the case of FTNs this mechanism works exactly like the traditional Subset Principle, but for RTNs it leads to a universal tie, thus allowing all VIs—i.e. not only LVIs but also FVIs—to be inserted in that position and essentially creating free choice for featureless RTNs. Our Revised Subset Principle thus captures the intuition that the feature specification of a terminal node acts as a filter on the type of VI that can be inserted there.

2.4.4 Conclusion

In this section I have argued for a single Vocabulary Insertion mechanism based on competition that allows FVIs to be inserted in root positions, but not the other way around.[33] The next section addresses two potential threats for the account.

[33] There is one scenario in which an LVI could be inserted in a functional terminal node, and that is when the language does not contain any FVI that bears (a subset of) the features present on that terminal node. This might be a possible source for language change, in particular grammaticalization.

2.5 Potential threats for the analysis: arguments for early insertion

2.5.1 Introduction

As was pointed out in section 2.2.3 there is a close link between a structural definition of roots and the Late Insertion hypothesis. Given that the analysis of roots presented above has been a structural one *par excellence*—RTNs are the mechanical by-product of asymmetric Primary Merge—late insertion of VIs forms an integral part of the account. In this respect it is worth pointing out that recent late insertion-based analyses tend to allow for a limited type of early insertion, typically of an index. For example, if a particular root position will be realized (post-syntactically) by the LVI *cat*, an index corresponding to that particular VI, say √283, is merged in narrow syntax (thus creating an RTN). This index signals that this specific VI will be inserted in that position. Given that this line of reasoning is directly at odds with the approach developed in this chapter, we want to address the two main arguments in support of early index insertion. We do so in the next two sections (see also Siddiqi 2006 for discussion).

2.5.2 Harley (2009)

Standard DM makes a distinction between readjustment rules and suppletion. The former alter the phonological exponence of a single VI after Vocabulary Insertion. For example, the fact that the final rhyme of *destroy* is replaced by *-uct* in nominal contexts is due to a readjustment rule. Suppletion, on the other hand, is the result of two distinct VIs competing for insertion into the same syntactic terminal. Suppletive verb forms such as *go* and *went* are thus not assumed to be exponents of a single VI. The crucial criterion for distinguishing between readjustment rules and suppletion is phonological similarity: when two (morphosyntactically related) lexical items share a portion of their phonology, the relation between them is assumed to be not suppletive, but due to readjustment. Hence, the *think-thought* alternation is due to a readjustment rule (because the two forms share an onset), but that between *am* and *is* is

suppletive. Marantz (1997) further proposes that suppletion is an exclusive property of *functional* VIs. His reasoning goes as follows: given that suppletion involves competition between VIs and given that only the insertion of functional VIs is regulated by competition in standard DM (see above, section 2.4.2, for discussion), only functional VIs can be suppletive.

It is this last conclusion that Harley (2009b) provides counterevidence against. She presents data from Uto-Aztecan languages showing that lexical verbs can be suppletive depending on the number specification of their arguments. For example, the Hiaki verb meaning 'to wander' can surface either as *weama* or *rehte*. Given that these forms do not share any phonological characteristics, the reasoning developed above would classify them under suppletion, not readjustment. Crucially, however, the verbs undergoing this process are not functional. For example, Hiaki suppletive verbs can denote 'to fall in water', 'to stampede', 'to make a netbag', etc. These data thus falsify Marantz's (1997) claim that suppletion is restricted to the functional domain.

Harley's findings are problematic for the traditional DM approach to Vocabulary Insertion. Recall that Marantz linked suppletion to functional VIs precisely because the latter are inserted through competition. Root terminal nodes on the other hand receive their phonetic exponent through free choice between lexical VIs—possibly mediated through a [Root]-feature, see above. As such, there is no mechanism to allow two suppletive VIs to compete for insertion into a single RTN.

Harley proposes to solve this problem via a limited form of early insertion. More specifically, she assumes that an abstract index is merged in syntax in root positions, an index that singles out a particular VI but bears no phonological relation to it. The advantage of this approach is that one can now specify insertion contexts for the various phonological exponents of this index. For example, supposing the index for the Hiaki root 'to wander' would be 361, its VI would look as follows:

(38) √361 ↔ *weama* / [___ DP_{sg}]
↔ *rehte* elsewhere

The VI states that the root bearing the index 361 will be realized as *weama* in the context of a singular DP-argument, and as *rehte* in all other contexts. More generally, by adopting early insertion of indices, Harley succeeds in introducing a limited form of competition in the Vocabulary Insertion of RTNs. Given that suppletive contexts seem to require such competition, this is a welcome result.

Note, however, that Harley's analysis faces the same problem that other DM-accounts of Vocabulary Insertion do (see above, section 2.4.2), i.e. it draws too strong a dividing line between the lexical and the functional domain. In particular, while Vocabulary Insertion in the lexical realm is driven by indices, functional terminal nodes specify morphosyntactic features that the VIs inserted in them have to express. In order to make this more concrete, compare the lexical VI in (38) with the functional one of the demonstrative *those* in (39).

(39) /ðoz/ ↔ [+D, +def, +distal, +pl]

Vocabulary insertion into RTNs is thus completely separated from Vocabulary Insertion into FTNs: while the former is based on and driven by indices, the latter is regulated by morhosyntactic features. As we have shown in the beginning of this chapter, however, such a strict separation is empirically untenable, as functional VIs can be inserted productively into RTNs (see the data in (5)-(10) and surrounding discussion).

What we propose instead is to give up the distinction between readjustment and suppletion, and to allow non-phonologically related forms—such as the Hiaki verb forms *weama* and *rehte*—to be derived via readjustment. After all, if such rules are able to derive *thought* from *think* and *destruct* from *destroy*, why not *was* from *is* or *weama* from *rehte*? The assumption that the criterion distinguishing suppletion from readjustment is phonological resemblance is purely stipulative, and the only attempt we are aware of of attaching theoretical significance to the distinction—Marantz' claim that suppletion is the prerogative of the functional domain—has been clearly falsified by Harley (2009b). Under the assumption that the *weama-rehte* alternation is the result of readjustment, Vocabulary Insertion can proceed exactly as outlined in the preceding sections: Asymmetric Primary Merge yields an empty syntactic

terminal at the bottom of the syntactic representation, into which any VI can be inserted (see above, the Revised Subset Principle in section 2.4.3). When the VI meaning 'to wander' is selected, it surfaces as *rehte*, unless when selecting a singular DP. In the latter context it undergoes readjustment to *rehte* (just like *think* undergoes readjustment to *thought* in a past tense context).

Summing up, then, the Uto-Aztecan data discussed by Harley (2009b) might be problematic on traditional DM-assumptions about Vocabulary Insertion, but they do not threaten the current proposal, nor do they not necessitate early insertion of root indices.

2.5.3 Pfau (2009)

2.5.3.1 Introduction

Pfau (2009) argues for the early insertion of indices based on psycholinguistic research into speech errors. The kind of data he focuses on involve cases where a VI different from the intended one is used, as in (40) (Pfau 2009:87).

(40) In welcher Höhe, äh, Tiefe haben sie gegraben? [German]
in what height er depth have they digged
'In what height, er, depth, did they dig?"

In this example the speaker intended to talk about the depth (*Tiefe*) of the dig, but erroneously uses the VI *Höhe* 'height'. Pfau uses such data to establish the relative order of certain grammatical operations. Two of his findings are relevant in the context of this paper. The first one concerns his claim that conceptual information must be present prior to Vocabulary Insertion, the second one involves cases of gender agreement with the intended (rather than the actually inserted) VI. We discuss these two cases in turn in the next two subsections. Our line of argumentation will be the same in both. While we agree with Pfau's conclusion about the relative ordering of grammatical operations, we do not agree with his conclusion about absolute ordering. In particular, we see no compelling arguments in his data for endowing root positions with featural content in or prior to narrow syntax. As as a result, Pfau's findings will not prove to be problematic for our approach.

2.5.3.2 Meaning-based speech errors and conceptual information

Meaning-based speech errors involve cases whereby the wrongly inserted VI stands in a certain semantic relation—hyponymy, hyperonymy, antonymy, synonymy, etc.—to the intended VI. The error in (40) was a first illustration of this—height and depth being antonyms—another one can be found in (41) (Pfau 2009:87). Here, the intended noun is *Spitzer* 'pencil sharpener', which is a cohyponym[34] of the wrongly inserted *Radiergummi* 'eraser'.

(41) Hast du einen Radiergummi da?
have you an eraser there
'Do you have an eraser?'
Intended: einen Spitzer
a pencil.sharpener

Pfau adopts from Levelt et al. (1999) the idea that a specific module, i.e. the Conceptualizer,[35] activates lexical concepts according to a preverbal message intention. This module contains a network of concepts. Pfau concludes that in order to account for meaning-based speech errors such as those in (40) and (41), the Conceptualizer must precede Vocabulary Insertion. He therefore assumes that the index of a root is part of the Numeration and hence present throughout the syntactic derivation.

As was pointed out above, there is a relative and an absolute claim in Pfau's argumentation, and while we agree with the former, we do not see any compelling evidence for the latter. Meaning-based speech errors indeed show that conceptual information is activated before or during Vocabulary Insertion, or to put it in Pfau's terminology: the Conceptualizer must indeed precede—or coincide with—Vocabulary Insertion. From this, however, it does not follow that this conceptual information must also be present in narrow syntax. Pfau's data are perfectly compatible with a model of the grammar in which a conceptualization module is sandwiched in between syntax and Vocabulary Insertion, feeding the latter but independent from the former. Meaning-based

[34] Two words are cohyponyms if they have the same hyperonym.

[35] Pfau notes that the Conceptualizer may be identified as Encyclopedia in DM.

speech errors do not, then, provide a compelling argument for early index insertion and hence are not problematic from the perspective of this chapter.

2.5.3.3 Form-based speech errors and gender accomodation

Pfau observes that there is a difference in gender accommodation between meaning and form-based speech errors. In the former case it is the wrongly inserted noun that controls gender agreement, while in the case of form-based errors it is the intended (yet initially unpronounced) noun that determines gender agreement on the determiner. The pair in (42)-(43) illustrates this dichotomy.

(42) Du musst die Tür dann festhalten,
you must the$_{fem}$ door$_{fem}$ then hold
Quatsch, das Fenster
rubbish the$_{neut}$ window$_{neut}$
'You'll have to hold the window then.' (Pfau 2009:344)

(43) Das ist immer der gleiche Chaos, äh, Kasus
that is always the$_{masc}$ same chaos$_{neut}$ er case$_{masc}$
'That's always the same chaos, er, case.' (Pfau 2009:125)

In (42) the intended noun *Fenster* 'window' is replaced by the cohyponym *Tür* 'door' and the determiner introducing the wrongly inserted noun (*die*) agrees with it in gender. In (43) on the other hand the intended noun *Kasus* 'case' is replaced by *Chaos* 'chaos' on purely formal grounds—both nouns are bisyllabic and have /ka/ as their first syllable—and the determiner agrees with the intended rather than the inserted noun.

Pfau proposes to analyze these data as follows. Meaning-based speech errors result from the insertion of a wrong, but semantically related, index in syntax, while in form-based errors syntax contains the correct index, but Vocabulary Insertion makes a mistake in selecting a (formally related, but) wrong VI. In both cases gender agreement between the determiner and (the index of) the noun takes place in narrow syntax. In meaning-based speech errors this will result in gender agreement with (the index of) the wrongly

inserted noun, while form-based speech errors show agreement with (the index of) the intended noun.

Once again, there is a relative and an absolute side to Pfau's reasoning. On the one hand, he shows convincingly that while meaning-based speech errors have to precede (the mechanism regulating) gender agreement, form-based speech errors have to follow it. On the other hand, though, the conclusion that this ordering of operations implies that root indices have to be present in narrow syntax crucially depends on one's assumptions about where in the grammar (gender) agreement takes place. While for Pfau it is self-evident that such agreement takes place in narrow synax—in which case his absolute argument would indeed go through—we follow the line of thinking initiated by Bobaljik (2008), whereby agreement—or at the very least its precise morphological shape and value, see Van Koppen (2005)—is entirely a post-syntactic operation. This means that while the relative ordering of the two types of speech errors and (gender) agreement remains, its split-up into a pre- and a post-syntactic part is not warranted.

2.5.3.4 Conclusion

This subsection has discussed the data and conclusions from Pfau (2009) pertaining to Vocabulary Insertion and its purported arguments in favor of early index insertion. We have shown that while Pfau's claims about the relative ordering of grammatical operations are well-founded, there is no compelling reason to adopt their absolute counterparts.

2.5.4 Conclusion

This section has considered two potential threats for the account outlined in the first have of this paper. Both Harley (2009b) and Pfau (2009) have presented arguments in favor of a limited type of early insertion, whereby the Numeration contains indices of the roots that will be inserted post-syntactically. We have examined these arguments in detail and have concluded that the data reviewed by Harley (2009b) and Pfau (2009) are perfectly compatible with the theory outlined in the preceding sections, and hence, that they do not warrant any conclusions about early index insertion.

2.6 Conclusion

In this chapter we have compared a lexical and a structural definition of roots. We have argued for a structural definition as it is empirically more adequate. A structural characterization of the root goes hand in hand with late insertion and allows for a strict separation between TNs and VIs. It was further shown that the featureless root position can be derived from the operation merge. Finally, we have modified the insertion principle in order to allow for FVIs to be inserted in an RTN.

3. *Subcategories and semi-lexical VIs*

3.1 Introduction

This chapter is a collection of three related case studies. They illustrate how structure prevails over properties of VIs. More specifically, the first case study shows how functional structure determines subcategories in the nominal domain. I discuss how fine-grained distinctions in countability are derived featurally (see also Borer 2005a). These distinctions are thus not projected from the properties of LVIs (see for example Doetjes 1997 and Cheng, Doetjes & Sybesma 2008 for such a proposal).

The second case study and the third one focus on so-called semi-lexical items (see for example Emonds 1985,[36] Van Riemsdijk 1998 and Corver & Van Riemsdijk 2001). More specifically, I will discuss the Dutch VI *stuk* 'piece', which can realize either an RTN or an FTN in the nominal domain, and the VI *heel* 'whole', which can function as a root and as a quantifier. These studies show that the denotation of a VI is determined by the terminal node it realizes. In other words, they illustrate that syntax determines the interpretation assigned to a VI.

This chapter is structured as follows. In section 3.2 I present two nominal subcategories, viz. the kind and unit reading. I show that the distinction between these readings is the result of the absence or presence of a particular functional projection, viz. the Size°-head.

Subsequently, I present two Dutch semi-lexical VIs, viz. *stuk* 'piece' and *heel* 'whole'. In section 3.3 I argue that *stuk* 'piece' realizes the Size°-head when this

[36] Emonds (1985) calls semi-lexical items grammatical nouns/verbs/…

head bears an ellipsis feature. This section illustrates and technically implements how semi-lexical items can be inserted both in an FTN and in an RTN in the present model. Finally, section 3.4 discusses the semi-lexical item *heel*. It is a universal quantifier which merges in the specifier of the Size°-head. This section highlights the different semantics of FTNs and RTNs. The final section sums up and concludes.

3.2 Kind and unit readings[37]

3.2.1 Introduction

In this section I illustrate how functional structure defines nominal subcategories. More specifically, I show how various nominal subcategories are the result not of inherent featural properties of LVIs, but of syntactic features and their corresponding functional projections in the structure. I propose a functional projection SizeP that results in a distinction between two types of count readings. I propose to call the first type the kind reading (see (1)) and the second one the unit reading (see (2)).[38]

(1) I studied two chocolates: a low fat variety and a normal one.
(2) Grandma gave me two chocolates: one for me and one for my sister.

When the NP *two chocolates* is interpreted in a kind reading, it can be paraphrased as 'two kinds of chocolate'. I therefore refer to it as the kind reading.[39] The NP

[37] Parts of this section also appear in De Belder (2011).
[38] In (1) and (2) I use two different contexts to make the two readings more salient. The different contexts are not required, however, to trigger the two readings. The NP *two chocolates* is ambiguous in and of itself. Hence, the following example is ambiguous as it is pragmatically compatible with both readings: *The laboratory worker gave me two chocolates.* Under the kind reading, the laboratory worker gave me two varieties, under the unit reading she gave me two pieces of chocolate.
[39] Despite the fact that they bear the same name, the kind reading that I shall be discussing must not be confused with Carlson's kind reading (Carlson 1977). Carlson's kinds are bare NPs which semantically behave like constants, i.e. as the proper name of an entire kind. They do not allow for quantifiers as they are not variables. They can be used both generically (e.g. *Dogs are loyal.*) and existentially (e.g. *There are dogs lying in the garden.*). The kind reading under discussion here is a

two chocolates in the second example can be paraphrased as 'two pieces of / two portions of chocolates' and is here referred to as the unit reading.

This section shows that the distinction between the unit and the kind reading is not only semantic, but also syntactic. I will show that in both cases the same VI realizes the RTN. In other words, the readings do not stem from a property of the LVI that realizes the root. Alternatively I propose that the different readings are derived from the interplay between two features, viz. [Num] and [Size]. It will become clear that the diminutive realizes the [Size] feature in Dutch.

This section is organized as follows. In section 3.2.2 I first present some background information on the mass-count distinction. I then introduce the two different count readings. It will become clear that previous analyses do not suffice to account for these data. I therefore propose an alternative analysis in section 3.2.3. The two count readings result from different structures. Countability stems from two syntactic features. The first one is the feature [Num]. It is realized as number marking and derives count readings. The second one is [Size], which assigns the unit interpretation to the noun. Section 3.2.4 comments on how Vocabulary Insertion proceeds for these readings. Section 3.2.5 comments on the role of conceptual information in language. Section 3.2.6 sums up and concludes.

3.2.2 Two count readings: kinds and units

3.2.2.1 Introduction

In this section I present an analysis of the mass-count distinction. It will serve as a preliminary for the analysis of kind and unit readings. I then briefly discuss some relevant properties of kind and unit readings. Finally, I point out that the fine-grained distinction between kind and unit readings cannot be captured by means of previous proposals.

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distinction in the nominal countability domain. They can occur as variables (e.g. *this chocolate, the two chocolates, all chocolates*, …). Note that both unit and kind readings can occur as Carlsonian kinds when used as a bare NP. *Chocolates can be melted* is ambiguous between a kind and unit reading in terms of this chapter, whereas it unambiguously represents a Carlsonian kind.

3.2.2.2 The mass-count distinction

Before discussing the distinction between the two count readings, viz. kind and unit readings, I would like to present an account of the broader distinction between mass and count readings in this section. It will be used as a starting point for the analysis of kinds and units.

Mass readings have the following properties which set them apart from count readings. Firstly, they are always singular from a syntactic point of view. This is shown by the fact that they trigger singular agreement when in subject position. Example (3) shows that mass NPs trigger singular agreement on both the adjective[40] and the verb.

(3) Helder-∅ water **is** goed.
Clear-**SG**.NEUTER water is good
'Clear water is good.'

While being singular, mass NPs can be combined with the fuzzy quantifier[41] *veel* 'much' and the universal quantifier *alle* 'all'. This is a defining property of mass readings (Allan 1980). This is illustrated in (4) and (5). Note that the NPs *veel water* 'much water' and *alle water* 'all water' trigger singular agreement on the verb.

(4) Veel water is niet schoon.
much water is not clean
'Much water is not clean.'

(5) Niet alle water **is** schoon.
not all water is clean
'Not all water is clean'

[40] The noun *water* 'water' is neuter, hence the adjective gets neuter agreement. Neuter, singular adjectival agreement is marked by a null morpheme in Dutch. If the noun were to trigger plural adjectival agreement, the result would be a schwa. See Schoorlemmer (2009) for recent discussion.

[41] A fuzzy quantifier refers to a non-specific quantity. Examples are *many* and *several*.

Thirdly, while being singular they observe cumulativity and divisivity (Quine 1960, Krifka 1989). Cumulativity is defined in (6) and divisivity in (7) (the definitions are taken from Borer 2005a:127).

(6) P is cumulative iff $\forall x,y\ P(x) \wedge P(y) \rightarrow P(x \cup y)$

(7) P is divisive iff $\forall x\ P(x) \rightarrow \exists y\ (P(y) \wedge y < x) \wedge \forall x,y\ P(x) \wedge P(y) \wedge y < x \rightarrow P(x-y)$

Cumulativity entails that if the same predicate holds for two entities, the predicate will still hold for their combination. Divisivity states that there is always a proper subset with the same properties. The examples below show that both properties hold for mass readings.

(8) Veel water en veel water is veel water.
much water and much water is much water
'Much water and much water is much water.'

(9) Een deel van veel water is water.
a part of veel water is water
'A part of much water is water.'

In sum, mass NPs are defined by their ability to combine with fuzzy quantifiers and the universal quantifier *all* while triggering singular agreement. They further observe cumulativity and divisivity.

Count readings can be distinguished from mass readings by means of the following property: they combine with an indefinite article when singular, as in (10), or with precise cardinals when plural, as in (11).

(10) een water
a water
'a water'

(11) drie waters
three waters
'three waters'

In what follows I will present an account on the mass-count distinction. It is based on Borer (2005a).

Recall that Borer (2005a) proposes that roots are not marked for a syntactic (sub)category (see chapter 1 section 1.3.3). As a result, the mass-count distinction cannot stem from roots either, but has to be syntactically derived. The hypothesis that roots are not lexically marked as mass or count receives support from the fact that roots that are traditionally categorized as count nouns can straightforwardly receive a mass reading (see Pelletier 1979 on the universal grinder).

(12) Grandma has three dogs. [count]
(13) There is dog in the soup. [mass]

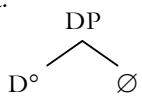
The VI *dog* is prototypically seen as a count noun, as (12) illustrates. Still, it can get a mass reading as in (13). Conversely, roots that are traditionally categorized as mass nouns can receive count readings without problem (see Bunt 1985 on the universal sorter).

(14) We produce a lot of linen. [mass]
(15) This is a good linen. [count]

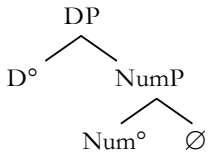
The VI *linen* is traditionally seen as a bona fide mass noun (cf. (14)). Nevertheless, it can be used without any problem in a count reading as in (15). The fact that roots can systematically receive both mass and count readings is unexpected if the LVI were present at syntax and if it were marked as mass or count. Borer therefore proposes that roots are lexically unmarked. Subcategories, such as mass and count nouns, are the product of functional structure, not of properties of roots. This point will be further elaborated in this section.

Borer further proposes that the mass reading is the default reading. It results from the absence of functional markings. The count reading on the other hand, is derived by adding specific syntactic features. Specifically, Borer (2005a) observes that number marking acts as a classifier projection. It thus derives count readings. I adopt this insight and I will say that count readings are derived by merging the syntactic head Num° (from Number) with the root. In sum, the difference between mass and count readings is represented structurally. A designated head, viz. the Num° head derives the count reading. In its absence the default interpretation is a mass reading. This is illustrated in (16)a and (16)b. Example (16)a shows the structure for a mass reading. Example (16)b illustrates a count NP.[42]

(16) a.



b.



I assume that the [Num]-feature on the Num°-head can have two values, viz. singular (sg) and plural (pl).[43] Singularity is realized by means of a zero affix, as in (17)a, or as plural marking in plural count readings, as in (17)b. The absence of Num° yields the default mass reading, see (17)c.

(17) a. There is a chicken-∅ in the garden. [count]
b. There are chickens in the garden. [count]
c. There is chicken on my plate. [mass]

[42] In this thesis I adopt Chomsky's (1995) Bare Phrase Structure. For ease of exposition I represent minimal projections as X°, intermediate ones as X' and maximal ones as XP. The symbol ∅ refers to the RTN (see chapter 2). Strictly speaking, features merge as sets (see chapter 2), hence the representation of minimal projections I use is a shorthand for {X}.

[43] In this respect the proposal strongly deviates from the one in Borer (2005a). Borer proposes that singulars are built on top of a dividing head, which corresponds more or less to the Num°-head syntactically. Semantically, however, there are some crucial differences between the Num°-head and the Div°-head, see Borer (2005a:123-132 for discussion).

This view will be adopted throughout the chapter.

To summarize, the mass-count distinction is a syntactic distinction. I adopt Borer's (2005a) view that the mass reading is the default one. The count reading is syntactically derived by merging a Num°-head.

3.2.2.3 The kind and unit reading

In this section I discuss the unit and kind reading briefly. I restrict myself to those details which are needed for the rest of the discussion.[44]

The two readings can be teased apart by means of two tests. First, kinds do not allow for modification by adjectives such as *whole* and *complete*, whereas units do.[45] This is shown in (18) and (19).

(18) *I studied two complete chocolates: a low fat variety and a normal one.

(19) Most of the chocolates in the box were broken, but grandma gave me two complete chocolates, one for me and one for my sister.[46]

The notion of completeness is uninterpretable for the kind reading in (18) whereas it licitly combines with the unit reading in (19).

Note that the kind and unit reading are both count readings. This is indicated by the licitness of the cardinal *two* in (18) and (19).

The second test relies on the fact that kinds can be in multiple places at the same time, whereas units cannot (Zemach 1970). The following pair of examples illustrates the difference: (20) contains a kind reading, (20) a unit reading.

(20) Right now, we store this chocolate, the low fat variety, both in laboratory A and laboratory B.

(21) * Right now, I keep the chocolate grandma gave me both in the kitchen and in my study.

[44] For a detailed semantic analysis see section 3.4.

[45] See section 3.4 for a detailed discussion on the interaction between *whole* and units.

[46] Imagine the chocolates are, for example, fragile easter eggs which break easily.

Note that kinds share both these properties with mass reading.

(22) * I ate much complete chocolate.

(23) Right now, we store much chocolate both in laboraty A and laboratory B.

Example (22) shows that mass readings do not allow for modification by *complete* either, while (23) shows that mass readings can occupy multiple spaces simultaneously.

The following semantic distinction underlies both tests. Kinds are continuous, i.e. unbounded, in space, whereas units are bounded in space (Zemach 1970). As such, one can determine the position of a unit and its degree of completeness. Kinds, on the other hand, are not bounded in space. When they are counted, the atoms are not units but types. Kinds share this property of not being bounded in space with mass readings, as is illustrated by example (23) above. In short, the core difference lies in the fact that units are bounded in space, whereas kinds are not. Kinds share this property with mass readings.

The addition of an indefinite article or plural marking to an NP results in count readings that are ambiguous between kind and unit readings. This is illustrated in (24)-(26). Example (24) shows a mass reading, (25) has an indefinite article and (26) has plural marking. (25) and (26) are ambiguous between kind and unit readings.

(24) I tasted chocolate.

(25) I tasted a chocolate.
kind: 'I tasted a certain kind of chocolate.'
unit: 'I tasted a piece of chocolate.

(26) I tasted the chocolates.
kind: 'I tasted the different kinds of chocolate.'
unit: 'I tasted the pieces of chocolate.

Interestingly, Dutch data show a different pattern. First note, however, that Dutch VIs which are traditionally seen as count nouns behave on a par with the English data above. The addition of an indefinite article or plural marking yields count readings which are ambiguous between kind and unit readings. This is illustrated in (27)-(28). Example (27) shows the indefinite article, (28) shows plural marking.

(27) een fiets
a bicycle
kind: 'a kind of bicycle (e.g. a mountainbike)'
unit: 'a bicycle (i.e. one object)'

(28) twee fietsen
two bicycles
kind: 'two kinds of bicycles (e.g. a mountainbike and a city bike)'
unit: 'two bicycles (i.e. two objects)'

However, if one adds an indefinite article or plural marking to Dutch VIs which are traditionally analyzed as mass nouns, the same ambiguity does not arise; the NP can only get the kind reading. This is shown in the following examples. Example (29) is a mass reading, (30) has an indefinite article and (31) contains plural marking. Both (30) and (31) only get a kind reading.

(29) Ik proefde chocolade.
I tasted chocolate
'I tasted chocolate.'

(30) Ik proefde een chocolade.
I tasted a chocolate
'I tasted a certain kind of chocolate.'
* 'I tasted a piece of chocolate.'

(31) Ik proefde chocolade-s.
I tasted chocolate-PL
'I tasted different kinds of chocolate.'
* 'I tasted pieces of chocolate.'

In order to derive a unit reading for these VIs in Dutch, one needs to add a diminutive affix in addition to the indefinite article or plural marking. The default interpretation will be something like 'a piece of a few square or cubic centimeters consisting of the stuff referred to by the LVI.' This is illustrated in (32) and (33) (cf. Wiltschko 2006).

(32) Ik proefde een chocola-tje.
I tasted a chocolate-DIM
* 'I tasted a certain kind of chocolate.'
'I tasted a piece of chocolate.'

(33) Ik proefde chocola-tje-s.
I tasted chocolate-DIM-PL
* 'I tasted different kinds of chocolate.'
'I tasted pieces of chocolate.'

Examples (32)-(33) show that the semantic distinction between kind and unit readings correlates with a morphological distinction in Dutch for VIs traditionally classified as mass nouns.[47] The absence of the diminutive affix gives rise to kind readings for these VIs, its presence makes the unit reading the most salient one. This morphological distinction indicates that the kind-unit

[47] Note that the diminutive does not contribute an affective meaning to examples such as (32). In affective readings, the diminutive is licit in many more contexts, as pointed out to me by Jenny Doetjes. For example in exclamatives (but also in other contexts), even kind readings allow for a diminutive, e.g. *Wat een lekker wijntje!* Lit. 'what a tasty wine-DIM' 'Such a great wine!' I have proposed elsewhere that this affective diminutive syntactically occupies a different head than the unit-denoting diminutive (see De Belder 2009 on the distinction between affective projections and unit deriving projections in Dutch and Italian, see further Steriopolo 2008 on the syntactic and morphological distinctions between diminutives expressing size and those expressing affect in Russian and Cinque 2007 on a different projection for size and endearment.)

opposition is a syntactic distinction. This means that syntax not only derives the mass-count distinction as Borer (2005a) suggests, but also the kind-unit distinction within the count readings. Note that a Num°-head does not suffice to account for the semantic distinction between kinds and units in these Dutch data. The Num° head derives count readings, but does not indicate any further distinctions. Moreover, the structure in (16)b does not provide a head that can host the diminutive affix. In the next section I will therefore propose a more extended structure to capture the fine-grained distinction between the kind and unit readings.

Recall that unit readings with LVIs which are traditionally seen as mass nouns invariably show a diminutive affix, whereas the ones which are called count nouns do not (see section 3.2.2.3). I postpone the account for this observation until section 3.2.5. In that section I reconcile the morphologically different behavior between these two types of LVIs with the view that they are featureless.

3.2.2.4 Conclusion

In this section I adopted Borer's (2005a) view that LVIs are lexically unmarked and that subcategories, such as mass and count nouns, are the product of functional structure. More specifically, number marking is the syntactic means to distinguish between mass and count readings. The mass reading is the default reading, the addition of number marking derives a count reading. I have then presented a more fine-grained distinction within count readings. I have set kind readings apart from unit readings. In the following sections I will propose a more elaborate syntactic structure in order to capture this distinction.

3.2.3 The syntax of mass, kind and unit readings

3.2.3.1 Introduction

In this section I show that the three-way split between the mass reading, the count kind reading and the count unit reading follows straightforwardly from the interaction between two features, viz. [Num] and [Size]. I further propose that the diminutive affix is an overt realization of [Size].

3.2.3.2 The proposal

Recall that kind and unit readings are mainly distinguished by the fact that units are bounded in space, whereas kinds are not (see section 3.2.2.3). Moreover, in Dutch the diminutive affix distinguishes morphologically between these two readings (cf. section 3.2.2.3). I therefore propose that this suffix realizes a feature that contributes the property of being bounded in space to the structure of the NP. I call this feature [Size]. I propose that the diminutive affix, which expresses smallness, can be used to express units. Jackendoff and Landau (1992) show that there is a necessary link between being bounded in space and having a certain shape[48] and size. If an item is bounded in space its surface necessarily has linear boundaries which are called edges. These edges serve to define the shape and size of the object. As such, there is conceptually a necessary connection between being a unit and having a certain shape and size (see also Zemach 1970 on entities).

In this section I propose that kind and unit readings are syntactically distinguished by the absence or presence of the [Size]-feature. I assume that the [Num]-feature serves to divide stuff into countable items (see Borer 2005a). It is realized by means of number marking on the noun. The interaction between the two features [Num] and [Size] yields the following hypothetical possibilities: (i) both features are absent, (ii) only [Num] is present, (iii) both [Num] and [Size] are present and (iv) only [Size] is present. I will show that (i) the absence of both features yields the default mass reading, (ii) that the presence of [Num] in the absence of [Size] results in count kind readings, (iii) that the presence of both features generates count unit readings and (iv) that the presence of [Size] in the absence of [Num] is illicit. This is schematized below.

[48] Shape does not seem to be relevant to Dutch nominal inflection. However, cross-linguistically shape classifiers have been attested (see Grinevald 2000 and Svenonius 2008 for discussion).

(34)

	+Num	-Num
+Size	unit	*
-Size	kind	mass

As mentioned above, the different readings (mass, kind, unit) are the result of different syntactic structures, not of different (types of) VIs. In other words, all VIs can in principle be inserted in all syntactic structures.

I use the possible presence of overt number marking and the diminutive affix as a diagnostic of the presence of the Num° head and the Size° head respectively. I adopt Borer's proposal that the indefinite article and plural marking indicate the presence of [Num]. I further assume that the diminutive affix is an overt realization of [Size].

3.2.3.3 Both features are absent: mass readings

Mass readings as in (35) do not allow for plural marking. This is shown in (36). They do not allow for diminutive affixes either, as can be seen in (37). Note that in (35) the fuzzy quantifier *veel* indicates that the singular NPs are mass NPs (see section 3.2.2.2). The licitness of the cardinal *drie* 'three' in (36) shows that the examples are count readings (see section 3.2.2.2).

(35) a. Ons bedrijf produceert veel **vilt**.
our company produces much felt
'Our company produces a lot of felt.'

b. Er zit veel **appel** in het dessert.
there sits much apple in the dessert
'There is a lot of apple in the dessert.'

c. Er zit veel **hond** in de soep.
there sits much dog in the soup
'There is a lot of dog in the soup.'

(36) a. # Ons bedrijf produceert drie **vilt-en**.
our company produces three felt-PL
(disallowed under a mass reading)

b. # Er zitten drie **appel-en** in het dessert.
there sit three apple-PL in the dessert
(disallowed under a mass reading)

c. # Er zitten drie **hond-en** in de soep.
there sit three dog-PL in the soup
(disallowed under a mass reading)

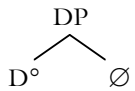
(37) a. * Ons bedrijf produceert veel **vilt-je**.[49]
our company produces much felt-DIM

b. * Er zit veel **appel-tje** in het dessert.
there sit much apple-DIM in the dessert

c. * Er zit veel **hond-je** in de soep.
there sit much dog-DIM in the soup

Based on the absence of number marking and the diminutive affix I conclude that the features that are expressed by these inflectional suffixes are absent from the syntactic structure. Mass readings thus have a structure that lacks both Num° and Size°. This is represented in (38).

(38)



[49] The examples in (37) are acceptable in motherese.

The determiner in (38) defines the RTN as a noun. The absence of functional projections in the nominal domain for countability furthermore defines the RTN as a mass noun.[50]

To conclude, the VIs *vilt* 'felt', *appel* 'apple' and *hond* 'dog' can all realize the RTN. The mass reading results from the absence of Num and Size heads; it is the default reading (Borer 2005a). It is thus the product of the absence of specific functional projections, not of lexical properties of the VI realizing the root position.

3.2.3.4 Only [Num] is present: kind readings

Kind readings as in (39) allow for plural marking, as illustrated in (40). Diminutive affixes, on the other hand, are excluded, as (41)[51] shows.

(39) a. Ons bedrijf produceert **een vilt**.
our company produces a felt
'Our company produces a kind of felt'

b. Ik bestudeer **een appel**.
I study an apple
'I study a kind of apple.'

[50] I presume a determiner layer for all mass NPs in an argument position. For definite mass NPs with an overt definite determiner it is clear that they have a D° head. For indefinite mass NPs I assume that an indefinite determiner introduces a variable in the D° head. This variable can be bound by existential closure or by an overt adverb (Heim 1982).

[51] Lexicalized diminutives, such as the English noun *napkin*, can get mass and kind readings, although they are technically diminutives. De Belder et al. (2009) point out that diminutives come in two kinds: there is a derivational diminutive alongside the inflectional one. The derivational diminutive is inserted in the domain of derivational word formation, the inflectional one is part of the nominal functional structure. This section only discusses inflectional diminutives; they interact with the Num°-head, which results in the various countability readings. As a consequence, they cannot get mass and kind readings. Derivational diminutives, on the other hand, are inserted too low in the structure to interact with nominal functional structure (see chapter 5 for an analysis of derivational word formation). De Belder et al. (2009) argue that all English diminutives are derivational diminutives. Hence, they are predicted to be compatible with mass and kind readings.

c. Ik bestudeer **een** **hond**.
I study a dog
'I study a kind of dog.'

(40) a. Ons bedrijf produceert **vilt-en**.
our company produces felt-PL
'Our company produces kinds of felt'

b. De Granny Smith en de Jonagold zijn **appel-en**
the Granny Smith and the Jonagold are apple-PL
die geschikt zijn voor appeltaart.
that suitable are for apple.pie
'The Granny Smtih and the Jonagold are kinds of apples that can be used in apple pie.'

c. De poedel en de jack russell zijn hond-en
the poodle and the Jack Russell are dog-PL
die ook geschikt zijn voor de jacht.
that also suitable are for the hunting
'The poodle and the Jack Russell are kinds of dogs that are also suitable for hunting.'

(41) a. * Ons bedrijf produceert een **vilt-je**.
our company produces a felt-DIM
(disallowed under a kind reading)[52]

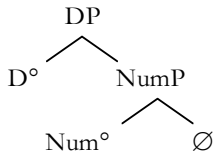
b. * De Granny Smith is **een** **appel-tje**
the Granny Smith is an apple-DIM
dat geschikt is voor appeltaart.
that suitable is for apple.pie

[52] But see footnote 46 on affective readings.

c. * De poedel is **een** **hond-je**.
the poodle is a dog-DIM
dat ook geschikt is voor de jacht.
that also suitable is for the hunting

Based on these facts I conclude that kind readings are syntactically derived by merging Num° but not Size° with an RTN, as depictd in (34) .

(42)



Note again that the kind reading is available for all three LVIs under discussion, viz. *vilt* 'felt', *appel* 'apple' and *hond* 'dog'. Restrictions with regard to kind readings are imposed by functional structure, not by specific VIs.

Note that I do not propose that the [Num] feature is a kind feature. It is a feature which yields countable items. Kind readings are thus count readings which lack the property of having size. In other words, kind readings are count readings which are not bounded in space.

3.2.3.5 Both features are present: unit readings

Unit readings allow for both plural marking and diminutive affixes. Example (37) illustrates this.

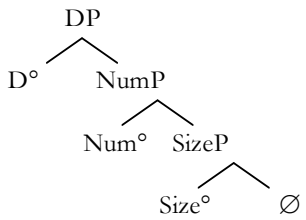
(43) a. Er kleven **vilt-je-s** onder de stoelpoten.
there stick felt-DIM-PL under the chairlegs
'There are pieces of felt under the chairlegs.'

b. Ik snijd de **appel-tje-s**.
I cut the apple-DIM-PL
'I am cutting the small apples.'

c. Ik aai de **hond-je-s**.
I pet the dog-DIM-PL
'I am petting the little dogs.

The co-occurrence of these affixes leads to the conclusion that unit readings are derived from a structure that has both Num° and Size°, as in (38).

(44)



Two comments are in order. Note first that I assume that Num° merges on top of Size° and not the other way around. Although conceptually the reverse order might seem attractive, number marking is found outside of diminutive affixes cross-linguistically (Perlmutter 1988).[53] As such, the order in (44) is supported empirically (see Baker 1985 and Belletti 1990) for support of this line of reasoning).

Secondly, note that this subcategory is again equally available for the LVIs *vilt* 'felt', *appel* 'apple' and *hond* dog', suggesting once again that restrictions with regard to kind and unit readings are imposed by functional structure, not by specific properties of LVIs.

3.2.3.6 Only [Size] is present

Items that are assigned a size are, as a matter of conceptual necessity, individual items. Hence, if something acquires the [Size]-feature, it automatically becomes countable. In other words, the presence of [Size] implies the presence of

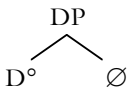
[53] Rare counterexamples have been ascribed to stem allomorphy. In other words, when an alleged plural affix occurs inside of a diminutive affix it has been analyzed as an instance of stem allomorphy and not as a true plural affix (see Perlmutter 1988 and De Belder 2010, see Bobaljik 2003 for an alternative view).

[Num]. From this follows the correct prediction that every Dutch diminutive is also pluralizable (see Haeseryn et al. 1997:172).

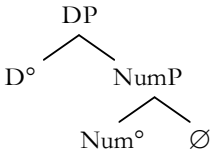
3.2.3.7 Conclusion

In this section I have shown that different nominal subcategories (such as mass, kind and unit) are the result of different structural representations, not of inherent properties of LVIs. More specifically, functional projections distinguish mass readings, count kind readings and count unit readings. To be concrete, I have proposed the structure in (45) for mass readings, the one in (46) for count kind readings and the one in (47) for count unit readings.[54]

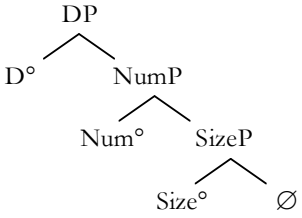
(45)



(46)



(47)



[54] I have assumed a D° layer introducing a variable for indefinite mass NPs in argument position (see footnote 49). In the same vein, I presume a D° head for all indefinite plurals -regardless whether they are kinds or units- introducing a variable.

I have further postulated that the possibility of having a Size° head in the absence of a Num° head is excluded on conceptual grounds.

3.2.4 Vocabulary Insertion

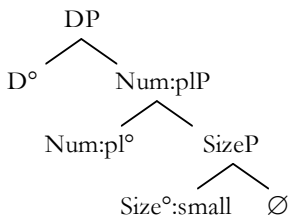
In the previous section I have argued that functional projections determine nominal subcategories. In other words, NPs belonging to a specific subcategory have the same syntactic structure. For example, all unit readings have both a Size and a Num projection, regardless of which VIs realize these heads. The unit reading in (48) thus has the same syntactic structure as the one in (49), although the former contains overt number marking and an overt size marker, while the latter contains no such VIs.

(48) Ik heb de hond-je-s geaaid.
I have the dog-DIM-PL petted
'I have petted the little dogs.'

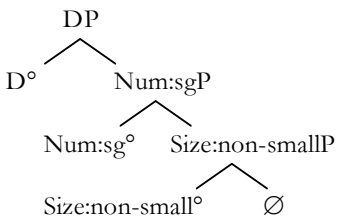
(49) Ik heb de hond geaaid.
I have the dog petted
'I have petted the dog.'

To be concrete, the object NP in both sentences is a realization of a structure which contains a Num°-head and a Size°-head. However, the feature values for these two heads differ. (50)a represents the syntactic structure of (48), (50)b shows the structure of (49).

(50) a.



b.

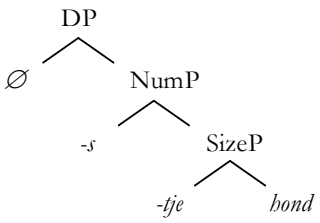


The data in (48) and (49) show that plural marking is realized overtly by means of the affixes *-s* and *-en*, whereas singular marking is null. Similarly, small size is realized overtly by means of a diminutive affix, whereas non-small size is not marked by an overt affix. I therefore assume the following VIs for Dutch:

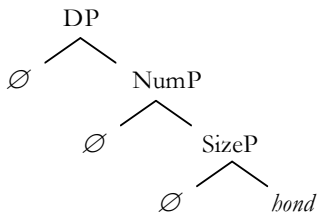
(51) /-s/ ↔ [Num:pl]
/-ən/ ↔ [Num:pl]
∅ ↔ [Num:sg]
/-tjə/ ↔ [Size:small]
∅ ↔ [Size:non-small]

Given the VIs in (51), the syntactic structures in (50) look like (52) after Vocabulary Insertion.[55]

(52) a.



b.



In sum, all instances of one subcategory have the same syntactic structure. Variation in their surface form is due to the insertion of different VIs, which may be null.

3.2.5 Conceptual boundedness

In section 3.2.2.2 I presented Borer's (2005a) view that roots are not marked as count or mass and that countability is a by-product of syntactic structure. I have adopted this approach and I have argued that the kind-unit distinction is also syntactic. As a result, all LVIs can be used in all readings. That being said,

[55] For the distribution of the plural affixes, see chapter 2 section 2.4.3 on the distribution of VIs which end in a tie.

there seems to be an intuition that the example in (53) is more marked than the one in (54).

(53) There is dog all over the wall. [mass]
(54) There is blood all over the wall. [mass]

The question that arises is where this difference comes from if it is not a syntactic feature which distinguishes *dog* from *blood*. This section addresses precisely this issue. I discuss what differentiates the concepts *dog* and *blood*.

LVIs that refer to things[56] and animate beings most typically realize the RTN of unit readings. In the same vein, the unit reading is more salient than the kind reading for things and animate beings, as is illustrated by the contrast in (55); the unit reading in (55)a is more salient than the kind reading in (55)b.

(55) three dogs
a. Fido, Laika and Lassie [unit]
b. the Jack Russell, the Labrador retriever and the poodle [kind]

The link between unit readings on the one hand and LVIs that refer to animate beings and things on the other stems from the fact that we have strong extra-linguistic knowledge about what constitutes a unit for these concepts. In other words, we know what individual cats, laptops, trains and trees look like. We straightforwardly identify two cats standing next to each other as two individual cats and not as one big heap of 'catstuff'. We know where one individual cat stops and where the other one begins. Put differently, these concepts have a high degree of conceptual boundedness. Our cognition contains information about what constitutes the conventional or natural unit for that given concept. At the same time, however, it fails to provide such information for other concepts. There is no convention on what constitutes one instance of silver or blood, for example. These concepts thus have a low degree of conceptual boundedness.

[56] See Zemach (1970) for a precise description of the concept 'thing'.

The competence to recognize a unit is real, but extra-linguistic. Hence, it is external to the computational system for natural language. Support for this position comes from the fact that this competence is not exclusively human. Research in comparative psychology has shown that elephants, rhesus monkeys, pigeons, lions, dolphins, parrots, rats and many more animals can count items (Irie-Sugimoto 2009; Brannon and Terrace 2000; Hirai and Jitsumori 2009 and Pepperberg 2006). Parrots, pigeons and chimpansees even perform simple summation tasks succesfully (Olthof and Roberts 2000; Pepperberg 2006 and references therein). This implies that some species of animals understand the more basic notion of what counts as one single instantiation of an object, i.e. what constitutes a unit. This shows that the notion of a unit is also understood by animals and as such cannot be purely linguistic. Instead, it has to be part of our broader cognition.

Having established that the notion of a unit resides in our broader cognitive capacities, the assumption that LVIs are marked with a syntactic feature that indicates whether they most commonly refer to units is superfluous, and therefore undesirable. The view that we have conceptual knowledge about this issue suffices. In fact, it even fares better than the view that the mass-count distinction is due to syntactic markings on the LVI. More specifically, conceptuable knowledge is more flexible than syntactic features.

Under traditional assumptions mass nouns can be distinguished from count nouns by means of the feature [+/- count]. This view has the disadvantage of being all or nothing; a noun is either mass or count. A binary distinction does not allow for intermediate positions. The idea that knowledge about boundedness is conceptual meshes well with the fact that it is ordered on a scale (Rothstein 2008 on a mass-count scale). At the upper end of this scale are animate beings and inedible things. For these concepts we have clear intuitions about what constitutes one singular instance. It is marked not to refer to a unit when talking about animate beings. This accounts for the marked nature of the mass reading in example (53). Conversely, we lack this knowledge for most materials. They have a very low degree of conceptual boundedness. As such, they can be found at the lower end of the scale. Food and animals we consume

are often in the middle; *cake* and *chicken* are as common in mass readings as in count ones.

Because conceptual knowledge can be overridden, items with a high degree of conceptual boundedness can occur in kind and mass readings. Note that the reverse does not necessarily hold. In order for a concept with a low degree of conceptual boundedness to occur as a unit, we need to have extra-linguistic knowledge about what constitutes such a unit. It is not immediately obvious that such knowledge can be provided in every case. Whereas conceptual knowledge about natural or conventional units can be straightforwardly overridden, it is less clear if such knowledge can be newly created. For example, in order to talk about a unit of silver, we need to know what a natural or conventional unit of silver is. However, if neither nature nor convention provides this knowledge, the interpretation of the noun *silver* used in a count unit context is unclear. More generally, we do not expect to find concepts with a low degree of conceptual boundedness in unit readings, unless the interpretive problem is in some way addressed or circumvented.

I propose that the feature [Size:small] can assign a default unit interpretation to concepts with a low degree of conceptual boundedness. The default interpretation for this feature realized by means of the diminutive is 'a unit of some square or cubic centimeters consisting of the stuff the VI refers to'. As such, the indication of smallness assigns a unit interpretation to concepts with a low degree of conceptual boundedness. As a consequence, (56) and (57) are interpretable, although world knowledge does not provide information about a standard unit for these examples.

(56) een hout-je
a wood-DIM
'a small piece of wood'

(57) een plastiek-je
a plastic-DIM
'a small piece of plastic'

It now follows that concepts with a high degree of conceptual boundedness may occur more easily with the feature [Size:non-small] realized by means of the zero affix than concepts with a low degree of conceptual boundedness. The former concepts do not rely on a precise specification of Size; world knowledge suffices for an indication of what counts as a unit.

Note that the availability of knowledge about what constitutes a unit may vary. Recall that the encyclopedic notion of a unit depends on knowledge provided by nature or convention. We expect that the conception of units is more or less universal; it is unlikely that in some languages two cats are considered as one unit. There is some variation, though. In Hungarian, for example, one pair of eyes is considered as one unit, whereas one eye is only half a unit: *fél szem* 'an eye' (Literally: half eye). Similarly, in Dutch the word *tweeling* 'twins' when used as a singular refers to two persons, whereas the English word *twin* refers to one sibling.

Summing up, our cognitive capacities are able to discriminate units. Moreover, it is reasonable to assume that we have knowledge about which concepts normally come in the shape of a unit; a dog is more likely to show up as an individual than as mass stuff. The reverse holds for blood. I called this piece of knowledge conceptual and I argued that it gives rise to the oddness of the example 'There is dog on the wall'. It is marked for the LVI *dog* to occur in a mass reading. It is important to note that this approach accounts for the markedness of this example without relying on a syntactic feature [count] for *dog*. I have further argued that our capacity for discriminating units is an extra-linguistic capacity. The consequence is that linguistic approaches may not be suitable to account for the salience of the unit reading for certain concepts and the oddness of example (53).

3.2.6 Conclusion

In this section I have illustrated how functional structure can determine the subcategory of the structure. I have distinguished between three nominal subcategories; the mass reading, the count kind reading and the count unit reading. I have followed Borer's proposal to distinguish between mass and count reading by means of a specific functional head which is realized by

number marking. In the absence of Num°, the default reading is the mass reading. The merge of this head derives a count reading. Similarly, I have set the kind and unit reading apart by means of another functional head, viz. the Size° head. In Dutch it can be realized by means of the diminutive affix or a null affix in case of a non-small reading. As such, I have emphasized on the fact that a specific reading invariably has the same underlying syntactic structure regardless the VIs that realize it. I have further shown that LVIs can acquire various readings. They are assigned a reading by the functional structure, not by Vocabulary. Finally, I have commented on the fact that world knowledge limits the malleability of LVIs to a certain extent. Most significantly, count unit readings are not easily interpretable for concepts for which there is no salient natural or conventional unit in the world.

3.3 A case study on semi-lexical VIs and Vocabulary Insertion

3.3.1 Introduction

In chapter 2 section 2.2.4 I have proposed that roots are defined structurally. In other words the RTN is a structural notion. More specifically, it is not the merger of an LVI which defines an RTN as a root. Rather, this position arises as a by-product of Primary Merge. A direct consequence is that FVIs may realize RTNs. In this section I point out that semi-lexical items are FVIs that can easily realize an RTN. Their denotation allows them to regularly occur in RTNs too. This section is a case-study about one such FVI, viz. *stuk*. I argue that it can realize both the RTN and the [Size] head in cases of NP ellipsis.

3.3.2 The functional use of *stuk*

The single Dutch VI *stuk* has two different uses; a functional one and a lexical one. The functional use of *stuk*, henceforth $stuk_F$ is shown in (58). Example (59) shows the lexical use of *stuk*, henceforth $stuk_L$. Note that the two subscripts, viz. $stuk_F$ and $stuk_L$, are not meant to suggest that there are two different VIs *stuk* in Vocabulary. They rather refer to two different *uses* of the same VI *stuk*.

(58) A: Hoeveel bananen heb je gekocht?
how.many bananas have you bought
B: Ik heb twee **stuk$_{F}$-s** gekocht.
I have two specimen-PL bought
'How many bananas did you buy? I bought two specimens.'

(59) Wil je twee **stuk$_{L}$-en** van deze banaan?
want you two piece-PL of this banana?
'Do you want two pieces of this banana?'

In its functional use the noun *stuk* is most accurately translated as 'specimen', i.e. it only refers to individual units. In its lexical use it can be translated as 'piece'. The two readings are associated with different plural affixes. When used functionally, *stuk* takes *–s* as a plural affix. When used lexically, on the other hand, it takes the plural affix *-en*. In this section I will focus on the functional use of *stuk*. I postpone the discussion of stuk$_{L}$ to section 3.3.3.

In its functional use *stuk* cannot take a diminutive affix. Example (60) illustrates the illicitness of the diminutive affix.

(60) * Ik heb twee stuk$_{F}$-je-s gekocht.[57]
I have two specimen-DIM-PL bought
Intended meaning: 'I bought two specimens.'

Note that the diminutive affix is fully productive in Dutch, i.e. all VIs realizing an RTN in a nominal structure can take a diminutive affix. It combines, for example, with LVIs denoting large objects, as in (61), to measure words, as in (62) and to abstract nouns, as in (63).

[57] The choice of the plural affix here is not determined by the noun as Dutch diminutives always take an *–s* as a plural affix

(61) die toren-tje-s in Dubai
those tower-DIM-PL in Dubai
'those towers in Dubai' (expresses contempt)

(62) een kilo-tje appelsienen
a kilo-DIM oranges
'a kilo of oranges'

(63) een leugen-tje
a lie-DIM
'an innocent lie'

In the light of the examples above it is highly unexpected that *stuk*$_F$ cannot be combined with a diminutive affix. I therefore propose that this VI is an instantiation of Size°.[58] From such a perspective it is not surprising that the diminutive affix, another realization of Size°, is incompatible with *stuk*$_F$: the two elements are in competition for the same syntactic terminal. Moreover, this analysis allows us to understand why *stuk*$_F$ refers to a whole specimen; this denotation is triggered by the feature [Size].[59]

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[58] One may wonder if the measure word in so-called direct partitive constructions also realizes a functional head in the noun's infectional domain. Direct partitive constructions are constructions in which two nouns that are in a partitive realtion are juxtaposed without the intervention of an intermediate preposition, e.g. *een glas water* 'a glass of water' (see Vos 1999 and Van Riemsdijk 1998:12). Van Riemsdijk (1998:15) notes that direct partitive constructions constitute a single extended projection, although the measure noun, i.e. the first noun, retains more of its syntactic independence than would be expected from a functional head. Important for my purposes is that the measure noun does not realize a functional head such as Num° or Size°. The main argument for analyzing *stuk* as a realization of Size° is the fact that it is in complementary distribution with the diminutive. Measure nouns in direct partitive constructions, however, are not in complementary distribution with nominal inflectional markers. Moreover, it seems that the measure noun and the second noun both can get inflection, e.g. *twee doosjes luciferretjes* 'two small boxes of small matches' (Lit. two box.DIM.PL of match.DIM.PL). In this respect, the measure noun differs from *stuk*. Moreover, note that *stuk* does not trigger a partitive reading. Consequently, *stuk* and direct partitive constructions should not be analyzed on a par.

[59] The fact that *stuk* realizes the feature [*Size*] may come as a surprise; it does not express smallness or bigness. In section 3.4.3.3 I am explicit about the precise semantics of the diminutive: it expresses both a measure function and smallness. Although *stuk* may not express smallness, I propose it expresses the same measure function.

This analysis predicts that *stuk*$_F$ cannot be used to refer to kind readings. Recall that the kind reading is incompatible with the [Size]-feature (cf. section 3.2.3.4). Hence, if *stuk*$_F$ expresses this feature, we expect the kind reading to be excluded. This prediction is borne out. This is shown in (85).

(64) A: Hoeveel bier-en heb je bestudeerd
how.many beer-PL have you studied
voor je thesis over gist?
for your thesis on yeast
B: * Ik heb twee stuk$_F$-s bestudeerd.
I have two piece-PL studied
Intended meaning:
A: How many kinds of beer did you study for your dissertation on yeast?
B: I studied two kinds of beer.

A further property of the noun *stuk*$_F$ is that it occurs exclusively in elliptical contexts.[60] The example in (65) shows that an example with both *stuk*$_F$ and an overt noun[61] is ungrammatical.

(65) * Ik heb twee stuk$_F$(-s) banaan(-en) gekocht.
I have two specimen-PL banana(-s) bought

In the absence of the noun, however, it is grammatical, as can be seen in (66).

(66) Ik heb twee stuk$_F$(-s) gekocht.
I have two specimen-PL bought
'I bought two specimens.'

[60] An exception to this rule in Dutch is the combination of *stuk*$_F$ with collective mass nouns (see chapter 5 section 5.3), such as *twee stuks vee* 'two pieces of livestock'. At this point, I do not understand why this should be the case. It may be that these examples should be analyzed as partitives, which would make them orthogonal to the discussion at hand. More research is needed, though.

[61] The term 'noun' is a shorthand for 'a root which is merged under nominal functional structure'.

I propose that (66) is the elliptical version of (65). Evidence in favor of this analysis comes from NPs that combine with a PP-modifier. Lobeck (1995:43) points out that such modifiers can remain outside of the ellipsis site. As such, a PP-modifier can be present in the elliptical sentence, although the NP that combines with it, is elided. She gives the following example:

(67) John's presentation on urban development was virtually ignored because [$_{NP}$Mary's [e] on arms control] was so much more interesting.

Now consider the following examples.

(68) een medaille voor / *van tennis
a medal for/of tennis
'a medal for tennis'

(69) België heeft vier medailles voor tennis gewonnen
Belgium has four medals for tennis won
en twee **stuk$_F$-s** voor zwemmen
and two specimen-PL for swimming
'Belgium obtained four medals for tennis and two for swimming.'

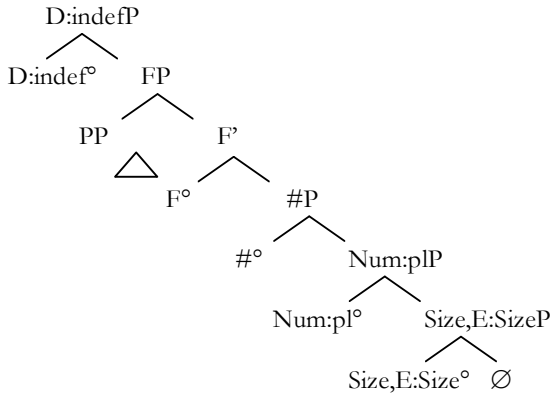
Example (68) shows that the noun *medaille* 'medal' takes the preposition *voor* 'for' to introduce its modifier. When compared to (69), it is reasonable to assume that the latter examples instantiate ellipsis: it is not the VI *stuk*$_F$ that selects the PP modifier, but the elided VI *medaille* 'medal'.

Lobeck claims that the features of certain functional heads can license the ellipsis of their complements. In example (67), it is the [+Poss] feature -realized by the *s* in *Mary's*- that licenses the ellipsis of its NP complement. Merchant (2004) develops this idea and proposes that certain heads can host an ellipsis feature. I assume that Size° is one of those heads: it can host [E:Size]. This feature licenses the ellipsis of the complement of Size°, viz. the RTN. The

syntactic structure of (70) is given in (71).[62] I assume that the modifier *voor zwemmen* is merged higher than the ellipsis site, but nothing further hinges on this.[63] The #° head will be realized as the cardinal.

(70) twee **stuk$_{F}$-s** voor zwemmen
two specimen-PL for swimming
'two specimens for swimming.'

(71)



Stuk is thus an instantiation of the functional head Size° marked both for the feature [Size] and an ellipsis feature.[64] This VI is depicted in (72).

(72) /stœk/ ↔ {Size, E:Size}

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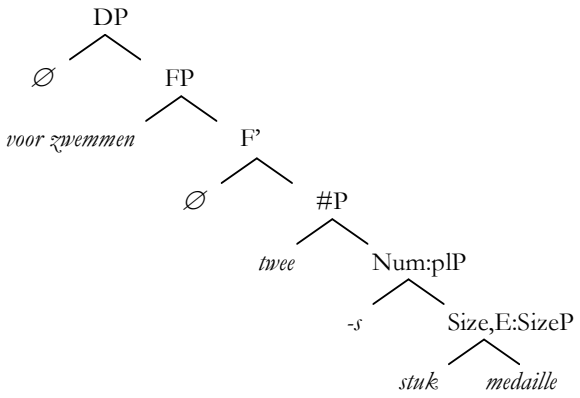
[62] I abstract away from the question of whether paucal cardinals such as *two* realize the #° head or its specifier. For ease of exposition, I assume they realize the head.

[63] Lobeck proposes that NP-ellipsis in these cases operates on an intermediate projection and that the modifier is adjoined to an N' above the one that is elided. Her proposal is unformulable in the present model. There is no N that projects. It further becomes more and more clear that ellipsis operates on full constituents (Merchant 2004), an observation which is incompatible with Lobeck's proposal.

[64] Note that the technical implementation of the ellipsis feature in the present proposal differs from the one in Merchant (2004). This is mainly due to the fact that Merchant adopts early insertion of VIs. The gist of the proposal, however, is fully compatible with his work.

This VI is the only one marked for these features in Dutch. As such, it is the most suitable candidate to realize a Size° head carrying these features. After Vocabulary Insertion, the structure looks like (73).

(73)



The ellipsis of the RTN is triggered by the ellipsis feature on Size°. I propose that it is a PF operation which follows Vocabulary Insertion. This order of operations is suggested by the fact that the choice for the preposition *voor* in the modifier *voor zwemmen* 'for swimming' depends on the LVI *medaille* 'medal'; this suggests that *medaille* 'medal' was inserted. The following data further support this view. The example below shows that the underlying LVI *loob* is clearly present in the sluiced wh-phrase site. Otherwise it could not have selected the case of the direct object, as in (74). The example is taken from Merchant (2004:665).[65]

[65] Merchant (2004) uses this example to argue that ellipsis involves full, syntactic projections which go unpronounced. In the present discussion this example serves a different purpose; it shows an ordering of operations at PF: ellipsis follows Vocabulary Insertion.

(74) Er will jemanden loben, aber sie wissennicht
he wants someone.ACC praise, but they know not
*wer / wen / *wem
who.NOM / who.ACC / who.DAT
'He wants to praise someone, but they don't know who.'

In (74) the verb *loben* requires for accusative case on its direct object. Hence, *jemanden* is an accusative form. Interestingly, the sluiced wh-phrase must bear this case too. This indicates that the LVI *loob* is present in the elided phrase and that ellipsis follows Vocabulary Insertion.

To conclude, the VI *stuk* can realize the Size° head in case this head is marked with an ellipsis feature. As such, I have proposed that the VI *stuk* is marked for the features [Size] and [E:Size]. The data further suggests that phonological material is only elided after Vocabulary Insertion.

3.3.3 The lexical use of *stuk*

In this section I present the lexical use of *stuk*, as in (75)-(77). I will refer to this use of the VI as $stuk_L$.

(75) Het is nog geen compleet artikel,
it is yet no complete article
het is nog maar een **$stuk_L$ (-je)**.
it is yet but a piece(-DIM)
'It is not yet a complete article, it is only a (little) piece.'

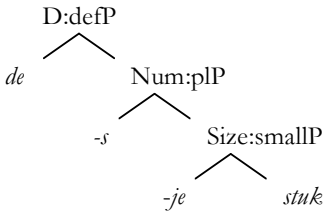
(76) Ik heb al twee **$stuk_L$-en** gegeten.
I have already two piece-PL eaten
'I already ate two pieces.'

(77) Ik heb de **$stuk_L$-je-s** opgegeten.
I have the piece-DIM-PL up.eaten
'I ate the pieces.'

Stuk$_L$ can be translated as 'piece' and it takes the plural affix *–en*, as shown in (76). It can further take a diminutive affix, as in (75), and it can be combined with both a diminutive affix and a plural affix, as shown in (77).

Summing up, *stuk*$_L$ takes regular nominal inflection. As such, it is not different from any other VI realizing an RTN in the nominal domain. The structure of the NP in (77) after Vocabulary Insertion is depicted in (78).

(78)



To conclude, in this section I have shown that the VI *stuk* has an unmarked use as the realization of an RTN. In combination with the conclusion reached in the preceding section, this means that the VI *stuk* can be used both lexically and functionally. In other words, it can realize both a RTN and a FTN. In previous proposals VIs which show comparable behavior have been called semi-lexical VIs (see for example van Riemsdijk 1998 and Corver and Van Riemsdijk 2001). In this section I postulate an alternative analysis for such VIs. I propose that they are simply FVIs that are frequently (and as a result in a relatively unmarked fashion) used to realize an RTN. In the remainder of this section I demonstrate how Vocabulary Insertion proceeds for this VI when it realizes an RTN.

In section 3.3.2 I have argued that the VI *stuk* is marked for the features [Size] and [E$_{Size}$], as repeated in (79).

(79) /stœk/ ↔ {Size, E$_{Size}$}

Now let us see how this semi-lexical VI can realize an RTN. Recall that the insertion principle in this model is a revised version of the Subset Principle. It is repeated in (29).

(80) The Revised Subset Principle (RSP)

Given a terminal node A with feature set F_0 and vocabulary items (VIs) $/B_{1,2,\ldots,n}/ \leftrightarrow F_{1,2,\ldots,n}$:

$/B_i/$ is inserted in A if $F_0 \times F_i \subseteq F_0 \times F_0$. When several VIs meet this condition, the one for which $F_0 \times F_i$ most closely matches $F_0 \times F_0$ is chosen.

Let us see how the VI in (79) fares under this principle. As (80) states, we first have to multiply the feature set of the RTN with itself. As an RTN is void of features by definition, the Cartsesian product of this set (called F_0 here) and itself is empty too. This is shown in (81).

(81) $F_0 \times F_0 = \varnothing$

This Cartesian product should then be compared to the product of the set of features on the TN and the set of features on the VI, viz. {Size, E:Size}, which I call F_{stuk}. This product is given in (82).

(82) $F_0 \times F_{stuk} = \varnothing \times \{\text{Size, E:Size}\} = \varnothing$

The RSP states that if $F_0 \times F_{stuk}$ is a subset of $F_0 \times F_0$ the VI can be inserted. The empty set is trivially a subset of the empty set. As a result, the VI in (79) can succesfully compete for insertion at the RTN. As such, this case study shows how the present model straightforwardly captures so-called semi-lexical VIs.

3.3.4 Conclusion

In this section I have presented a case study on the semi-lexical VI *stuk* 'piece'. It has a functional use as the realization of a Size° head marked with an ellipsis feature. In other words, it is an FVI. At the same time, however, it has a denotation which is richer than those syntactic features too. As such, it frequently realizes an RTN. As RTNs are defined structurally in this model the nature of the VI which realizes it is irrelevant. An FVI may therefore realize an RTN. The double use of this semi-lexical VI is thus immediately accounted for in this model.

3.4 A case study on the interpretation of semi-lexical VIs

3.4.1 Introduction

This section focuses on the lexical and the functional reading of the Dutch VI *heel*. The lexical one is given in (83), the functional one in (84).

(83) Het **heel-e** bord is veel waard,het kapot-e bord niet.
the whole-INFL plate is much worth the broken-INFL plate not
'The intact plate is worth a lot, the broken one isn't.'

(84) Ik heb **heel** het boek gelezen.
I have whole the book read
'I have read the entire book.'

I show that the VI *heel* in (83) functions as an adjective and in (84) as a quantifier (see also Zwarts 1992). When used as an adjective, it realizes an RTN. As a quantifier it realizes the features [singular], [definite] and [size]. I conclude that the denotation of the VI *heel* is structurally defined. In other words, the interpretation the VI *heel* receives is determined by the syntactic structure. As such, this section illustrates once again that structure prevails over VIs. Whereas the previous section on the semi-lexical item *stuk* focused on the technical details of how an FVI can realize both an RTN and an FTN, this section focuses on how an FVI can get a different interpretation depending on the terminal node it realizes.

This section is structured as follows. In the following two subsections (subsections 3.4.2 and 3.4.3) I discuss the syntax and semantics of *heel* when it is used as a quantifier. After an intermediate conclusion in subsection 3.4.4 I discuss the lexical use of *heel* in subsection 3.4.5. The final subsection concludes.

3.4.2 The syntax of *heel* when used as a quantifier

3.4.2.1 Introduction

This section studies the quantificational use of the VI *heel*. As a quantifier, *heel* occurs to the left of the determiner, as shown in (85).

(85) heel het boek
whole the book
the entire book

It is not the only quantifier that can occupy this position. The universal quantifier *al* 'all' can do so too, as can be seen in (86).

(86) al de chocolade
all the chocolate
'all the chocolate'

Zwarts (1992) observes that the two quantifiers which occur before the determiner are both universal quantifiers.[66] They are in complementary distribution: the first one, *al* 'all', occurs with definite mass nouns (87)a and definite plural DPs (87)b, the second one, *heel* 'whole', is restricted to definite singulars (87)c.

[66] There are many uses associated with the Dutch word *heel* 'whole' (see Den Dikken 2002). In this chapter I will only be concerned with the use of *heel* in pre-determiner position and *heel* when used as an adjective.

(87) a. {al / *heel} de chocolade
all/whole the chocolate
'all the chocolate'

b. {al / *heel} de regio's
all / whole the regions
'all the regions'

c. {*al / heel} de regio
all /whole the region
'all the region

Al 'all' is not specified for number. If it were specified for singular it would not be able to co-occur with plurals. If it were specified for plural, it would not be compatible with mass readings, which lack a projection for number. As far as *heel* 'whole' is concerned, Zwarts (1992) concludes from these data that *heel* 'whole' is marked for singularity, as it only co-occurs with singular NPs. At first sight, the distribution of *al* 'all' and *heel* 'whole' seems straightforward. On the one hand, singular NPs select *heel* 'whole', which is marked for the feature [singular], while on the other plural NPs and NPs in a mass reading select *al* 'all' as an elsewhere option. In this section I propose, however, that the distribution of *heel* is more complex. I will show that it realizes a quantifier which is marked for singularity, definiteness and [Size].

3.4.2.2The Data: Heel *and countability*

The examples in (87) already suggest that the occurrence of *heel* as a quantifier is related to countability. It is disallowed with mass readings and plurals DPs, whereas it is grammatical with singular DPs. In this section I explore its compatibility with various mass and count readings in Dutch in more detail.

Recall from section 3.2.2 the distinction between the mass reading, as in (88), and two types of count readings, viz. the kind reading in (89) and the unit reading in (90).

(88) chocolade
chocolate
'chocolate'

(89) chocolade-s
chocolate-PL
'several kinds of chocolate'

(90) chocola-tje-s
chocolate-DIM-PL
'portions of chocolate'

I have shown that these readings are semantically distinct from one another. Kind readings can be paraphrased as 'a kind of' and the concepts they refer to are not bounded in space. They have this property in common with mass readings, yet they differ from mass readings in being a subtype of count readings. Unit readings can be paraphrased as 'a unit/individual/portion of' and the concepts they refer to are bounded in space Recall that mass, kind and unit readings show different morphosyntactic behavior in Dutch. Mass readings do not allow for number or size marking. Kind readings allow for number marking, but not size marking. Unit readings are compatible with both number marking and size marking. In what follows, I show that these readings also differ in compatibility with the VI *heel* 'whole' when used as a quantifier.

As was already noted in section 3.4.2.1, Dutch DPs with mass readings cannot be combined with *heel* 'whole' when used as a quantifier. This is illustrated in (91).

(91) * heel de chocolade
whole the chocolate

Example (91) shows that *heel* 'whole' is incompatible with a mass readings.

When used as a quantifier *heel* 'whole' cannot modify a DP with a kind reading, either, not even when the DP is singular and definite. This is shown in (92).

(92) *? Op deze workshop over de Granny Smith verwelkomen
on this workshop on the Granny Smith welcome
we professor Janssen, die **heel die appel** analyseerde.
we professor Johnsson that whole that apple analyzed.
Intended: 'For this workshop on the Granny Smith we welcome professor Johnsson who has analyzed this kind of apple from a to z.'

In (92) the DP 'that apple' does not refer to individual instances of apples, but to a kind of apple, viz. the Granny Smith. When used in this sense, the DP *die appel* 'that apple' does not allow for *heel* 'whole' when used as a quantifier.

Singular definite unit readings can be combined with *heel* 'whole' when used as a quantifier, as can be concluded from (93).

(93) heel het chocolaatje
whole the chocolate-DIM
'the entire chocolate'

The example in (93) is a unit reading, as can be deduced from the presence of the diminutive. It allows for *heel* when used as a quantifier.

If we now combine the insights about the structure of mass readings, kind readings and unit readings (see section 3.2.3) and their combinatorial possibilities with *heel* we reach the conclusion depicted in the table below.

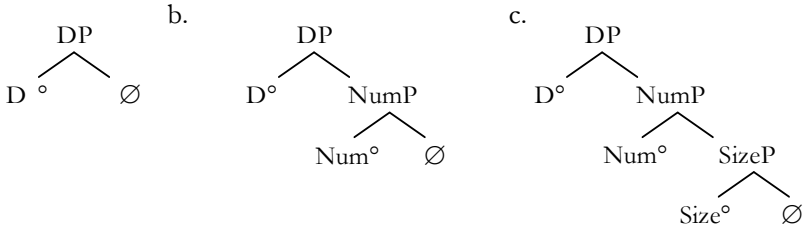
(94)

	plural	diminutive	*heel*
mass	*	*	*
kind	√	*	*
unit	√	√	√

The table shows that mass readings do not allow for any type of nominal inflection, nor for *heel* 'whole' when used as a quantifier. Kind readings can combine with number marking, but not with a diminutive affix or *heel*. Finally, unit readings allow for diminutives, *heel*, and number marking. In sum, the data in (94) suggest that the occurrence of *heel* 'whole' is somehow related to the possibility of using the diminutive. In what follows I account for this observation.

Recall that mass readings, kind readings and unit readings are structurally distinguished. In section 3.2.3.4 I took the well-formedness of number marking as indicative for the presence of the feature [Num] in the structure. The possibility of the diminutive affix signalled the presence of the feature [Size]. As both the kind and the unit reading allow for number marking, I concluded both marked for [Num]. Only the unit reading is marked for [Size] as it is the only reading which can combine with a diminutive affix. The structure of a mass reading is repeated in (95)a, (95)b shows the structure of the kind reading and (95)c depicts the unit reading.

(95) a. b. c.



If we now compare the features of the various mass and count readings in (95) with the distribution of the VI *heel* when used as a quantifier, we observe a correlation between the feature [Size] and the presence of *heel*. An overview is given in the table in (96).

(96)

	number	diminutive	*heel*
mass {∅}	*	*	*
kind {Num}	√	*	*
unit {Num, Size}	√	√	√

The table shows that only unit readings are marked for the feature [Size] and that only those same readings allow for the presence of the VI *heel* 'whole' when used as a quantifier. It further shows that the readings which lack the feature [Size] disallow *heel* 'whole'. In sum, when the feature [Size] is present, the use of *heel* 'whole' is licit. I therefore conclude that the VI *heel* 'whole' realizes (at least) the feature [Size]. As the quantifier is marked for the feature [Size] I propose that it merges in the specifier of the SizeP. In other words, this quantifier originates inside of the DP, although it surfaces to the left of the determiner.

*3.4.2.3*Heel *realizes [Num:sg], [def] and [Size]*

Heel when used as a universal quantifier to the left of the determiner is marked for more features than only [Size]. If it were only marked for [Size], it would be able to co-occur with all possible unit readings, contrary to fact. As was noted in the introduction, it only co-occurs with singular definite NPs, not with (definite or indefinite) NPs with plural unit readings, as in (97), or singular indefinite unit readings, as in (98).

(97) * heel (de) chocola-tje-s
whole the chocolate-DIM-PL

(98) * heel een chocola-tje
whole a chocolate-DIM

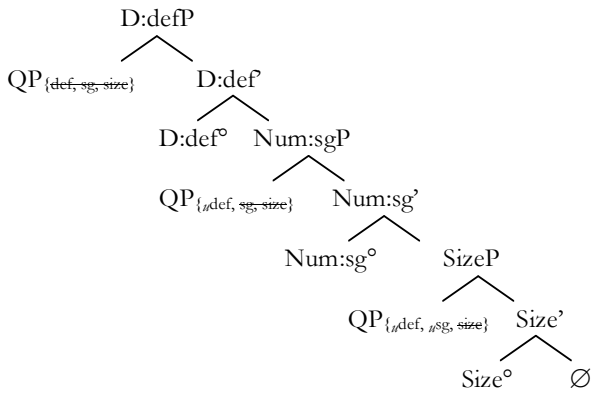
I therefore assume that the quantifier which *heel* 'whole' realizes is not only marked for [Size], but also for the feature singular, i.e. [Num:sg] and the feature definite, i.e. [def]. In what follows I call this quantifier the quantifier of completeness and formally refer to it as $Q_{\{def,num:sg,size\}}$. It is a quantifier which universally quantifies over the parts of a single item.

3.4.2.4 Summary

In the previous sections, I have shown that *heel* 'whole' realizes a quantifier which is marked for the features [Size], [Num:sg] and [def]. These features merge at different places in the syntactic tree, yet they are spelled-out by a single quantifier. In order to relate these features, I propose that the quantifier moves in the tree. I therefore propose the structure in (100) for the DP in (99).

(99) heel het chocola-tje
whole the chocolate-DIM
'the whole piece of chocolate'

(100)



In (30) the quantifier merges in the specifier of the SizeP, where it checks its feature [Size]. It raises further to the specifier of the NumP head in order to check its [Num:sg]-feature. It then moves to its surface position, the specifier of the DP to check its feature [def].

3.4.3 The semantics of *heel* when used as a quantifier

3.4.3.1Introduction

In this section I analyze the semantics of *heel* when used as a quantifier. I propose it expresses completeness. Hence, I will refer to it as the quantifier of completeness. I first present background information on modifiers of completeness in the adjectival domain. It will become clear that they refer to a closed scale. I then extend these insights to the quantifier of completeness.

3.4.3.2 Background: The semantics of completeness

The quantifier of completeness, realized by *heel* 'whole' in Dutch, adds the notion of completeness to the DP, just like the etymologically related VI *whole* does in English. For example, it is odd to combine DPs modified by *whole* with adverbs like *partly*, as in (101) .

(101) # I partly ate the whole cookie.

The same is true for the Dutch quantifier of completeness, as shown in (102).

(102)	#	Ik	heb	heel	het	koekje	deels	opgegeten.
		I	have	whole	the	cookie	partly	eaten

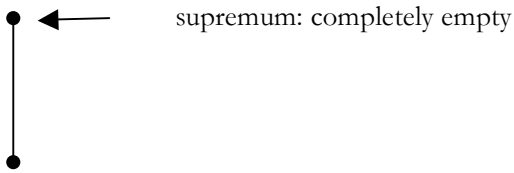
Previous semantic formalizations have been proposed for the notion of completeness, mainly in the realm of adjectives (Kennedy & McNally 2005, Kennedy 2007, Winter & Rotstein 2004, Barbiers 1995, Vanden Wyngaerd 2001). It has been noted that absolute adjectives allow for modifiers that express completeness, whereas relative adjectives do not. This is illustrated in (103) and (104).

(103) completely empty
(104) * completely expensive

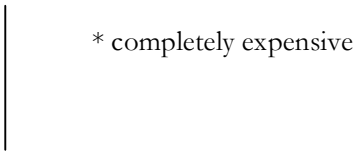
Adjectives like *empty* and *open* allow for modifiers which express completeness, whereas adjectives like *expensive* and *tall* do not. The former are called absolute

adjectives, the latter relative adjectives. This pattern follows from the fact that absolute adjectives express a closed scale, whereas relative ones express an open scale. In both cases, the scale refers to an ordered set of degrees. The closed scales of absolute adjectives have a supremum, i.e. a highest degree, whereas the open scales of relative adjectives do not. A modifier of completeness refers to the supremum of a scale. Not surprisingly then, only adjectives that refer to a scale with a supremum allow for such modifiers (Kennedy & McNally 2005, Kennedy 2007). This is illustrated in (105) and (106).

(105) *Empty*



(106) *Expensive*



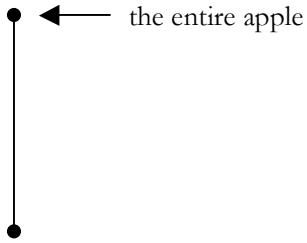
(105) shows that an absolute adjective such as *empty* refers to a closed scale. This closed scale has a supremum, which can be referred to by means of modifiers that express completeness. Relative adjectives such as *expensive* on the other hand, refer to an open scale, as depicted in (106). These scales do not have a supremum, and hence such adjectives do not allow for modifiers that refer to that supremum.

3.4.3.3 The semantics of heel *and unit readings*[67]

Given that the quantifier of completeness expresses completeness, I assume it also refers to the supremum of a closed scale. Recall that it only co-occurs with unit readings (cf. sections 3.4.3.2). The distinguishing syntactic characteristic of unit readings is the presence of the Size°-head. I assume it is this head that provides the semantics of the closed scale the supremum of which can be referred to by means of the quantifier of completeness.

Let us assume a closed scale that is defined as an interval of real numbers. This scale refers to the degree of completeness of the unit. The bottom of that scale refers to the individual, smallest parts, its middle to sets of parts and its top to the complete sum of all parts of the unit. For example, if we are talking about an apple, the bottom of the scale refers to the smallest discernible pieces of the apple, the middle to half an apple and the top to the whole apple. This is illustrated in (107).

(107)



The Size°-head introduces units by referring to a measure function that points to a certain number on the closed scale, which is an interval of real numbers. In other words, the Size°-head asserts that the concept the noun refers to consists of a specific and closed number of parts. These parts are represented by means of the scale above. As the Size°-head indicates that the number of parts is closed, the item the NP refers to is measurable in space. The semantics of the Size° head can be formally represented as follows:

(108) $\lambda P \lambda n \lambda x [m_q(x) = n \wedge P(x)]$
with $m_q \rightarrow [0,1]$

[67] I am highly indebted to Joost Zwarts for the formalization of this proposal.

(108) states that the concept the noun refers to has a certain value (this value is represented as n) on the closed scale (this scale is represented as m_q). The quantifier of completeness in the specifier of Size° points to the supremum of that scale.[68] *Heel* 'whole' can be defined as follows: [69]

(109) $[[Q_{\{def,sg,size\}}]] = \lambda F[F(supremum_q)]$

The quantifier of completeness thus takes the function that the Size° head yields as its argument and fills in a value on the scale the Size°-head introduces. This is illustrated in (110).[70] Note that P(x) refers to the predicate expressed by the RTN. Note further that the RTN is lower in the structure than the Size°-head. At the point at which the Size°-head is interpreted, this predicate is therefore already filled in.

(110) $\lambda F[F(supremum_q)] (\lambda n \lambda x[m_q(x) = n \wedge P(x))$
$\Rightarrow \lambda n \lambda x[m_q (x) = n \wedge P(x)] (supremum_q)$
$\Rightarrow \lambda x[m_q(x) = supremum_q \wedge P(x)]$

Now note that the Dutch diminutive, which realizes the Size° head with the value *small*, thus not only expresses smallness, but also a closed scale. Its semantics is given in (111).

(111) $[[dim]] = \lambda X \lambda n \lambda x[m_q(x) = n \wedge X(x) \wedge small (x) > d_s]$
with $m_q \rightarrow [0,1]$

---

[68] In the absence of *heel* the default value of *n* is a small interval at the top of the scale. In other words, if one is talking about a cookie, the default interpretation will be that one is talking about a (nearly) complete cookie (cf. Kennedy 2007 on the default interpretation of absolute adjectives).

[69] Note that (109) is the same as $[[Q_{\{def,sg,size\}}]] = \lambda FF(1)$

[70] P(x) refers to the predicate expressed by the RTN. Note that the RTN is lower in the structure than the Size° head. When the Size° head will be interpreted, the predicate will therefore already be filled in.

In (111) the first part of the formula states that the diminutive expresses a closed scale, while the third part says that the degree of smallness is higher than the average degree of smallness in the context[71] (cf. Kennedy 1999 on d_s, i.e. the standard degree).

3.4.3.4 Conclusion

In this section I have presented background information on modifiers of completeness in the adjectival domain; they refer to closed scales. Subsequently, I have proposed that the Size°-head introduces a closed scale into the structure. The quantifier of completeness points to the supremum of this scale. Note more generally that the meaning of the quantifier of completeness is fully compositional. This is expected; functional structure is interpreted compositionally at LF (see chapter 1 section 1.3.1).

3.4.4 Intermediate conclusion

In this section I have discussed the syntax and semantics of the quantifier of completeness in Dutch. I have shown that it interacts with the nominal functional heads that are responsible for countability. More specifically, it is licensed by the Size°-head, which also derives unit readings. In this way, I accounted for the fact that the quantifier of completeness is restricted to unit readings. It is further specified for singularity and definiteness.

From a semantic point of view, I have defined the Size°-head as a measure function that refers to a scale, which I defined as an interval of real numbers. This scale refers to the degree of completeness of the unit. The quantifier of completeness interacts with this scale; it points to the supremum. By asserting that there is a set of parts, one assures that the unit is measurable in space. By pointing to the supremum, one indicates that it is complete.

3.4.5 *Heel* realizing an RTN

In the previous sections I have discussed the fact that *heel* can realize a quantifier in Dutch. Yet the same VI can also realize an RTN; *heel* 'whole' is

[71] The degree of smallness becomes greater as the object becomes smaller.

commonly used as an adjective, meaning 'whole, unbroken, intact'. An example is given in (112).

(112) Het **heel-e** bord is veel waard, het kapot-e bord niet.
the whole-INFL plate is much worth the broken-INFL plate not
'The intact plate is worth a lot, the broken one isn't.'

There is little reason to doubt that *heel* realizes an RTN embedded under an adjectival functional projection in these examples. It has all the properties of garden-variety adjectives, as shown below.

Firstly, when used as an adjective, *heel* can be modified by degree modifiers. It takes the same modifiers as absolute adjectives (see section 3.4.3.2). The examples below illustrate this.

(113) Het bord was al volledig **leeg**.
the plate was already completely empty
'The plate was already completely empty.'

(114) Het bord was nog volledig **heel**.
the plate was still completely whole
'The plate was still completely intact.'

Example (113) shows the combination of the degree modifier *volledig* 'complete' and the adjective *leeg* 'empty'. (114) shows that the same degree modifier combines with *heel* when used as an adjective.[72]

[72] This section is about the use of *heel* as an adjective. As such, it can be translated as *intact*. However, *heel* can also refer to completeness when it surfaces in the adjectival domain of the NP, e.g. *ik heb het hele boek gelezen* 'I read the entire book' (see also Zwarts 1992). Despite its low position, this use is probably quantificational too. This is suggested by the fact that it cannot be coordinated with other adjectives, that it cannot be used predicatively and that is does not allow for adverbial degree modification. Interestingly, it does co-occur with indefinite singular NPs, as in *Ik heb een heel boek gelezen* 'I read an entire book'. This suggests that the high position of the quantifier as discussed in section 3.4.2 is related to definitess. Interesting though these facts may be, I fail to understand them fully. In order to make sure that the remainder of this discussion shows *heel* as an adjective, I invariably combine it with a degree modifier.

Heel when used as an adjective further shows adjectival inflection, as can be seen in (112). In this example *heel* takes the same inflection as *kapot* 'broken'. It further does not impose any restrictions on number or definiteness, as can be deduced from the licitness of the examples in (115)-(118). The *a*-examples show the use of *heel*, the *b*-examples are minimal pairs which show that the ordinary adjective *groot* 'tall' shows the same pattern. Recall that the use of the quantifier of completeness is more restricted; it is licit with singular, definite DPs, but not with all other DPs.

(115) a. *Singular, definite*

Het volledig **heel-e** bord is veel waard.
the completely whole-INFL plate is much worth
'The completely intact plate is worth a lot'

b. Het **groot-e** bord is veel waard.
the big-INFL plate is much worth
'The big plate is worth a lot'

(116) a. *Plural, definite*

De volledig **heel-e** borden zijn veel waard.
the completely whole-INFL plates are much worth
'The completely intact plates are worth a lot.'

b. De **groot-e** borden zijn veel waard.
the big-INFL plates are much worth
'The big plates are worth a lot.'

(117) a. *Singular, indefinite*

Een volledig **heel** bord is veel waard.
a completely whole-INFL plate is much worth
'A completely intact plate is worth a lot.'

b. Een **groot** bord is veel waard.
a big-INFL plate is much worth
'A big plate is worth a lot.'

(118) a. *Plural, indefinite*
Volledig **heel-e** borden zijn veel waard.[73]
completely whole-INFL plates are much worth
'Completely intact plates are worth a lot.'

b. **Groot-e** borden zijn veel waard.
big-INFL plates are much worth
'Big plates are worth a lot.'

Examples (115)a and (116)a show the VI *heel* 'whole' used as an adjective in definite DPs. (115)a is a singular DP, (116)a is a plural one. Examples (117)a and (118)a illustrate that it can equally occur in indefinite DP, both in singular ones, as in (117)a and plural ones, as in (118)a. Moreover, when used as an adjective, *heel* 'whole' surfaces in the adjectival domain in the DP. The examples in (119) illustrate this.

(119) a. de **mooi-e, volledig heel-e, antiek-e** borden
the pretty.INFL completely whole. INFL antique. INFL plates
'the pretty, completely intact, antique plates'

b. de **volledig heel-e, mooi-e, antiek-e** borden
the completely whole. INFL pretty.INFL antique. INFL plates
'the completely intact, pretty, antique plates'

[73] In plural, indefinite DPs *heel* cannot only be interpreted as an adjective, it can also get an elative reading. As such, it can be translated by means of *many*. In these cases it presumably realizes yet another quantifier. I cannot account for these data. In (118) *heel* is certainly an adjective as it is modified by means of a degree modifier, viz. *volledig*. Under a quantificational reading such a modifier is illicit.

c. de **mooi-e, antiek-e, volledig heel-e** borden
the pretty.INFL antique. INFL completely whole. INFL plates
'the pretty, antique, completely intact plates'

The examples in (119) shows that *heel* when used as an adjective can precede, follow or be placed in between other adjectives. Moreover, it cannot only be used attributively, but also predicatively, as in (120).

(120) Die antiek-e borden zijn nog volledig **heel**.
those antique-INFL plates are still completely intact
'Those antique plates are still completely intact.'

It can also be coordinated with other adjectives, as in (121). As coordination most regularly combines constituents of the same category (Chomsky's 1959 Coordination of Likes Constraint), this suggests again that *heel* realizes an RTN under an adjectival functional projection in these contexts.

(121) Die antiek-e borden zijn nog
those antique-INFL plates are still
volledig **heel en gaaf**.
completely intact and undamaged
'Those antique plates are still completely intact and undamaged.'

Although it has been noted that the Coordination of Likes Constraint allows for counterexamples (see Sag et al. 1985), quantifiers and adjectives cannot be coordinated, as (122) illustrates. As such, we can conclude that *heel* in (121) is not used as a quantifier.

(122) * **Alle en mooie** meisjes zijn welkom.
all and pretty girls are welcome

Finally, *heel* when used as an adjective can occur as a comparative or a superlative.[74]

(123) Deze borden zijn nog net een beetje
these plates are yet just a little.bit
heel-er dan de andere.
intact-COMPARATIVE than the others.
'These plates are just a little bit more intact than the others.'

(124) Dit bord is nog het **heel-st** van al.
this plate is yet the intact-SUPERLATIVE of all
'This plate is the most intact one of all.'

In sum, when interpreted as 'intact', *heel* has all the characteristics of an adjective. I conclude that the FVI *heel* can realize an RTN embedded under adjectival functional structure.

The meaning of *heel* when used as a quantifier is derived differently than when it realizes an RTN under an adjectival structure. When *heel* realizes a

[74] This use is slightly marked, presumably because *heel* is an absolute adjective.

quantifier LF will interpret the features on the FTNs and assign this meaning to the VI that realizes this node. In other words, when *heel* realizes an FTN its meaning is dependent on the features on this node at syntax. However, when *heel* realizes an RTN its meaning depends uniquely on post-syntactic modules. More specifically, Encyclopedia will assign a meaning to it on the basis of learned, rich lexical semantics associated with this LVI under adjectival structure.

The FVI *heel* can express both very precise compositional semantics when it realizes an FTN and a non-featural meaning when realizing an RTN. At the heart of this proposal lies the idea that structure prevails over VIs. The syntactic nature of the TN determines the interpretation a VI gets. The specific properties of a VI are subordinate to the structure in which they are inserted given late insertion.

In sum, in this section I have shown that heel can also be used as an adjective. I argued that when used as such it gets its interpretation entirely from Encyclopedia.

3.4.6 Conclusion

In this section I have shown that the Dutch VI *heel* can realize both a quantifier and an RTN under adjectival functional structure. In other words, the quantifier and the adjective are realized by means of one and the same VI. The different readings result from the fact that it realizes different TNs. When it is interpreted as a quantifier it realizes an FTN. When it gets an adjectival reading it realizes an RTN. I have further capitalized on the fact that FTNs are interpreted differently from RTNs. FTNs are assigned a meaning compositionally on the basis of the feature set for which they are marked. For example, the [Size] feature introduces a closed scale. The quantifier of completeness points to the supremum of this scale. The denotation of a particular VI realizing an RTN on the other hand, is learned. It is stored in Encyclopedia.

3.5 Conclusion

In this chapter I have presented three case studies to support the proposal that structure prevails over VIs. This general point was illustrated by means of two observations: structure determines subcategories and it controls whether a VI is interpreted as an FVI or an LVI.

I have first discussed a case study on nominal subcategories. I have argued that a specific functional head, viz. the Size° head, distingishes between two types of count readings. Its presence results in unit readings, its absence derives a kind reading. More generally, I have shown that an LVI may acquire more than one reading. These readings are determined by the functional structure above the RTN, not by the properties of the VI that realizes the RTN.

I have shown that structure determines the interpretation of a VI by studying two Dutch semi-lexical VIs, viz. *stuk* 'piece' and *heel* 'whole'. Such VIs commonly realize both FTNs and RTNs. When they realize an FTN they are interpreted according to the feature set on that specific node. When they realize an RTN their denotation is learned and arbitrary. I have further shown that semi-lexical VIs are essentially FVIs. As FVIs can realize both FTNs and RTNs in the present model (see chapter 2 section 2.4), the specific behavior of semi-lexical VIs follows immediately, a welcome result.

This chapter closes the first part of the thesis in which it is shown that LVIs do not determine syntactic structure. On the contrary, structure assigns an interpretation to VIs. The next chapter questions categorial heads.

4. *Derivation is acategorial*

4.1 Introduction

Traditionally, it is assumed that derivational affixes express categorial feature bundles[75] (see for example Marchand 1969, Williams 1981 and Selkirk 1982 amongst many others). For example, the suffix *-er*, as in *baker*, expresses a nominalizing head, while *-ize*, as in *verbalize*, represents a verbalizing one.

In this chapter I argue against this line of reasoning. I question the existence of categorial heads by reexamining derivational affixes. In chapter 1 section 1.3.3 I discussed a proposal from the Exo-Skeletal Model (Borer 2005a,b, 2009a,b,c) which holds the view that categorial heads are superfluous from a syntactic point of view. They are not needed for assigning a category to the structure (see chapter 1 sections 1.2 and 1.3.3). Hence, they may not be primitives of syntax. In this chapter I contribute to this view by focusing on its morphosyntactic consequences. I show that a model which does not assume categorial heads can capture the distribution of affixes with the same empirical adequacy as one which does assume them. In fact, I will show that the present model even fares better when it comes to affixes which occur under more than one category.

This chapter is structured as follows. In section 4.2 I present a theory on homonymy, the conclusions of which will be used later in the chapter. I put forward tests to determine whether different affixes with the same phonological form are homonymous, i.e. two different VIs, or rather different instantiations

[75] One may propose that categories are defined by a single categorial feature, e.g. [N] for nouns or via the interaction between several features as proposed by Chomsky (1981:48) and others (see Muysken & Van Riemsdijk 1986 and Baker 2003 for discussion), e.g. [+N, -V] for nouns. In the former case it is more appropriate to speak of a categorial feature, in the latter of a categorial feature bundle.

of the same VIs. In section 4.3 I present data which are problematic for the traditional approach of derivational affixes as categorial heads, but which follow naturally and immediately from the present proposal. More specifically, I discuss affixes which can realize more than one categorial head. I show that they are a common phenomenon. In accounting for such affixes, the present proposal is empirically more succesful than the traditional one. Section 4.4 addresses the fact that the present model overgenerates. For example, I do not predict a verb such as **to ugliness* to be ill-formed. However, I point out that syntactic approaches in general fail to capture this fact. I therefore conjecture that it is not a syntactic problem. The last section, section 4.5, sums up and concludes.

4.2 A theory of homonymy

4.2.1 Introduction

In this section I present tests to detect homonymy, which I define in (1).

(1) Two affixes are homonyms if they are listed as two separate vocabulary items, even though they have the same phonological exponence.

Homonyms are thus two different VIs with the same surface form. As they are two different VIs, they each have their own semantics and insertion contexts.

Many generalizations concerning affixes suffer from exceptions. The solution for this state of affairs often has been to assume the existence of homonymic affixes. That is, falsifying data are assumed to be properties of a homonymic affix, and therefore irrelevant to the proposed generalization.

Let me illustrate with an example. Booij (2002:122-123) observes that the Dutch deverbal suffix *-er* derives nouns which express a theta role of the underlying verb, as in (2) and (4).

(2) Jan is een schrijv-er.
John is a write-ER
'John is a writer.'

(3) Jan<AGENT> schrijft.
John writes
'John writes.'

(4) Alice in Wonderland is een aanraad-er.
Alice in Wonderland is an recommend-ER
'Alice in Wonderland is a must.'

(5) Ik heb Alice in Wonderland<PATIENT> aangeraden.
I have Alice in Wonderland recommended
'I have recommended Alice in Wonderland.'

When comparing (2) to (3) it is clear that the suffix *-er* expresses the subject's agent theta role in (2). Similarly, (4) expresses the object's patient theta role as can be deduced from (5). Booij (2002) concludes that *-er* expresses a theta role which is associated with the underlying verb. However, the suffix *-er* equally attaches to VIs that would traditionally be classified as nouns in Dutch. This is illustrated in the examples below.

(6) recht-er
justice- ER
'judge'

(7) het recht
the justice
'justice'

(8) * Ik recht.
I justice

(9) wetenschap-er
science- ER
'scientist'

(10) de wetenschap
the science
'science'

(11) * Ik wetenschap.
I science

Examples (6) and (9) show *-er* nominalizations. Examples (8) and (11) illustrate that these nominalizations are not built on top of a verb, i.e. the LVIs they contain are not commonly used as such. On the other hand, they do contain a noun in Booij's view, see (7) and (10). The denominal use of the suffix *-er* is incompatible with the generalization that *-er* expresses a theta role of an underlying verb. To account for these cases, Booij (2002) appeals to homonymy. He argues that Dutch Vocabulary contains two homonymic suffixes *-er*. One attaches to verbs and expresses a theta role, the other to nouns. This analysis is exemplary, in that it shows how one can appeal to homonymy in a morphological analysis. Yet, homonymy considerably weakens the explanatory power of the theory.

In this section I propose tests to distinguish between true homonyms on the one hand and variants of one and the same affix on the other. They will serve as a guideline to decide whether it is justified to appeal to homonymy in a certain analysis or not. The advantages of such a restrictive theory on homonymy is that when one appeals to homonymy in an account one does so on principled grounds. Homonymy is then no longer an arbitrary choice. As a result, morphological analyses will gain explanatory power.

I present three empirical tests to distinguish between homonyms and different instances of the same affix. I show that homonyms do not have the same allomorphs, that they do not have the same synonyms and that they can co-occur. I illustrate each test by means of the suffix *-er* presented above. For ease of exposition, I refer to the alleged homonomyms as the deverbal[76] agentive suffix *-er* and the denominal agentive suffix *-er*. I further contrast these two agentive suffixes with the Dutch pluractional suffix *-er*. The examples in (12)-(14) show the three suffixes under discussion. (12) contains a deverbal agentive suffix *-er*, (13) has a denominal agentive suffix and (14) shows a pluractional suffix.

[76] Given that the framework developed here refutes that LVIs are marked for a category, the terms *deverbal* and *denominal* have no theoretical status in this work. I use these terms solely for the sake of the argument.

(12) bak-er
bake-ER
'baker'

(13) recht-er
justice-ER
'judge'

(14) kiep-er-en
topple-ER-INFINITIVE
'topple over'

The pluractional verb in (14) is derived from the simple form in (15). As such, the pluractional suffix is clearly recognizable as an affix in Dutch.

(15) kiep-en
topple-INFINITIVE
'topple over'

In what follows it will become clear that the suffix *-er* in (12) and (13) pattern together, whereas the one in (14) stands alone. I will conclude that the suffixes in (12) and (13) are instances of one and the same VI, whereas the *-er* in (14) is a true homonym of the *-er* in (12) and (13).

4.2.2 Test #1: Homonyms do not have the same allomorphs

4.2.2.1 Introduction

In what follows I present the first test for homonymy. It is based on allomorphy. I claim that homonyms do not have the same allomorphs. As a result, when two different affixes have different allomorphs, they should not be called homonyms. Before I present the test, I first define allomorphy in the next section.

4.2.2.2 A definition of allomorphy

I define allomorphy in (16) (see also Harley and Noyer 1999 for discussion).

(16) Allomorphs are different phonological instantiations of one single vocabulary item. They share phonological features. Their distribution cannot be captured by referring to phonological rules exclusively.

The definition involves two aspects: (i) phonological similarity and (ii) non-phonological conditions of the distribution. I will comment of each of these in turn.

The definition in (16) states that there is a formal resemblance between allomorphs. I assume that allomorphs share certain phonological characteristics or features. These features allow the language learner to recognize their relatedness. The allomorphs *-er* and *-aar*, for example, share a coda. I leave it to further research how exactly this phonological similarity should be defined.

I now turn to the second aspect of the definition, i.e. the factors conditioning the distribution of allomorphs. The definition states that variation in the surface form of VIs which solely results from phonological rules is not allomorphy. It thus sets variation caused by phonology apart from variation caused by the distribution of surface realizations of VIs. Pure phonological variation can be recognized by its regularity and by the fact that it applies to all VIs with the relevant phonological features. Consider the following example. The suffix *-s* in English which realizes plurality in the NP may surface either as /s/, /z/ or /ɪz/, as is illustrated in (17).

(17) a. /*s*/ two cat**s**
b. /*z*/ two dog**s**
c. /*ɪz*/ two kiss**es**

The distribution of these surface forms is fully predictable on phonological grounds. Voice assimilation with the preceding sound determines the occurrence of the voiceless /*s*/ and the voiced /*z*/. The string /*ɪz*/ occurs after a sibilant (Harris 1994). The variation can thus be attributed to

phonological principles. Moreover, it is not specific to the VI at issue. Exactly the same variation can be found for other VIs too. For example, the suffix *-s* which is a possessive marker and the one which realizes third person singular follow the same phonological pattern. Across VIs, a suffix *-s* has the same surface froms, viz. *s*, *z* and *ɪz*. This is illustrated in (18).

(18) a. /*s*/

plural	two cat**s**
3sg	She chat**s**.
possessive	Rett'**s** proposal.

b. /*z*/

plural	two dog**s**
3sg	She rob**s** the store.
possessive	Bob'**s** proposal.

c. /*ɪz*/

plural	two kiss**es**
3sg	He kiss**es** te bride.
possessive	Ma**x's** proposal.

The examples show that the three affixes display exactly the same variation in surface forms. This variation is thus not specific for one VI, but has to be ascribed to phonology. This kind of variation is not called allomorphy in this thesis.

Allomorphy is essentially irregular. Although certain phonological regularities may occur, it is not fully determined by phonological rules. Furthermore, it is specific to a single VI. In what follows I discuss the distribution of /ər/, spelled as *-er*, and /ar/, spelled as *-aar*, in Dutch.[77] They are surface instantiations of the deverbal agentive suffix *-er*. I first show that one can observe phonological regularities in their distribution. However, I then point out that phonology does not determine the distribution completely;

[77] See Haeseryn et al. (1997) on the allomorphic status of *-aar*.

counterexamples can be found easily. I then show that the variation is specific to the the agentive suffix *-er*. It is not caused by general phonological patterns in Dutch.

There is a clear phonological pattern in the distribution of /ər/ and /ar/. The allomorph /ar/ is invariably used if the last syllable of the base VI has a rhyme consisting of a schwa followed by a sonorant[78] (see de Haas & Trommelen 1993:170). Examples are given in (19) (they are taken from de Haas and Trommelen 1993:170).

(19) a. wandel-aar /wɑndəlar/
walk-AAR
'walker'

b. google-aar /gugəlar/
google-AAR
'googler'

c. fluister-aar /flœystərar/
whisper-AAR
'whisperer'

d. bewonder-aar /bəwɔndərar/
admire-AAR
'admirer'

e. teken-aar /tekənar/
draw-AAR
'drawer'

[78] A search through the electronic version of the dictionary *Van Dale* reveals that *opener* 'opener' is the only exception.

f. loochen-aar /loxənar/
deny-AAR
'denier'

Despite this clear phonological rule, the variation between /ər/ and /ar/ is more complex. As an illustration, consider the sequences of a long vowel followed by an /n/ below. In this phonological context the suffix may surface as /ər/ or as /ar/.[79,80]

(20) a. zien-er /zinər/
see-ER
'seer'

b. dien-aar /dinar/
serve-AAR
'servant'

Furthermore, the same allomorphs are occasionally found after a short vowel followed by a sonorant, as shown below.

(21) min-aar /mɪnar/
love-AAR
'lover'

[79] The variation in and the distribution of the allomorphs of *-er* is more complex than the discussion in this section suggests. See de Haas & Trommelen (1993) for a full description.

[80] More rarely, the suffix even surfaces as /dər/, spelled as *-der*. A search in the electronic version of the dictionary Van Dale teaches us that /dər/ occurs only rarely after a schwa or a long vowel followed by an /n/ or an /l/. After a long vowel followed by an /r/, on the other hand, one occasionally finds /ar/, as in *leraar* 'teacher' or most commonly /dər/, as in *toehoorder* 'listener', but never /ər/. (I disregard the occasional loanword such as *scorer* 'scorer'). However, when /dər/ follows an /r/ it may not be an instance of the allomorph *-der*. Instead, it may be a combination of the allomorph *-er* and *d*-insertion, because *d*-insertion is common in this phonological context in Dutch. For example, when the homophonous comparative affix /ər/ attaches to a long vowel followed by an /r/ one finds *d*-insertion too, e.g. *zwaar-d-er* /zwardər/ 'heavier'.

(22) a. win-aar /wɪnar/
win-AAR
'winner'

b. kost-win-er /kɔstwɪnər/
bread.and.butter-win-ER
'breadwinner'

Given that these allomorphs occur in the same phonological context, phonology does not regulate their distribution. What causes the allomorphy in these cases is nothing but etymological happenstance. Diachronically, some forms were lexicalized with one allomorph, others with another one. These are true examples of allomorphy.

There is yet another reason to assume that Dutch phonology does not fully determine the distribution of /ər/ and /ar/. The variation between these two surface forms is specific to the agentive suffix *-er*. Given the pattern in (19), one could be under the impression that there is a phonological rule in Dutch which prevents the final sequences /ələr/, /ərər/ and /ənər/. The distribution between /ər/ and /ar/ is then not due to a property of the VI, but to a phonological rule, as was the case for the English suffix *-s* above. However, there is an important difference. Dutch phonology does not disallow the occurrence of /ər/ after a rhyme which consists of a schwa followed by a sonorant in general, it only does so for the VI under discussion.[81] To see this, let us compare the agentive *-er* to another Dutch suffix with the same phonological form, viz. the comparative affix. The Dutch bound affix to form comparatives invariably surfaces as /ər/, regardless of the rhyme of the base VI.[82]

[81] To be precise, Dutch does disallow for the sequence /ərər/. Generally, a *d* is inserted after the first *r*, resulting in /ərdər/. I come back to this issue in footnote 81.

[82] In Dutch comparatives formed with the bound suffix *-er d*-insertion takes place if the coda of the base VI is an *r* and the vowel in the nucleus is a schwa or a long vowel. Examples are *zuurder* 'more sour' from *zuur* 'sour' and *zwaarder* 'heavier' from *zwaar* 'heavy' (cf. footnote 80).

(23) a. Zij is **somber-d-er** dan haar zus. /sɔmbərdər/
she is somber-D-COMP than her sister
'She is more pessimistic than her sister.'

b. Zij is **sober-d-er** dan haar zus. /sobərdər/
she is austere-D-COMP than her sister
'She is more austere than her sister.'

c. Zij is **soepel-er** dan haar zus. /supələr/
she is supple-COMP than hersister
'She is more flexible than her sister.'

d. Zij is **flexibel-er** dan haar zus. /flɛksibələr/
she is flexible-COMP than her sister
'She is more flexible than her sister.'

e. Zij is **gesloten-er** dan haar zus.[83] /ɣəslotənər/
she is closed-COMP than her sister
'She is more introvert than her sister.'

f. Zij is **tevreden-er** dan haar zus. /təvredənər/
she is content-COMP than her sister
'She is more content than her sister.'

The form *-aar* is absolutely illicit in these examples, as shown below.

[83] Standard Dutch prescribes the use of *meer* 'more' to form the comparative for *gesloten* and *tevreden* (Haeseryn et al. 1997:416), i.e. *meer gesloten* 'more closed' and *meer tevreden* 'more content', the reason being that they stem from past participles, which generally take a periphrastic comparative in Dutch. However, the forms with *-er* can be easily found in spoken and written Dutch. In contrast, comparative forms of the same base VIs with *-aar* are completely out.

(24) a. * Zij is **somber-aar** dan haar zus.
she is somber-AAR than her sister

b. * Zij is **sober-aar** dan haar zus.
she is austere-AAR than her sister

c. * Zij is **soepel-aar** dan haar zus.
she is supple-AAR than her sister

d. * Zij is **flexibel-aar** dan haar zus.
she is flexible-AAR than her sister

e. * Zij is **gesloten-aar** dan haar zus.
she is closed-AAR than her sister

f. * Zij is **tevreden-aar** dan haar zus.
she is content-AAR than her sister

The examples show a contrast between the agentive suffix *-er*, which calls for the allomorph /ar/ after a final sequence of a schwa and a sonorant, and the comparative suffix *-er*, which does not. The contrast makes clear that the /ar/ allomorph is an idiosyncratic property of the agentive suffix, not a general rule of Dutch phonology. Phonological tendencies or patterns in the distribution of the allomorphs of one single affix thus do not suffice to refute their allomorphic status.

In sum, in this section I have defined allomorphy. In the next section I will use allomorphy as a first test to determine homonymy.

4.2.2.3 Allomorphy as a test for homonymy

Allomorphy can be used to test for homonymy. As homonymic affixes are independent VIs they have a different etymological source. It is therefore possible that they have different allomorphs.[84] As such, different allomorphs

[84] Similarly, homonymic verbs may have different irregular past tenses and participles, e.g. *bid*$_1$

signal homonymy. In other words, if two affixes with the same phonological form have different allomorphs, they are true homonyms. If two homonyms had exactly the same allomorphs, this could only be ascribed to sheer coincidence. Such a view should therefore only be adopted if the unexpected identity of the allomorphs can be independently accounted for. In sum, I consider affixes with the same phonological form, but with different allomorphs to be homonyms. I will also treat affixes with the same allomorphs as instances of the same affix. When an affix has no allomorphs the test cannot be applied.

By way of illustration, let us reconsider the Dutch agentive deverbal suffix *-er*, as in (25), the denominal one in (26) and the pluractional affix *-er*, pronounced as /ər/, in (27).

(25) a. bak-er
bake-ER
'baker'

b. loop-er
run-ER
'runner'

(26) a. recht-er
justice-ER
'judge'

b. wetenschap-er
science-ER
'scientist'

(as in ' He bid on the painting') has the participle *bid*, while *bid*$_2$ (as in 'bid farewell') has the participle *bade*.

(27) a. klap-er-en
clap-ER-INFINITIVE
'to flap'

b. kiep-er-en
fling-ER-INFINITIVE
'to fling'

We have seen above that the deverbal agentive suffix *-er* has allomorphs, viz. /ər/ and /ar/. These same allomorphs can be found for the denominal agentive *-er* suffix. Examples are given below.

(28) a. Hoogeveen-er
Hoogeveen-ER
'inhabitant of Hoogeveen'

b. Ferwerderadeel-er
Ferwerderadeel-ER
'inhabitant of Ferwerderadeel'

(29) a. molen-aar
mil-AAR
'miller'

b. Brussel-aar
Brussels-AAR
'inhabitant of Brussels'

As the deverbal agentive suffix *-er* and the denominal one share the same allomorphs, I conclude they are not homonyms. They are just different instantiations of the same VI.

The pluractional suffix *-er*, on the other hand, has none of these abovementioned forms as an allomorph. In fact, this by now improductive

suffix was not regularly attached to a rhyme with a sonorant as its coda. In this respect, it shows a different pattern than the agentive suffixes *-er*.[85] I have only found one example in which it was. It is given below.

(30) wiel-er-en
wheel-ER-INFINITIVE
'to bike'

It has another allomorph, viz. /əl/, spelled as *-el*,[86], as shown in (30).

(31) a. meng-el-en
mingle-EL-INFINITIVE
'to mingle'

b. prik-el-en
prick-EL-INFINITIVE
'to prickle'

The distribution of *-er* and *-el* is irregular. It is certainly not determined by the rhyme of the base VI, as the pairs in (32)-(33) illustrate.

(32) a. kwab-er-en /kwɑbərən/
flab-ER-INFINITIVE
'to quiver'

[85] This became clear to me after a search in the electronic version of the dictionary *Van Dale* and the invert dictionary of Theissen et al. (1988).

[86] Note that in the previous section I have stated that allomorphs share phonological features. If it is correct that the pluractional affixes /ər/ and /əl/ are allomorphs, the phonological similarity has to be defined in terms of phonological features indeed, not in terms of phonemes. Although the codas of /ər/ and /əl/ have different phonemes, they are highly similar featurewise. They share the same vowel and they both end in a liquida. Note further that even if one does not accept *-el* as an allomorph of *-er* the argument still stands. The fact that the pluractional suffix *-er* never surfaces as *-aar* suffices to make the point that they are homonyms.

b. kwab-el-en /kwɑbələn/
flab-EL-INFINITIVE
'to quiver'

(33) a. tok-er-en /tɔkərən/
pull-ER-INFINITIVE
'to stick/to tap'

b. tok-el-en /tɔkələn/
pull-ER-INFINITIVE
'to pluck (e.g. guitar strings)'

In the examples above the rhyme of the base VI in the *a*-example is identical to the one in the *b*-example. The examples in (32) and (33) are even formed on the basis of the same VI. Yet the *a*-examples are formed by means of the allomorph *-er* and the *b*-examples use *-el*. This shows that the rhyme of the base VI does not determine the distribution between *-el* and *-er*. As phonology does not determine their distribution, they are allomorphs.

In sum, we have seen that the deverbal agentive suffix *-er* and the denominal one pattern together in that they share the same allomorphs. The pluractional suffix *-er*, on the other hand, does not. I take it that sharing the same set of allomorphs indicates identity. Affixes with the same allomorphs are instances of the same VI, whereas different allomorphs indicate homonymy.

4.2.3 Test #2: Homonyms can co-occur

It is generally illicit to repeat the same affix in a derivation (Beard 1995:165). This is shown in (34) (the example is taken from Beard 1995:165).[87] In contrast, it is common to combine two different affixes, as in (35).

(34) * a bakeryery
Intended: 'a place of bakeries'

(35) a **bakeryless** town

Given that different affixes can be combined, it is expected that homonymic affixes can also co-occur. After all, they are different affixes with their own unique semantics. Different instances of the same affix, on the other hand, cannot co-occur.

The following examples illustrate the test. In the previous discussion it became clear that the pluractional suffix *-er* is a homonym of the deverbal agentive suffix *-er*. It is not suprising, then, that the pluractional suffix *-er* can combine with a deverbal agentive-*er*, as in (36) and (37).

(36) klap-er-aar
clap-ER$_{\text{PLURACTIONAL}}$-AAR$_{\text{AGENTIVE}}$
'flapper'

(37) kiep-er-aar
tumble-ER$_{\text{PLURACTONAL}}$-AAR$_{\text{AGENTIVE}}$
'tumbler'

[87] In Dutch certain affixes may be repeated without any semantic or syntactic effect caused by the repetition. It is, for example, possible to reduplicate the comparative affix in informal speech, e.g. *groterder* (Lit. big-er-er). The form *groterder* does not differ in meaning or use from the regular form *groter* 'bigger'.

The fact that the agentive suffix *-er* can combine with the pluractional suffix *-er* indicates once again that they are homonyms. I take the combinability of two affixes with the same form as positive evidence for homonymy.

In principle, the denominal agentive suffix *-er* should be able to occur above the deverbal one if these affixes were different VIs. However, they do not, as the following examples illustrate.

(38) * schrijv-er-aar
write-$ER_{DEVERBAL}$-$AAR_{DENOMINAL}$
Intended: 'someone who is in one way or another involved with authors'

(39) * print-er-aar
print-$ER_{DEVERBAL}$-$AAR_{DENOMINAL}$
Intended: 'someone who is in one way or another involved with printers'

The examples in (38) and (39) are as illicit as **bakeryery*. This is immediately accounted for if it is assumed that both agentive affixes are the same affix and therefore do not co-occur.[88]

To summarize, if affixes with the same form can co-occur they are homonyms, if they cannot they may not be homonyms.

4.2.4 Test #3: Homonyms do not have the same synonyms

Homonyms do not have the same synonym(s). I define synonymy in (40).

(40) Vocabulary items are synonyms if they have the same or a very similar meaning in at least one of their uses.

Clear homonyms, such as *too* and *two*, do not have the same synomyms. For instance, *also*, which is a synonym of the English word *too*, is not a synonym of *two*.[89] If it were, this would be due to a sheer coincidence.

[88] Note, however, that the test is not conclusive in this direction. The illictness of (38) and (39) may be due to another reason.
[89] In the same vein, they do not have the same antonyms either.

This test can be applied to all affixes which have synonymous affixes. Below I present an example of how synonymy can indicate homonymy. In order to do so, I first present a synonymous affix of the deverbal agentive suffix *-er*. I then show that this synonymous affix is also a synonym of the denominal agentive affix *-er*. I conclude that the deverbal agentive suffix *-er* and the denominal one are homonyms.

The deverbal agentive suffix *-er* is a synomym of the agentive *-ant*. This is supported by the fact that they occasionally even attach to the same base VI, as shown in (41)-(42).[90]

(41) predik-er
preach-ER
'preacher'

(42) predik-ant
preach-ANT
'preacher'[91]

If *-ant* is also a synonym of the denominal suffix *-er*, the deverbal agentive suffix *-er* and the denominal one are not homonyms but one and the same suffix according to this test. Now observe the following examples. The denominal agentive suffix *-er* may express a profession which involves the base VI.

[90] I assume that the suffixes *-er* and *-ant* are not allomorphs as they do not share any phonological characteristics.

[91] In the Catholic church *prediker* and *predikant* are synonyms; both refer to a preacher. In the Protestant church they are not; a *prediker* is a preacher and a *predikant* is a clergyman.

(43) a. rechter
justice-ER
'judge'

b. wetenschap-er
science-er
'scientist'

The suffix *-ant* can be used in exactly the same way. It can attach to base VIs to form the name of a profession, as in (44).

(44) a. muziek-ant
music-ant
'musician'

b. komedie-ant
comedy-ant
'comic actor'

The examples above show that the suffix *-ant* is a synonym of both the deverbal and the denominal agentive suffix *-er*. As the deverbal and the denominal suffix *-er* share a synonym, they are not homonyms, but one and the same affix.

In contrast, the suffix *-ant* is not a synonym of the pluractional suffix *-er*. This indicates once again that the agentive suffix *-er* is a homonym of the pluractional suffix *-er*. In sum, if two phonologically identical affixes share the same synonym they are one and the same VI.

4.2.5 Conclusion

In this section I have presented a theory on homonymy. It enables us to decide on principled grounds whether affixes are homonyms or various instantiations of one and the same affix. The advantage of having such a theory is that one has criteria to detect homonymy. As such, homoymy is not adopted arbitrarily in an analysis, a welcome result.

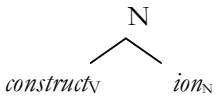
I have presented three tests for homonymy. Homonyms have different allomorphs and different synonyms and they can co-occur. In what follows I will only appeal to homonymy if the VIs pass these tests.

4.3 Multicategorial affixes

4.3.1 Introduction

It is generally assumed that suffixes and a subgroup of the prefixes determine the category of the word of which they are the head (Williams 1981:249). For example, *-ion* assigns the category N to the word *construction*. This is illustrated in (45) (the structure is taken from Williams 1981:249).

(45)



In (45) the suffix *-ion*, which is marked as nominal in the lexicon, is the head of the word. It therefore projects and assigns the category N to the entire derived structure. As such, the suffix determines the category of the complex word.

In this section I present data which are problematic for this traditional analysis. As I shall show, about 20% of the Dutch affixes[92] do not unequivocally determine the category of the word they occur in. Under traditional approaches, this is unexpected. Such approaches need to have recourse to additional assumptions to account for these data. Under the present proposal which refutes categorial heads, however, this situation is what we expect: since derivational affixes are devoid of a category indication, we expect the items they form to be able to occur under many different kinds of functional superstructure. The present section focuses on these multicategorial affixes. I postpone the discussion of the remaining 80% of the affixes to section 4.4.

[92] In what follows I ignore prefixes which have never been analyzed as category-changing, such as *contra-*, as in *contraproductive* and *pseudo-*, as in *pseudo-intellectual*. The term *affixes* thus comprises all

4.3.2 Affixes may express more than one category

4.3.2.1 Introduction

One fifth of the Dutch affixes does not determine the category of the derivation they occur in. In other words, they do not always yield the same category. Below I present the relevant data. I start the discussion with some specific examples. I then give an overview of the behavior of Dutch affixes.

4.3.2.2 Suffixes that can be found under a nominal and adjectival superstructure

Dutch has 143 affixes.[93] Twenty-one of them yield both nouns and adjectives. The suffix *–eel* and its allomorphs *-ieel*, *-ueel, -aal*, *-icaal*, *-onaal* and *-iaal*, for example, show this behavior.

(46) de intellect-ueel
the intellect-UEEL
'the intellectual'

(47) de koloni-aal
the colony-AAL
'the colonial'

(48) Zij is intellect-ueel-er dan haar vader.
she is intellect-UEEL-COMPARATIVE than her father
'She is more intellectual than her father.'

(49) een koloni-aal-e stijl
a colony-IAAL-COMMON style
'a colonial style'

---

suffixes and those prefixes which have been analyzed as category assigners, such as *en-*, as in *enlarge*.

[93] This number is based on the inventory of affixes in de Haas & Trommelen (1993).

The determiner in (46) and (47) shows that *intellectueel* and *koloniaal* can be used as nouns. In the same vein, the comparative in (48) and the adjectival inflection in (49) show that the same derived forms can be used as adjectives.

It is not true that *-eel* systematically realizes one category and that the other category is systematically derived via a conversion mechanism. The affix *-eel* and its allomorphs can derive forms which only have a nominal status, as *houweel* 'pickax' and *bureel* 'office' or which only can be used as adjectives, such as *universeel* 'universal' and *paradoxaal* 'paradoxal'. As such, it is not the case the the nouns result from a systematic conversion of adjectives or vice versa. More generally, *-eel* is not marked for a specific category.

Note that homonymy is not at play here either; the affix which occurs in the nouns is the same vocabulary item as the one which occurs in the adjectives. This can be concluded if we apply the tests for homonymy presented in section 4.2. For one thing, the affixes have the same allomorphs.[94] The examples below illustrate for each allomorph that it can occur both in nouns and adjectives. The *a*-examples are used as nouns, the *b*-examples are used as adjectives.

(50) *-eel*

a. het mor-eel
   the mor-AAL
   'the morale'

   het person-eel
   the person-EEL
   'the staff'

b. de mor-eel-e verplichting
   the mor-EEL-INFL obligation
   'the moral duty'

[94] Their distribution is not determined by phonology, but by eytmology (see the lemma -EEL in De Vries and te Winkel 2001).

de univers-eel-e waarde
the univers-EEL-INFL value
'the universal value'

(51) *-ieel*

a. het potent-ieel
the potent-IEEL
'the potential'

het different-ieel
the different-IEEL
'the differential'

b. het karakter-ieel-e profiel
the character-IEEL-INFL profile
'the personality profile'

de offic-ieel-e opening
the offic-IEEL-INFL opening
'the official opening'

(52) *-ueel*

a. de homosex-ueel
the homosex-UEEL
'the homosexual'

de convent-ueel
the convent-UEEL
'the conventual'

b. de homosex-ueel-e jongen
the homosex-UEEL-INFL boy
'the homosexual boy'

de contract-ueel-e verplichting
the contract-UEEL-INFL obligation
'the contractual obligation'

(53) *-aal*

a. de liber-aal
the liber-AAL
'the liberal'

het kapit-aal
'the capit-AAL
'the capital (i.e. wealth in the form of money)'

b. de liber-aal-e politicus
de liber-AAL-INFL politician
'the liberal politician'

de kapit-aal-e fout
the capit- AAL-INFL error
'the capital error'

(54) *-icaal*

a. de vert-icaal
the vert-ICAAL
'the vertical'

de rad-icaal
the rad-ICAAL
'the radical'

b. de vert-icaal-e lijn
the vertic-AAL-INFL line
'the vertical line'

het nonsens-icaal-e antwoord
the nonsens-ICAAL-INFL answer
'the nonsensical answer'

(55) *-naal*

a. de marge-i-naal
the margin-LP-NAAL
'the outcast'

het passie-o-naal
the passion-LP-NAAL
'the passional'

b. de marge-i-naal-e groep
the margin-LP-AAL-INFL group
'a fringe group'

de regio-naal-e overheid
the region-NAAL-INFL overheid
'the regional government'

(56) *-iaal*

a. het equator-iaal
the equator-IAAL
'the equatorial telescope'

het glac-iaal
het glac-IAAL
'the ice age '

b. de pest-iaal-e ziekte
the pest-IAAL-INFL power
'the pestlike disease'

het glac-iaal-e dal
the glac-IAL-INFL valley
'the glacial valley'

The examples show that the suffix which is used in the nouns and the one which is used in the adjectives have exactly the same (non-phonologically conditioned) allomorphs. I conclude that they are the same vocabulary item.

Further, the suffixes cannot co-occur. This is shown in (57)-(58).

(57) * de nonsens-icaal$_{A}$-aal$_{N}$
the nonsense-ICAAL-AAL
Intended: 'someone or something which is nonsensical'

(58) * het convent-ueel$_{N}$-eel$_{A}$-e leven
the convent-UEEL-EEL-COMMON life
Intended: 'the conventual life'

The fact that these suffixes do not co-ocur is immediately accounted for if we accept that they are one and the same vocabulary item.

Moreover, both for the nominal and the adjectival use of *-eel* and its allomorphs the same synonyms can be found. The suffix *-eel* and its allomorphs can be used to derive the name of a phoneme and the corresponding adjective. The noun is shown in (59), the adjective in (60).

(59) de guttur-aal
the guttur-AAL
'the guttural'

(60) de guttur-aal-e klank
the guttur-AAL-INFL sound
'the guttural sound'

The suffix *-ief* can be used for the same purpose. (61) is refers to a phoneme, (62) is the corresponding adjective.

(61) de plos-ief
de plos-IEF
'the plosive'

(62) de plos-iev-e klank
the plos-IEF-INFL sound

Both the nominal and the adjectival suffix *-eel* thus have the same synonym, viz. *-ief*. When two instances of a suffix have the same synonym, they are the same vocabulary item and not homonyms. In sum, claiming that there are two affixes *-eel*, viz. a nominal and an adjectival one, obscures the fact that they have the same allomorphs and synonyms and that they cannot co-occur. I therefore conclude that every *-eel* is an instance of the same VI. This VI is not nominal as it can derive adjectives, but it is not adjectival either as it can derive nouns. I conclude that it is category neutral.

The suffix *-eel* is far from an isolated case in Dutch. There are 21 suffixes which can derive both nouns and adjectives and for which there is no reason to assume they are homonyms (see section 4.2). A complete list is given in (63).

(63)

suffix	N	A
-air	*diamantair*	*elementair*
	'diamond dealer'	'elementary'
-oot	*malloot*	*idioot*
	'scatterbrain'	'idiotic'
-(o)ide	*asteroïde*	*paranoïde*
	'asteroid'	'paranoid'
-ieur	*interieur*	*inferieur*
	'interior'	'inferior'
-aan	*mohammedaan*	*momentaan*
	'Muhammadan'	'momentary'
-aat	*kandidaat*	*accuraat*
	'candidate'	'accurate'
-ant/-ent	*communicant*	*arrogant*

	‘communicant’	‘arrogant’
	solvent	*coherent*
	‘solvent’	‘coherent’
-é	*exposé*	*privé*
	‘account’	‘private’
-iel	*debiel*	*fragiel*
	‘imbecile’	‘fragile’
-iet	*meteoriet*	*erudiet*
	‘meteorite’	‘erudite’
-oos	*leproos*	*mucoos*
	‘leper’	‘mucous’
-t	*product*	*abstract*
	‘product’	‘abstract’
-(e)ling	*tweeling*	*mondeling*
	‘twins’	‘oral’
-el	*aquarel*	*naturel*
	‘aquarelle’	‘natural’
-er	*bakker*	*Groninger*
	‘baker’	‘from Groningen’
-eel/-aal	*bureel*	*paradoxaal*
	‘office’	‘paradoxical’
-iek	*motoriek*	*sympathiek*

	‘locomotion’	‘congenial’
-ief	*collectief*	*foutief*
	‘collective’	‘wrong’
-oir	*urinoir*	*notoir*
	‘urinal’	‘notorious’
-ikoos	*abrikoos*	*studentikoos*
	‘apricot’	‘studentlike’
-en	*Zweden*	*houten*
	‘Sweden’	‘wooden’

The list above shows that it is common for an affix to form both nouns and adjectives. Below I discuss affixes which are ambiguous between other categories.

4.3.2.3 Suffixes that can be found under a nominal and verbal superstructure

The suffix *-el/-er* derives both nouns and verbs. The examples in (64)-(66) are nouns, (67)-(69) are verbs.

(64) een krab-el
a scratch-EL
‘a scribble’

(65) een trom-el
a drum-EL
‘a drum’

(66) een klont-er
a lump-ER
‘a lump’

(67) krab-el-en
scratch-EL-INFINITIVE
'to scrawl'

(68) trom-el-en
drum-EL-INFINITIVE
'to drum'

(69) klont-er-en
lump-ER-INFINITIVE
'to lump'

Note that the fact that a suffix can occur both under nominal and verbal functional structure indicates that a featural decomposition of categories cannot be used to account for multicategorial affixes. One could argue to decompose categories in a feature matrix as in 0 (see Chomsky 1981 and chapter 6 section 6.1.2). In 0 categories are defined by feature matrices, i.e. categories are defined by specific combinations of features. The table shows that two binary features, viz. V and N define four lexical categories, viz. V, N, A and P.

(70)

	V	N
Verb	+	_
Noun	_	+
Adjective	+	+
Preposition	_	_

For an affix such as *-eel* which derives both adjectives and nouns (see section 4.3.2.2) it is reasonable to assume that *-eel* realizes the feature [+N]. Although this account succesfully derives the multicategorial behavior of *-eel* , it predicts that affixes never realize both verbs and nouns as these categories do not share a feature. This section shows, however, that the multicategorial behavior of

affixes is not restricted to those categories which share a value. Hence, a feature matrix cannot be used to account for multicategorial affixes.

4.3.2.4 Suffixes that can be found under an adjectival and verbal superstructure

The suffix *–ig* derives both adjectives, as in (71)-(73), and verbs, as in (74)-(76).

(71) een maat-ig-e belangstelling
a measure-IG-INFL interest
'a moderate interest'

(72) een wet-ig-e echtgenote
a law-IG-INFL wife
'a lawful wife'

(73) een hart-ig-e hap
a heart-IG-INFL snack
'a savoury snack'

(74) maat-ig-en
measure-IG-INFINITIVE
'to moderate'

(75) wet-ig-en
law-IG-INFINITIVE
'to legitimate'

(76) steen-ig-en
steen-IG-INFINITIVE
'to stone'

4.3.2.5 Suffixes that can be found under an adverbial and adjectival superstructure

The suffix *-(e)lijk* is used to derive both adjectives and adverbs. Example (77) shows an adjective, (78) an adverb.[95]

(77) de sterf-elijk-e mens
the die-ELIJK-INFL human.being
'the mortal man'

(78) Zij werd vals-elijk beschuldigd.
she became false-ELIJK accused
'She was falsely accused'

Dutch thus has an affix which can derive both adjectives and adverbs.

4.3.2.5 Multicategorial prefixes

Dutch has 5 category-defining prefixes.[96] Four of them form both verbs and nouns. These are *be-*, *ver-*, *ont-* and *her-*.[97] The examples in (79), (81), (83) and (85) are nouns which are derived by means of these prefixes. The examples in (80), (82), (84) and (86) are verbs containing those same prefixes.

be-

(79) a. het be-leid
the BE-lead
'the policy'

[95] All Dutch adjectives can be used as adverbs. However, the reverse does not hold. The adverb *valselijk* 'falsely', for example, cannot be used as an adjective, e.g. **een valselijke beschuldiging*, Intended: 'a false accuse'.

[96] There is a sixth VI which may be considered to be a prefix, viz. *-er*. However, it is highly marginal as it only occurs in three verbs, viz. *erbarmen* 'to have mercy on', *erkennen* 'to recognize' and *ervaren* 'to experience'.

[97] The category-defining status of *her-* is in dispute. See de Haas and Trommelen (1993:89-94) for detailed discussion.

b. het be-zwaar
the BE-heavy
'the objection'

c. het be-roep
the BE-call
'the profession'

d. het be-raad
the BE-advise
'the consideration'

(80) a. be-plant-en
BE-plant-INFINITIVE
'to plant'

b. be-wierook-en
BE-insence-INFINITIVE
'to praise'

c. be-loov-en
BE-laud-INFINITIVE
'to promise'

d. be-zorg-en
BE-care-INFINITIVE
'to provide'

ver-

(81) a. het ver-keer
the VER-turn
'the traffic'

b. het ver-tier
the VER-yell
'the amusement'

c. het ver-lof
the VER-LOF
'the permission'

(82) a. ver-wacht-en
VER-wait-INF
'to expect'

b. ver-brand-en
VER-burn-INF
'to burn'

c. ver-mager-en
VER-meager-INF
'to loose weight'

(83) a. de her-komst
the HER-coming
'the origin'

b. het her-stel
the HER-put
'the recovery'

(84) a. her-waardeer-en
HER-appreciate-INF
'to revalue'

b. her-enig-en
HER-unite-INF
'to reunite'

(85) a. het ont-zag[98]
the ONT-see
'the respect'

b. het ont-zet
the ONT-set
'the liberation'

(86) a. ont-duik-en
ONT-dive-INF
'to evade'

b. ont-maagd-en
ONT-virgin-INF
'to deflower'

The affix *ge-* yields nouns, as in (87), verbs, as in (88) and adjectives, as shown in (89).

(87) a. het ge-bit[99]
the ge-bite
'the teeth'

[98] *Zag* is a stem allomorph of *zie* 'see'.
[99] *Bit* is a stem allomorph of *bijt* 'bite'. The word *gebit* refers to a set of teeth.

b. het ge-bed[100]
the GE-pray
'the prayer'

(88) a. ge-loov-en
GE-loov-INF
'to believe'

b. ge-draag-en
GE-bear-INF
'to conduct'

(89) ge-trouw
GE-loyal
'loyal'

Prefixes thus commonly derive more than one category. Most of them can be used to derive at least both nouns and verbs.

4.3.2.6 Overview

I have presented 29 Dutch affixes which are multicategorial. 24 of them are suffixes, 5 are prefixes. Dutch has a total of 143 affixes.[101] 29/143 or 20% of the affixes derives more than one category. The multicategorial character is most outspoken for the prefixes. They all merge under more than one category. The vast majority of the ambiguous suffixes, i.e. 87,5%, forms both nouns and adjectives.

In sum, in this section I have shown that affixes do not necessarily attach to only one single category. In fact, one fifth of the Dutch affixes forms words of different categories.

[100] *Bed* is a stem allomorph of *bid* 'pray'.

[101] A list of affixes which only yield one category can be found in section 4.4.

4.3.3 Conclusion

One fifth of the Dutch affixes can derive more than one category. Multicategorial affixes are thus not a marginal phenomenon.[102] This conclusion is incompatible with the view that affixes determine the category of the word they are a part of. Under the assumption that derivational affixes do not express categorial heads, however, their categorially hybrid nature follows immediately. Nevertheless, if derivational affixes do not express a category at all one would expect that *all* affixes can occur under *all* categories. This is clearly not borne out. The next section addresses this issue.

4.4 The conversion paradox

4.4.1 Introduction

If derivational affixes do not express categorial features, it is predicted that any word formation process can express any category. In other words, the present model predicts (90)a to be licit in English, contrary to fact. In the same vein, (90)b is wrongly ruled in for Dutch.

(90) a. * to ugliness

b. * lelijk-heid-en
ugly-HEID-INFINITIVE
Intended: * 'to ugliness'

Recall from section 4.3 that derivational affixes do not realize categorial features. As such, the derivation *ugliness* in (90)a and its Dutch counterpart in (90)b are not nominal or nominalized in any sense. In principle then, it should be possible to merge them with verbal functional projections. Yet, these examples are illicit. Consequently, the proposal at hand seems to be empirically

[102] And see Beard (1995) for similar considerations. Beards even concludes that the phenomenon is universal.

inadequate in that it vastly overgenerates. However, in what follows I show that these examples are not problematic for the hypothesis that derivational affixes do not realize categorial heads.

4.4.2 The conversion paradox

The claim I wish to defend here is that the fact that **to ugliness* is not ruled out is a problem that is by no means specific for the present proposal. Approaches which propose that affixes are categorial heads face the same problem. The problem persists in approaches wich have a conversion mechanism in addition to categorial heads ((Marchand 1969, Williams 1981, Selkirk 1982, Halle & Marantz 1993, Harley and Noyer 1999). In what follows I discuss this issue more in detail. I will further suggest that the problem is not a syntactic problem.

The view that affixes are derivational heads necessitates a conversion mechanism to derive all data. To see this, consider the following examples:

(91) a. to proposition
b. to picture

(92) a. tuin-ier-en
garden-IER-INFINITIVE
'to garden'

b. kwart-et-en
quarter-ET-INFINITIVE
'to play 'kwartet', i.e. a specific game'

c. het ver-keer
the VER-turn
'the traffic'

d. een analfab-eet-e student
an analfab-eet-INFL student
'an analfabetic student'

The English suffixes *-tion*, as in (91)a, and *-ure*, as in (91)b, and the Dutch suffixes *-ier* and *-et* in (92)a-b are traditionally seen as nominalizers, yet they can also surface as the only overt affix in a verb. Similarly, the Dutch prefix *ver-* in (93)c has traditionally been described as a verbalizer, although the example is a noun. In (93)d the suffix *-eet* which is conventionally taken to be a nominalizer appears in an adjective. Note that these affixes deviate from the multicategorial ones in section 4.3. The ones under discussion in the present section prototypically derive words which typically merge under one specific superstructure. As such, the formations in (92) are exceptional. They do not indicate a general pattern for these suffixes. To derive these data, both traditional approaches (Marchand 1969, Williams 1981, Selkirk 1982) and approaches within the framework of Distributed Morphology rely on zero affixes for conversion. This is illustrated in (93)-(94).

(93) a. proposi-tion$_N$-$\varnothing_V$
b. pict-ure$_N$-$\varnothing_V$

(94) a. ver$_V$-keer-$\varnothing_N$
VER-turn-$\varnothing$
'traffic'

b. kwart-et$_N$-$\varnothing_V$
quarter-ET-$\varnothing$
'to play old maid'

c. tuin-ier$_N$-$\varnothing_V$
garden-IER-$\varnothing$
'garden$_V$'

d. een analfab-eet$_{N}$-∅$_{A}$-e student
an analfab-eet-∅-INFL student
'an analfabetic student'

The derivations in (93)-(94) show that a conversion mechanism is required to derive the examples in (91)-(92). More generally, a model in which affixes are categorial heads needs to provide a conversion mechanism.[103] Otherwise, it would undergenerate.

The conversion mechanism which rules in (91) has the unwanted side-effect of allowing for *to ugliness* as well, as this verb has the same structure as (93). This is shown in (95) for English and in (96) for Dutch.

(95) * ugli-ness$_{N}$-∅$_{V}$

(96) * lelijk-heid$_{N}$-∅$_{V}$
ugly-HEID-∅

Under traditional assumptions the illicit formation *to ugliness* has the same structure as the licit derivation *to proposition*. Both contain a nominalizing suffix on top of which a zero verbalizing one is merged. However, sometimes this structure is well-formed, other times it is not. I will call this puzzle the conversion paradox.[104]

There are models which do not assume a conversion mechanism based on zero affixes. The Exo-Skeletal Model (Borer 2005a,b, 2009a,b,c) is an example. In this framework all overt derivational affixes are assumed to be categorial heads. However, productive zero affixes are assumed not to exist. The advantage of such a model is that it immediately derives the illicitness of *to ugliness*. The suffix *-ness* is taken to be a nominalizer and the derived word form cannot be converted. Hence, a verbal use of *ugliness* is straightforwardly

[103] Note that I have discussed in section 4.2 that appealing to homonymy to account for these data is not an option.
[104] The word *paradox* does not refer to a logical paradox here.

excluded. However, as a side-effect it wrongly rules out *to proposition*.[105] In sum, although it succesfully rules out the illicit word forms, it fail to allow for the licit ones. This illustrates that excluding a conversion mechanism does not solve the problem of the conversion paradox.

The conversion paradox constitutes a problem for all models. They all have to allow and exclude one and the same structure. Traditional models have not succeeded in accounting for the conversion paradox.

Unlike the approaches just discussed, the present proposal has no problem with affixes that sporadically or regularly occur under more than one kind of superstructure, since it assumes that derivational affixes do not express a category. I succesfully account for both the nominal and verbal use of *to proposition*, for example. On the downside, I do not capture the fact that *to ugliness* is illformed, but as I have shown, this is a problem that surfaces in one way or another in approaches that assume that derivational affixes express categorial heads as well.

In sum, all proposals suffer from the same explanatory inadequacy. However, the present model deviates from the traditional ones; I have taken flexibility as a theoretical primitive. If one does not propose categorial features, one does not need a conversion mechanism either. The net result in empirical adequacy is the same, but the apparatus is far simpler.

4.4.3 The conversion paradox may not be a syntactic problem

In the previous section I have shown how syntactic models fail to capture the conversion paradox. In this section, I want to speculate on the possible reasons for this state of affairs. The reason that syntactic models are not designed to account for the conversion paradox may simply be that it is not a morphosyntactic problem to begin with. Although we know that *to ugliness* is illformed, we do not know what causes this illformedness. There is no *a priori* reason to assume that it is caused by syntax and not by another module. Chomsky (1965:10-11) points out that grammaticality is only one of many factors that can determine acceptability. In other words, we do not know

[105] Hagit Borer (p.c.) assumes that the verb *proposition* is not morphologically complex.

whether *to ugliness* is ungrammatical, we only know it is unacceptable (see Chomsky 1965:10-11 on acceptability vs. grammaticality). Syntax under this view is by no means the only cause of unacceptability. Encyclopedia for one may fail to connect a meaningful interpretation to some syntactically well-formed forms. For another, we may have pragmatic reasons to reject a word form (see Clark and Clark 1979). Thirdly, we may find some words unacceptable simply in virtue of a convention, such as when we would be giving a girl's name to a boy. In what follows I conjecture that the conversion paradox is not a syntactic problem.

Recapulating, there are three groups of affixes. Some, such as the Dutch suffixes *-eel* and *-ig* systematically derive more than one category (see section 4.3). The relevant examples are repeated below.

(97) de intellect-ueel
the intellect-UEEL
'the intellectual'

(98) Zij is intellect-ueel-er dan haar vader.
she is intellect-UEEL-COMPARATIVE than her father
'She is more intellectual than her father.'

(99) een maat-ig-e belangstelling
a measure-IG-INFL interest
'a moderate interest'

(100) maat-ig-en
measure-IG-INFINITIVE
'to moderate'

The example in (97) shows that *-eel* can be used to derive a noun, while in (98) it derives an adjective. In (99) the suffix *-ig* is used to derive an adjective, whereas in (100) it appears in a verb. These examples are not exceptions; the affixes appear fully regularly in different categories. Other affixes, such as the

Dutch affix *-ier* (cf. (91)) and the English affix *-tion* (see (91)) only sporadically occur under a verbal structure; they most often occur under a nominal structure. A third group of affixes are exclusively tied to one category. Below I list all Dutch affixes which fall into this category. List (101) gives an overview of all affixes which merge only with a nominal superstructure. The affixes in (102) are only compatible with an adjectival functional structure. The ones in (103) are always adverbial, and the ones in (104) are invariably verbal. Note that these lists are the complements of the lists in section 4.3, which show the affixes that are compatible with more than one category.

(101) Affixes which only merge with a nominal functional structure[106]

-aard / -erd	slim-erd smart-ERD 'smart person'
	dronkaard drunk-AARD 'alcoholic'
-erik	dom-erik dumb-ERIK 'dumb person'
-and	heil-and salvation-AND 'Savior'
-(i)aan	Freud-iaan Freud-IAAN 'Freudian'

[106] In traditional terms these affixes are called nominalizers.

	ultramont-aan ultramont-AAN 'ultramontane'
-ied	Ajax-ied Ajax-IED 'supporter of Ajax'
-ein	republik-ein republic-EIN 'republican'
-ino	signor-ino signor-INO 'signorino'
-ees	Chin-ees Chin-EES 'Chinese'
-ijn	Argent-ijn Argentin-IJN 'Argentinian'
	tamboer-ijn tambour-IJN 'tambourin'
-(at)eur	direct-eur direct-EUR 'principal'
-ier [je]	cabaret-ier

	cabaret-IER 'someone who performs cabaret'
-ien	electric-ien electric-IEN 'electrician'
-icus	music-us music-US 'musician'
-arius	ordin-arius ORDIN-ARIUS 'full professor'
-aris	bibliothec-aris BIBLIOTHEC-ARIS 'librarian'
-ist	compon-ist compos-IST 'composer'
	social-ist social-IST 'socialist'
-ast	gymnasi-ast gymnasi-AST 'gymnasium pupil'
-ans, pl: -antia	stimul-ans stimul-ANS

	‘stimulator’
	stimul-antia
	stimul-ANTIA
	‘stimulating drugs’
-ioen	kamp-ioen
	champ-IOEN
	‘champion’
-eut	techn-eut
	techn-EUT
	‘technician’
-urg	chir-urg
	surg-URG
	‘surgeon’
-oor	past-oor
	past-OOR
	‘pastor’
-man	Frans-man
	French-MAN
	‘Frenchman’
-een	Chil-een
	Chil-EEN
	‘Chilean’
-i	Irak-i
	Iraq-I
	‘Iraqi’

-es	prins-es prince-ES 'princesse'
-ster	arbeid-ster labor-STER 'lady worker'
-in	koning-in king-IN 'queen'
-se	schipper-se shipper-SE 'shipper's wife / lady shipper'
	exta-se ecsta-SE 'ecstasy'
-egge	diev-egge thief-EGGE 'female thief'
-e	student-e student-E 'female student'
-euse	mass-euse mass-EUSE 'masseuse'

-rice	direct-rice direct-RICE 'lady principal'
-ière	cabaret-ière cabaret-IÈRE 'woman who performs cabaret'
-ienne	comed-ienne comed-IENNE 'lady comedian'
-ette	brun-ette brun-ETTE 'brunette'
-ine	blond-ine blond-INE 'blonde'
-ica	polit-ica polit-ICA 'lady politician'
-esse	bibliothecar-esse BIBLIOTHECAR-ESSE 'lady librarian'
-ina	baller-ina baller-INA 'ballerina'
-itsa	tsar-itsa

	tsar-ITSA
	‘tsarina’
-ka	judo-ka
	judo-KA
	‘judoka’
-ië	Belg-ië
	Belg-IË
	‘Belgium’
-ije	Hongar-ije
	Hungar-IJE
	‘Hungary’
-(i)stan	Pak-istan
	Pak-ISTAN
	‘Pakistan’
-age	person-age
	person-AGE
	‘character’
-ij	schilder-ij
	painter-IJ
	‘painting’
-ing	verloov-ing
	engage-ING
	‘engagement’
-sel	brouw-sel
	brew-SEL

	‘brewed stuff (pejorative)’
-(e)nis	beeld-enis image-ENIS ‘statue’
-st	kom-st come-ST ‘coming’
-heid	lelijk-heid ugly-HEID ‘uglyness’
-te	wijd-te wide-TE ‘width’
-dom	heilig-dom holy-DOM ‘sanctuary’
-schap	vriend-schap friend-SCHAP ‘friendship’
	heer-schap lord-SCHAP ‘man (pejorative)’
-(at)or	transform-ator transform-ator

	‘transformer’
	communic-ator communic-ATOR ‘communicator’
-rix	dominat-rix dominate-RIX ‘dominatrix’
-de	lief-de love-DE ‘love’
-elaar	pruim-elaar plum-ELAAR ‘plum tree’
ge- -te	ge-vogel-te GE-bird-TE ‘fowl’
-ie (stressed)	morfolog-ie morpholog-IE ‘morphology’
-ie (unstressed)	agress-ie agress-IE ‘aggression’
-iteit	ident-iteit ident-ITEIT

	‘identity’
-isme	commun-isme commun-ISME ‘communism’
-asme	org-asme org-ASME ‘orgasm’
-ade	limon-ade lemon-ADE ‘lemonade’
-(e)ment	isol-ement isol-EMENT ‘isolation’
-itis	bronch-itis bronch-ITIS ‘bronchitis’
-uur	kwets-uur hurt-UUR ‘injury’
-ure	doubl-ure double-URE ‘understudy’
-aire	document-aire document-AIRE ‘documentary’

-erie	parfum-erie perfume-ERIE 'parfumerie'
-ma	lem-ma lem-MA 'lemma'
-eem	lex-eem lex-EEM 'lexeme'
-icon	lex-icon lex-ICON 'lexicon'
-tje	uit-tje out-TJE 'day trip'
-um	muse-um muse-UM 'museum'
-arium	dolfin-arium dolphin-ARIUM 'dolphinarium'
-us	abort-us abort-US 'abortian'

-men	exa-men exam-MEN 'exam'
-ale	univers-ale universe-ALE 'universals'
-ix/-ex	ind-ex ind-EX 'index'
-ium	chroom-ium chrome-IUM 'chromium'
-ase	prote-ase prote-ASE 'protease'
-ose	sacchar-ose sacchar-OSE 'saccharose'
-ol	glyc-ol glyc-OL 'glycol'
-is	bas-is base-IS 'basis'
-yl	vin-yl

vin-YL
'vinyl'

(102) Affixes which only merge with an adjectival functional structure

-baar	eet-baar eat-BAAR 'edible'
-zaam	een-zaam one-ZAAM 'lonely'
-erig	lach-erig laugh-ERIG 'giggly'
-achtig	groen-achtig green-ACHTIG 'greeny'
-(e)loos	draad-loos thread-LOOS 'wireless'
-s	jood-s jew-S 'jewish'
-(e)lijks	maand-elijks month-ELIJKS 'monthly'

-end	woede-end rage-END 'enraged'
ge- -t/-d	ge-spier-d GE-muscle-D 'muscled'
-isch	film-isch film-ISCH 'filmic'
-eus	nerv-eus nerve-EUS 'nervous'
-abel/-ibel	discut-abel discuss-ABEL 'discussable'
	suggest-ibel suggest-IBEL 'suggestible'

(103) Affixes which only merge with an adverbial functional structure

-gewijs	druppel-gewijs drop-GEWIJS 'gradually'

-erwijs	logisch-erwijs logical-ERWIJS 'logically'
-weg	simpel-weg simple-WEG 'simply'
-halve	ambt-s-halve profession-LP-HALVE 'in virtue of on's office'
-iter	normaal-iter normal-ITER 'normally'
-waarts	huis-waarts home-WAARTS 'homewards'

(104) Affixes which only merge with a verbal functional structure

be- -ig	be-schade-ig-en BE-damage-IG-INFINITIVE 'to damage'
ver- -ig	ver-een-ig-en VER-one-IG-INFINITIVE 'to unify'
-eer	halv-eer-en half-EER-INFINITIVE

'to halve'

It is not obvious what causes these affixes to select for a specific category of functional structure. I shall present evidence from nonce formation suggesting that their monocategorial nature may be due to convention.

The lists above describe the typical use of these affixes in Standard Dutch such as it can be found in both the descripitive and theoretical morphological literature. As such, they do not necessarily give an accurate picture of the actual data that can be found. A closer look at corpus data in fact suggests that the affixes in the lists above do occur under an atypical functional structure in nonce formations. A sample taken from Google is given in (105).

(105) a. Kun je je vingers nog een beetje bewegen
can you your fingers still a little move
of zijn ze nog te zeer **ge-kwets-uur-d**?[107]
or are they still too much GE-hurt-UUR-D
Lit.: 'Can you move your fingers a little or are they too badly injury-ed?'
Intended: 'Can you move your fingers a little or are they too badly injured?'

b. En ik heb net **ge-boer-in-d** onder werktijd.
and I have just GE-farmer-IN-D during worktime
Lit.: 'And I have just lady farmered during work.'
Intended: 'And I have just played the game in which my avatar is a female farmer during work.'[108]

[107] The circumfix *ge- -d/-t* forms the past participle of the verb and as such indicates that the word form is used verbally.
[108] The exact meaning of *geboerind* was deducible from the context in which the example was found.

c. Er werd getekend, geknutseld, gedanst
there became drawn assembled, danced
en **ge-prins-es-t** dat het een lieve lust was.
and GE-prince-ES-T that it a sweet lust was
Lit. 'They had drawn, did crafts, danced and princessed like there was no tomorrow.'

d. [ik] voel me heerlijk **ge-onderwijzer-es-t**.
I feel me delightfully GE-teacher- ES-T
Lit. 'I feel delightfully female teachered.'

e. Nu is ie zelf **ge-abort-us-t** door een ultrachrist.
now is he self GE-abort-US-T by an ultrachrist
Lit. 'Now he is abortioned by an ultrachrist.'
Intended: 'Now he is aborted by an ultrachrist.'

f. **ge-schild-erij-d-e** muren
GE-paint-ERIJ-D-INFL walls
Lit.: 'paintinged walls'
Intended: 'walls with paintings'

g. Soms denk ik wel eens dat beleidsmakers
sometimes think I PRT PRT that policy.makers
een alfahoofdige maatschappij voorstaan waarin veel
an alpha.headed society defend in.which much
nagedacht, gepraat en **ge-kennist** wordt
reflected talked and GE-know-NIS-T becomes
maar weinig gebouwd, verbouwd of gemaakt.
but little built rebuilt or created
Lit.: 'Sometimes I think our leaders defend a society in which people reflect, talk and knowledge a lot, but in which they build, rebuild and create little.'
Intended: 'Sometimes I think our leaders defend a society in which people reflect, talk and know a lot, but in which they build, rebuild and create little.'

h. en de plek waar doorgaans **ge-draad-loos-d** wordt
and the place where generally GE-wire-LOOS-D becomes
Lit.: 'and the place where they are generally wirelessing'

i. die 15% van de **normaal-iter-e** premie bedraagt
that 15% of the normal-ITER-INFL premium amounts
Lit.: 'which amounts to 15% of the normally premium'
Intended: 'which amounts to 15% of the normal premium'

j. Kan je de bacteriedruk ook niet verminderen
can you the bacterium.pressure also not reduce
door een **druppel-gewijs-e** toediening
by a drop-GEWIJS-INFL administration
van sterk verdunde kp?
of strongly diluted *kp*[109]
Lit.: 'Isn't it also possible to reduce the pressure of the bacteria by dropwise administering highly diluted'
Intended: 'Isn't it also possible to reduce the pressure of the bacteria by administering highly diluted *kp* drop by drop?'

k. want nu heb ik alleen je code nagekeken
because now have I only your code controlled
en een **logisch-erwijs-e** oplossing gegeven
and a logisch-ERWIJS-INFL solution given
Lit.: 'beause now I have only checked your code and given you a logicalwise solution'
Intended: 'beause now I have only checked your code and given you a logic solution'

Examples (105)a-k show word forms with affixes which only merge with nominal functional structure in Standard Dutch, yet in these examples they merge under a verbal structure. Example (105)f shows the verbal use of an affix which is only be compatible with an adjectival structure in Standard Dutch.

The existence of these examples of nonce formation may suggest that it is indeed convention which underlies the conversion paradox. Given that these nonce words exist, they did not crash at narrow syntax. Hence, the data suggest that they are excluded in Standard Dutch for non-syntactic reasons. More generally, what underlies the conversion paradox may ultimately not be anything very profound. That is, there might not be a deep reason why *-eel* systematically occurs under several categories, whereas *-eet* only sporadically

[109] It did not become clear to me what *kp* stands for in this context.

does so in Standard Dutch, and *-loos* only shows this behavior in marginal nonce words. Sheer convention may cause this division.

To conclude, the conversion paradox may not be a syntactic problem. For some affixes it is accepted that they occur under more than one type of functional structure, for others it is not. The reason may be sheer convention, as indicated by the existence of nonce words.[110]

4.4.4 Conclusion

In this section I have presented affixes which only merge with one type of functional structure. At first sight, they seem to pose an empirical problem for the model at hand, which incorrectly predicts that anything goes. However, I have shown that the present proposal has the same empirical coverage as traditional theories. I have pointed out that all models should allow for well-formed conversions. However, by allowing for conversions one cannot exclude illicit conversions. I have called this problem the conversion paradox. I have conjectured that syntactic models cannot capture it. Subsequently, I have proposed that it may not be syntax which underlies the conversion paradox. It

[110] One may wonder whether the vocabulary items the lists contain observe an obvious pattern. The answer is negative. The property of being monocategorial is not connected to any other property of the VI. For example, their productivity does not seem to be relevant. The lists contain both productive affixes, such as *-heid*, *-achtig* and *-loos* and unproductive ones, such as *-ka*, *-in* and *-egge*. It further contains both Germanic and non-Germanic affixes. The suffix *-heid* and the circumfix *ver- -ig*, for example, are Germanic, whereas *-arium* and *-ale* are Latinate. The suffix *-ka* is Japanese. One can also find affixes which attach to a Latinate bound stem, such as *-ibel* as well as affixes which attach to free base VIs, such as *-loos*. A phonological pattern does not show either. One can find stressed affixes, such as *-in* in *koningin* 'queen', *-eer* in *halveren* 'to halve' and *-ie* in *morfologie* 'morphology' alongside unstressed ones, such as *-isch* in *filmisch* 'filmic' and *-erig* in *lacherig* 'giggly'. There are affixes which impose a phonological word boundary between the free LVI and the affix and ones that do not. The affix *-(e)lijks*, as in *maandelijks* 'monthly', for example, does not impose a word boundary between the LVI *maand* 'month' and itself. This can be deduced from the fact that the final /d/ in *maand* 'month' is not devoiced, as final devoicing is a phonological process which takes place at word boundaries in Dutch. In contrast, the suffix *-loos* in *draadloos* 'wireless' does impose a word boundary between the LVI *draad* and itself, as indicated by the fact that the final /d/ in *draad* 'wire' is devoiced. Semantically, the following generalization can be drawn: all suffixes which mainly denote female gender or abstractness are exclusively restricted to nominal functional structures. However, the nonce words in (105) clearly show that the these affixes marginally do occur under a verbal structure as well.

may be the case that it is convention which draws the line between what belongs to the standard language and what does not.

4.5 Conclusion

In this chapter I have presented a theory on homonymy. More specifically, I have presented three tests for detecting it. By having an independent standard to appeal to homonymy morphological reasoning will gain explanatory adequacy.

I have then proposed that derivational affixes do not realize categorial heads. This hypothesis is supported by the existence of affixes which occur under several categories. Such multicategorial affixes constitute one fifth of the total affix inventory for Dutch. I concluded it is a common phenomenon.

Furthermore, I have argued that affixes which rigidly occur under one single category do not undermine the hypothesis. I have shown that all syntactic approaches fail to capture these data in a satisfying manner. I have called this problem the conversion paradox. This paradox entails that each approach should allow for *to proposition* while disallowing for *to ugliness*, in spite of the fact that both are the combination of a base VI and a nominalizing affix in traditional terms. To capture the licit examples any model should be flexible. Traditional models build in flexibility via a detour. They propose conversion mechanisms. This is how the present model deviates from the traditional ones; I have taken flexibility as a theoretical primitive. If one does not propose categorial features, one does not need a conversion mechanism either. The net result in empirical adequacy is the same, but the apparatus is far simpler. I have further suggested that the reason why syntactic approaches fail to account for the conversion paradox might be that it is not a syntactic problem. After all, it is possible to find licit nonce words which are predicted not to occur.

In sum, in this chapter I have shown that one can capture the distribution of derivational affixes with the same empirical adequacy if one does not assume that derivational affixes realize categorial heads as if one does assume them. Consequently, categorial heads should not be assumed for morphosyntactic purposes. In chapter 1 I have presented a proposal which argues that categorial

heads are not needed for syntactic purposes either (see chapter 1 sections 1.2 and 1.3.3). In short, categorial heads are not required as syntactic primitives.

5. *An alternative view on derivation*

5.1 Introduction

In the previous chapter I have argued against the existence of categorial heads in the structure. Consequently, derivational affixes cannot realize such categorial heads. In other words, the suffix *-ness* does not realize a nominal(izing) head as there is no such thing as a nominal(izing) head in the grammar. However, realizing a categorial head has traditionally been considered the main *raison d'être* for derivational affixes (see for example Marchand 1969, Williams 1981, Selkirk 1982 amongst many others) As such, my proposal calls for a rethinking of the function of derivational affixes. This will be carried out in the present chapter.

I first show that the meaning of derivational affixes is lexical, i.e. rich and contentful.[111] VIs with lexical meaning are by default LVIs. However, recall from the discussion on *stuk* and *heel* in chapter 3 that there is yet another type of VI with lexical meaning, viz. semi-lexical VIs. In short, VIs with lexical meaning are thus either LVIs or semi-lexical VIs. In this section I explore both options for derivational affixes. More specifically, I propose that derivational affixes are LVIs which realize RTNs by default. This idea is not unprecedented. Lowenstamm (2009, 2010) has proposed this view on phonological grounds (see also De Belder et al. 2009).[112] After showing that derivational affixes are

[111] Rich meaning is meaning which is not composed out of the meaning of functional features.

[112] Lowenstamm (2009, 2010) contrasts with the present proposal as he does not eliminate categorial heads. He assumes that all word forms contain a categorial head which is realized by means of a zero affix. De Belder et al. (2009) argue for a lexical position (which is arguably an RTN) for a derivational diminutive affix in various languages.

lexical, I present a case study on semi-lexical derivational affixes which derive collective nouns.

If derivational affixes realize RTNs it follows that derivational word forms are concatenations of RTNs. The base VI realizes the lowest RTN and the affixes realize the higher ones. I discuss the structure of such derivational word forms in detail in this chapter.

This chapter is structured as follows. In the next section, viz. section 5.2, I provide evidence for the claim that the meaning of derivational affixes is lexical. I conclude that they therefore realize an RTN by default. Section 5.3 contrasts with section 5.2. It presents a case study on semi-lexical derivational affixes, i.e. affixes with a functional role. Section 5.4 discusses the newly proposed structure for derivational word formation in detail. Section 5.5 focuses on the order of VIs in a derivational word form at Vocabulary Insertion and at the surface. The final section sums up and concludes.

5.2 Derivational affixes have lexical meaning

5.2.1 Introduction

Derivational affixes contribute meaning. The English affix *-ess* as in *princess*, for example, expresses femininity. This can be concluded from the minimal pair in (1) and (2).

(1) The prince$_i$ called his$_i$ Irish Setter.
(2) The princess$_i$ called her$_i$ Irish Setter.

One may wonder whether this meaning, viz. femininity, is functional or lexical. If it is functional, the affix realizes the syntactic feature [feminine] which can also be found in, for example, feminine pronouns. If it is lexical it is similar to an LVI such as *woman*. Note in this respect that the properties of the LVI *woman* -such as its lexical semantics- are irrelevant for the syntactic structure given the fact that I have argued for late insertion.

In this section I show that the meaning of all derivational affixes is lexical. In section 5.2.2 I first show that the meaning of derivational affixes is

malleable. This is a prototypical property of lexical meaning (see chapter 1 section 1.3.3). I then show that they can refer to kinds of matter (in section 5.2.3) and to artifacts and inventions (in section 5.2.4). As it has been argued that functional features cannot refer to kinds of matter, artifacts or inventions, this once again shows that the meaning of derivational affixes is lexical. I finally show in section 5.2.5 that derivational affixes do not constitute a closed class. This is relevant as lexical meaning is often associated with open classes. Section 5.2.6 concludes.

5.2.2 The denotation of derivational affixes is malleable

Borer (2005) provides a simple test to distinguish between functional and lexical meaning. Functional meaning is not malleable, whereas lexical meaning is. A past tense, for example, will always be interpreted as such regardless of the context.[113] Example (3) illustrates this.

(3) * Tomorrow I worked several hours.

The temporal adjunct *tomorrow* does not affect the temporal properties of the past tense; it is simply incompatible with it. Lexical meaning on the other hand can be molded by polysemy, metaphors, humor, syntactic and discourse context and so forth. An example, taken from Jackendoff (1991:17),[114] is given in (4).

(4) (One waitress says to another:)
The ham sandwich in the corner wants another cup of coffee.

It is clear in this example that *the ham sandwich* should be interpreted as 'the customer with the ham sandwich'. This is obviously not listed as the meaning

[113] Past tense can get a few other interpretations. For example, it can be interpreted conditionally. However, each of the various meanings is syntactic, rigid and listable. For example, if a past tense is used conditionally, it is rigidly interpreted as such. The relevant distinction is thus not whether a VI can get *several* interpretations. What is relevant, is the fact whether a particular interpretation is rigid and listable or malleable and context dependent.
[114] Jackendoff attributes the example to Nunberg (1979).

of *ham sandwich* in Encyclopedia. Rather, this information stems from the context; the use of *wants* suggest that the subject should be a voluntary agent, hence the hearer knows *ham sandwich* is used as a *pars pro toto* for a person. The system crucially relies on the fact that the most literal and common interpretation of *ham sandwich* is odd in the given context, and so the interpretation is molded in order to make sense. Only lexical meaning allows for this type of manipulation.

We can now apply this test to derivational affixes. If their meaning is fixed it is functional. If it can be manipulated and overridden, it is lexical. In what follows, I show that the semantics of affixes is flexible. Hence, I conclude that it is lexical.

Consider the suffix *–heid* for example. It contributes the notion of abstractness to the complex word containing it (de Haas & Trommelen 1993:247). An example is given in (5).

(5) schoon-heid
pretty-HEID
'beauty'

In principle, this abstract meaning could either result from a functional feature [abstract] which is realized by *-heid* or it could just be the lexical meaning of the suffix. In the former case it is predicted that the notion of abstractness is rigid, in the latter case context can alter it. Now observe that it is possible to override the abstract meaning of *-heid*. This is shown in (6).[115]

(6) Wat een schoon-heid!
what a pretty-HEID
'What a beauty!'

[115] Not all complex words with the suffix *-heid* can be used to refer to people having the property expressed by the word formation. However, there is no reason to expect regularity in the domain of encyclopedic semantics.

In example (6) the word *schoonheid* 'beauty' can get a concrete meaning. It may refer to a woman, for instance. The same phenomenon can be seen with the suffix *–nis*, which also has abstractness as its core meaning (de Haas & Trommelen 1993:245).

(7) hinder-nis
hinder-NIS
'hindrance'

(8) ken-nis
know- NIS
'knowledge/acquaintance'

The word *hindernis* has both an abstract and a concrete interpretation. It can refer either to an abstract notion or to a concrete thing that prevents progress. In the same vein, *kennis* can refer both to the abstract notion of knowledge or to a person one is acquainted with.

Another example comes from the suffix *-itis*. Both in English and Dutch it exclusively refers to inflammations, as in (9).

(9) a. bronch-itis
bronch- ITIS
'bronchitis'

b. hepat-itis
hepat- ITIS
'hepatitis'

c. vagin- itis
vagin- ITIS
'vaginitis'

However, this denotation is malleable. This is shown by the humoristic use of *-itis* in the Dutch example in (10) and the English ones in (11).

(10) aansteller-itis
poser- ITIS
'affectation'

(11) a. creditcarditis
b. Hollanditis

Consider a fourth example. The suffix *–in* derives female persons, as in (12) (de Haas & Trommelen 1993:192).

(12) koning-in
king- IN
'queen'

The word *koningin* 'queen', however, can easily refer to things which are clearly not intrinsically female, such as a playing card, a piece in chess, the most excellent one in a given set, as in (13), or a cactus, as in (14).

(13) Oostende, de koning-in van de badsteden,
Oostende$_{\text{NEUTER}}$, the king- IN of the bath.cities
'Oostende, queen of the seaside resorts'

(14) koning-in van de nacht
king-IN of the night
'selenicereus grandiflorus (a type of cactus)'

One could argue that it is *koningin* 'queen' as a whole which is malleable and not *-in*. However, this is not relevant. If *-in* truly realized the feature [feminine], this femininity should be syntactically relevant and not alterable. It should, for example, block sentences such as the one in (15).

(15) De koningin$_i$ is zijn$_i$ schoenen vergeten.
the queen is his shoes forgotten
'The queen forgot his shoes'.

However, (15) is perfectly acceptable in a context in which a queen is played by a man. The contrast is clear when compared to a syntactic feature [feminine] on a pronoun, as in (16).

(16) * Zij$_i$ is zijn$_i$ schoenen vergeten.
she is his shoes forgotten

The examples above show th at the syntactic derivation does not contain a syntactic feature [feminine] for (15) in contrast with (16).

The suffix *–ling* typically derives words which refer to persons (de Haas & Trommelen 1993:183).[116] This is illustrated in (17).

(17) leer-ling
learn-LING
'pupil'

The animacy restriction can be overriden by the context, however. This is shown in (18).

(18) Onze wijk was de beste leerling
our neighbourhood was the best learn-LING
van de klas op het vlak van energieverbruik.
of the class on the domain of energie.use
'Our neighbourhood scored best when it came to energy consumption.'

One may argue that the examples above illustrate incidental cases and are not indicative of the general meaning of derivational affixes. Note in this respect,

[116] There are some occasional exceptions such as *teerling* 'die'.

however, that more than one fourth of the Dutch affixes have been described as deriving animates in general or feminines specifically (see de Haas and Trommelen 1993). One could easily repeat the arguments presented above for all members of this group. Note further that I have shown that the same observation holds for derivational affixes which do not refer to animates too, such as those which refer to abstractness. In other words, the examples above are far from isolated cases.

Summarizing, the meaning of derivational affixes is not hardwired. Its interpretative source is therefore not to be found in functional features.

5.2.3 Derivational affixes can express kinds of matter

Talmy (2000:12) observes that syntactic meaning cannot be specific as to certain aspects of the described situation, such as speed or kinds of matter. He concludes that Universal Grammar has no functional features to distinguish between different types of matter.[117] Consequently, functional vocabulary items should not be able to express different kinds of matter. Hence, if vocabulary items do express different types of matter they do not express functional features, but lexical meaning.

There are derivational affixes in Dutch which vary according to the precise nature of matter referred to. The suffix *-icide* refers to poisons, *-aan* to gasses, *-een* and *-yl* to specific subsets of organic compounds, *-ase* to enzymes and *-ose* to sugars (de Haas & Trommelen 1993:274). Examples are given below.

(19) insect-icide
insect-ICIDE
'insecticide'

[117] To be precise, functional features do not distinguish between *types* of matters. For example, they cannot express the difference between *milk* and *water* or between *sugar* and *sand*. Arguably, there may be functional features which distinguish between consistencies. For example, a language may have different classifiers for liquids, such as *milk* and *water*, and semifluids, such as *mayonnaise*.

(20) prop-aan
prop-AAN
'propane'

(21) malt-ase
malt-ASE
'maltase'

(22) malt-ose
malt-OSE
'maltose'

(23) vin-yl
vin-YL
'vinyl'

If Talmy is right that functional features systematically ignore differences in matter, then these derivational affixes express lexical meaning.

5.2.4 Derivational affixes may refer to inventions

It is reasonable to assume that grammatical features cannot refer to inventions or artifacts (Talmy 2000, Kiparsky 1997 vs. Fodor 1981). Universal Grammar cannot have foreseen human inventions. Therefore, if derivational affixes refer to artifacts, their meaning is lexical, not functional. This is indeed the case, as the reader can already deduce from the previous section; the suffix *-yl* refers to a synthetic substance. More examples can easily be found. The suffix, *-theek*, for example, refers to places where one can rent stuff, as in (24). The whole concept of renting is a human invention; animals do not rent stuff.

(24) a. video-theek
video-THEEK
'video shop'

b. biblio-theek
biblio-THEEK
'library'

c. speel-o-theek
play-LP-theek
'place where one can rent toys'

These examples show that affixes can express inventions. This implies that the semantics of derivational affixes cannot be innate and therefore is not syntactic.

5.2.5 The class of derivational affixes is not closed

Functional meaning is commonly associated with closed classes. The discussion above shows that derivational affixes express lexical meaning, yet they are claimed to be a closed set (Talmy 2000). In this section I briefly comment on this claim. Although the set of derivational affixes does indeed only grow slowly, it is not a closed class. New derivational affixes emerge from reinterpretatons. de Haas & Trommelen (1993:278) point out that the suffixes *-tiek*, *-tel*, *-taria* and *-burger* are recent additions to Dutch Vocabulary. The suffix *-tiek* refers to a luxurious and specialized shop, as in (25)b. It stems from a reinterpretation of the word *boetiek* 'boutique' in (25)a.

(25) a. boetiek
boutique
'boutique'

b. tegel-tiek
tile-TIEK
'luxurious tile store'

The VI *cafetaria* in (26)a gave rise to the suffix *-taria* for spots where one can grab a bite. This is shown in (26)b.

(26) a. cafetaria
cafetaria
'cafetaria'

b. snack-taria
snack-TARIA
'cafeteria where one can eat snacks'

A brand new member of the set of Dutch derivational affixes is the suffix *-ama*. It refers to night wear, as in (27)b. It was derived from (27)a.

(27) a. pyjama
paj-AMA
'pajamas'

b. short-ama
short-AMA
'summer pyjamas with short sleeves and a short'

Recent English suffixes are *-licious*, *-pedia*, *-tastic* and *-rama,*[118] as in the examples below.[119]

[118] The examples show that *-rama* requires a linking vowel which is *-o-* or *-a-*.
[119] The oldest appearance of the suffix *-licious* known to me is the word 'cha-licious' which is the name of the debut album of the rap band *Menajahtwa*. It was released in 1994.

(28) a. booty-licious[120]
b. cheetah-licious[121]
c. mama-licious fashion
d. choco-licious

(29) a. Wiki-pedia
b. Art-o-pedia
c. babynames-pedia
d. food-a-pedia
e. Mario-pedia (encyclopedia containing information on Mario Bros)
f. free-pedia (website containing free software downloads)

(30) a. a nerd-tastic Halloween costume
b. a fun-tastic summer
c. photo-tastic memories

(31) a. sign-a-rama (a shop for signs)
b. crap-o-rama (a flea market or garage sale)
c. source-o-rama (a center for spring water)
d. link-o-rama (a webpage which is a collection of links)
e. bummer-rama (a series of unfortunate events)

The Dutch and English examples above show that in both languages new derivational affixes can be found. They are formed via a reinterpretation of parts of words as affixes, a process called suffix clipping. Lehmann (1992:224) points out that a similar reinterpretation underlies the origin of the English suffixes *-ling* and *-able*. The suffix *-ling* was clipped from *æpeling* 'nobleman', which actually contained the base VI *æpele* 'noble' and the suffix *-ing*. The suffix *-able* was clipped from words such as *habitable* from the Latin word *habitabilis*.

Admittedly, new arrivals are not common in the domain of derivational affixes, but they do not constitute a closed class. Although the class of

[120] *Bootylicious* is the title of a single from the pop trio *Destiny's child* which was released in 2001.
[121] *Cheetah-licious Christmas* is an album from the pop band *The Cheetah Girls*. It appeared in 2005.

derivational affixes grows slowly, it is essentially an open class. In this respect it differs from completely closed classes.

5.2.6 Conclusion

In this section I have shown that the meaning of derivational affixes is lexical. This became clear through the fact that it is malleable and that it can refer to kinds of matter, artifacts and inventions. Moreover, I have shown that the class of derivational affixes is not closed. This is expected for a class which expresses lexical meaning.

The lexical meaning of derivational affixes strongly suggests that they are LVIs and hence, that they are realizations of RTNs. I therefore take this as the default option. I will only assume that a derivational affix is an FVI if it can be shown that it expresses features with a clear syntactic effect.

5.3 Semi-lexical derivational affixes

5.3.1 Introduction

In section 5.2 we have seen that derivational affixes express lexical meaning. There are two types of VIs which can express lexical meaning. Firstly, lexical meaning is most commonly associated with LVIs. However, in chapter 3 sections 3.3 and 3.4 I have demonstrated that it is not *a priori* excluded for FVIs either. In that chapter I presented the VIs *stuk* and *heel*. I showed that they are FVIs with lexical meaning, i.e. semi-lexical VIs. They constitute a second group of VIs with lexical meaning; they combine a lexical meaning with functional features. The same bifurcation between lexical and semi-lexical VIs can be found in the domain of affixes too. In the previous section I discussed derivational affixes which are lexical VIs. In this section I present a case study on a specific set of affixes which are semi-lexical FVIs. I show that they are used to derive Dutch collective mass nouns.[122] These are nouns which refer to

[122] The term 'collective noun' is sometimes also used to refer to nouns such as *committee* or *team*, which represent a collection of members (see for example Chierchia 1998). Such nouns have a count reading, and as such do not fall under my definition of collective noun. Moltmann

a collection and strongly resist plural marking, such as *ondergoed* 'underwear' or *suikerwerk* 'confectionery'. I argue that these nouns are all derivational word forms and that the fact that they resist plural marking is a property of the functional features expressed by the affix. The collective readings results from the lexical meaning of these affixes.

This section is organized as follows. In section 5.3.2, I discuss the data which constitute my central argument. I show that collective mass nouns only get mass readings, but that they also refer to a collection of salient individuals. In section 5.3.3 I argue that collective mass nouns in Dutch are products of derivational word formation. Section 5.3.4 gives an analysis for the fact that collective nouns are restricted to mass readings. Section 5.3.5 focuses on the semi-lexical status of collective suffixes. The last section sums up and concludes.

5.3.2 The properties of collective mass nouns

In this section I lay out the central data for the argument, i.e. the properties of collective mass nouns. In order to do so, I compare collective mass nouns with regular mass DPs (see chapter 3 section 3.2.2.2). I first focus on the similarities to show that collective mass nouns indeed give rise to singular mass readings. I then discuss the properties which set the two types of mass readings apart.

First observe that collective mass nouns occur in singular NPs.[123] This is shown by the fact that they trigger singular agreement when in subject position. Example (32) shows that collective nouns trigger singular agreement on both the adjective[124] and the verb.

(1997:88) sets apart collective nouns from nouns denoting collections based on the following contrast: 'The ring was among Mary's jewelry' (collective noun) vs. # 'The ring was among Mary's collection of jewelry' (collection noun). Only collective nouns such as *jewelry* fall in the scope of this chapter, nouns denoting collections such as *collection* do not.

[123] Idiosyncratic plural forms, such as *groceries*, and other plural forms do not fall under the scope of this chapter. See Acquaviva (2008) for detailed discussion.

[124] The noun *ondergoed* is neuter, hence the adjective gets neuter agreement. Neuter, singular adjectival agreement is marked by a null morpheme in Dutch. If the noun were to trigger plural adjectival agreement, the result would be a schwa. See Schoorlemmer (2009) for recent discussion.

(32) Net-∅ ondergoed/zilverwaar/huiswerk
neat-**SG**.NEUTER underwear/silverware/homework
is/*zijn belangrijk.
is/are important
'Neat underwear/silverware/homework is important.'

They share this property with all other mass NPs in Dutch, as is illustrated in (3).

(33) Helder-∅ bier/water/vernis **is/*zijn** goed.
Clear-**SG**.NEUTER beer/water/varnish is/are good
'Clear beer/water/varnish is good.'

As singulars, collective mass nouns can co-occur with the fuzzy quantifier[125] *veel* 'much' (see((34)) and the universal quantifier *alle* 'all' (see (36)), just like regular mass NPs in Dutch, as in (4) and (37). This is a defining property of mass readings (Allan 1980).

(34) veel ondergoed / zilverwaar / huiswerk
much underwear / silverware / homework
'much underwear/silverware / homework'

(35) veel bier / water / vernis
much beer / water / vernis
'much beer / water / vernis'

(36) alle ondergoed / zilverwaar / huiswerk
all underwear / silverware / homework
'all underwear/silverware / homework'

[125] A fuzzy quantifier refers to a non-specific quantity. Examples are *many* and *several*.

(37) alle bier / water / vernis
all beer / water / varnish
'all beer / water / varnish'

In contrast, a singular count reading does not allow for the quantifiers *veel* 'much' and *alle* 'all', as can be concluded from the illicit examples in (38)-(39).

(38) * veel hond
a lot of dog
Intended: 'a large part of the dog'

(39) * alle hond
all dog
Intended: 'the whole dog'

Thirdly, both types of mass nouns observe cumulativity. Cumulativity is defined in (6) (the definition is taken from Borer 2005a:127).

(40) P is cumulative iff $\forall x,y\ P(x) \wedge P(y) \rightarrow P(x \cup y)$

It is well known that regular mass readings are cumulative (Quine 1960). For example, if one adds sugar to sugar the result is still sugar. Cumulativity also holds for collective mass nouns. If one adds underwear to underwear the result is still underwear. This is illustrated for Dutch in (41).

(41) Ondergoed en ondergoed is ondergoed.
underwear and underwear is underwear
'Underwear and underwear is underwear.'

In sum, collective mass nouns resemble regular mass DPs in the sense that both are syntactically singular, combine with fuzzy and universal quantifiers, and are cumulative.

Unlike regular mass readings, however, collective mass nouns refer to a collection of salient atoms, on a par with plural DPs. This was shown in an experiment by Barner and Snedeker (2005). Informants were presented with a picture of one large shoe, one large spoon and one large portion of toothpaste next to pictures of three tiny shoes, three tiny spoons and three tiny portions of toothpaste. When the informants were asked: "Who has more shoes?" they picked the picture showing the three small shoes. For plurals, more small items thus outnumber one big item. Reversely, when they were asked: "Who has more toothpaste?", they judged the one large portion to be more than the three little ones. Interestingly, the question "Who has more silverware?" led to the picture with three tiny spoons. As such, the experiment showed that collective mass nouns[126] behave on a par with plurals and not with regular mass readings in referring to a collection of salient individual items.

Because collective mass nouns refer to salient individuals, they do not obey divisivity, whereas regular mass readings do. Divisivity is defined in (7) (Borer 2005a:127).

(42) P is divisive iff $\forall x\ P(x) \rightarrow \exists y\ (P(y) \wedge y < x) \wedge \forall x,y\ P(x) \wedge P(y) \wedge y < x \rightarrow P(x-y)$

Regular mass readings observe divisivity, which states that there is always a proper subset with the same properties (Krifka 1989). For example, a subset of a certain amount of sugar is still sugar. This property, however, does not carry over to collective mass nouns. They have salient subparts that cannot be divided any further. The collective noun *cutlery* can serve as an example in this respect. Although one item of cutlery, say a fork, is still cutlery, it is doubtful whether one tooth of a fork can still be called cutlery.

The non-divisivity of collective mass nouns results from the fact that they are atomic. In other words, they refer to salient individual items. Atomicity is defined in (43) (Moltmann 1997:17).

[126] Collective mass nouns are called object-mass nouns by Barner and Snedeker (2005).

(43) a. *Definition of an atom*

a is an atom in a set X iff $(\neg\exists x)(x \in X \,\&\, x < a \,\&\, x \neq a)$.

b. *Definition of atomicity*

A set X is atomic iff for every $x \in X$, x = *sum* (Y) for a set Y of atoms in X.

An atom is the smallest part a certain predicate can refer to and a DP is atomic if it refers to sums of atoms. This semantic property holds for collective mass nouns. They refer to collections of salient individual items as Barner & Snedeker (2005) have shown (see above).

A final characteristic which sets collective mass nouns apart from other nouns which occur in a mass DP is their inability to occur in a count context. In other words, collective mass nouns are not malleable; they are syntactically mass and therefore exclude count readings. Example (44) shows collective mass nouns in a mass reading; (45)-(46) illustrate the illicitness of the count reading. The indefinite determiner triggers a count reading in (45), whereas in (46) the numeral and the plural marking force a count reading.

(44) veel ondergoed / zilverwaar / vlechtwerk [mass]
much underwear / silverware / wickerwork
'much underwear/silverware / wickerwork'

(45) * een ondergoed / zilverwaar / vlechtwerk [count]
a underwear / silverware / wickerwork

(46) * drie ondergoed-(er)en/zilverwaar-en/vlechtwerk-en [count]
three underware-PL / silverware-PL / wickerwork-PL

This lack of malleability is not found with other nouns (see chapter 3 section 3.2.3). Any noun apart from collective mass nouns can occur in a count reading, given the Universal Sorter (Bunt 1985:11).[127]

(47) veel bier / water / vernis [mass]
much beer / water / varnish
'much beer / water / varnish'

(48) een helder bier / water / vernis [count]
a clear beer / water / varnish
'a clear (kind of) beer / water / varnish'

(49) drie heldere bier-en/water-s / vernis-en [count]
three clear beer-PL / water-PL / varnish-PL
'three clear beers / waters / varnishes'

The examples discussed so far show that Dutch collective mass nouns get *bona fide* mass readings, both from a syntactic and from a semantic point of view. However, they refer to a collection of salient individual items.[128] In this respect they differ from ordinary mass DPs. The conclusions are summarized in the table below.

[127] Some roots are found more frequently in a count reading, while others are more natural in a mass reading. This is not due to syntax, but to an interference from Encyclopedia (see chapter 3 section 3.2.5).

[128] Chierchia (2005) calls collective mass nouns 'fake mass' because they are syntactically mass, but pattern with count structures from a semantic point of view as they are atomic. See also Ware (1979) on the count-like meaning of collective mass nouns.

(50)

	regular mass DP	collective mass DP
syntactically singular	+	+
allows for fuzzy & universal quantifiers	+	+
cumulative	+	+
divisive	+	-
salient atoms	-	+
necessarily mass	-	+

In what follows, I show that these characteristics of collective mass nouns follow from their morphological structure. The next subsection addresses this issue.

5.3.3 Collective mass nouns are derivational word forms

In this section I show that collective mass nouns are instantiations of derivational word formation. I argue that they contain a derivational affix. In the two subsequent sections I will show that this affix realizes features which block a count reading.

The overwhelming majority[129] of Dutch collective mass nouns are clearly morphologically complex. They typically end in one of the following VIs: *-schap*, *-goed*, *-waar*, *-werk*, *-(er)ij*, *-gerei*[130], *-raad,* or *-air.*[131] Examples are given in (51)-(63).

[129] See section 5.3.4.4 for a discussion of the exceptions.

[130] Northern Dutch informants prefer the form *-gerei*, Southern Dutch informants prefer *-gerief.*

[131] In West-Flemish dialects, the suffix *-erij* is commonly used as a collective suffix. Blankenberge Dutch, for example, has the following derivations: *koterij* /kot□ ri□ / 'the collection of small rooms and porches which did not originally belong to a house, but which were attached later on' (Lit.shack-ery). and *bedderij* /b□ d□ ri□ / 'bed linen' (Lit. bed-ery), amongst many others.

(51) de koop-waar
the buy-WAAR
'the merchandise'

(52) de smokkel-waar
the smuggle-WAAR
'the contraband'

(53) het vlecht-werk
the plait-WERK
'the wickerwork'

(54) het aarde-werk
the earth- WERK
'the ceramics'

(55) het speel-goed
the play-GOED
'the toys'

(56) het bed-e-goed
the bed-LP- GOED
'the bed linen'

(57) het klein-goed
the small- GOED
'the small pastries and cookies'

(58) het schrijf-gerei
the write-GEREI
'the stationery'

(59) het naai-gerei
the sew-GEREI
'the things one needs to sew'

(60) het vis-gerei
the fish-GEREI
'the fishing tools'

(61) het gereed-schap[132]
the ready-SCHAP
'the tools'

(62) de kled-ij
the cloth-IJ
'clothing'

(63) de huis-raad
the house-RAAD
'the household goods'

(64) het sanit-air
the sanit-AIR
'the plumbing and sanitary facilities'

(65) het meubil-air
the MEUBIL-AIR
'the furniture'

Note that not all speakers treat *kledij* 'clothing' as a collective mass noun in Dutch, in that they allow it to be pluralized. *Kledij* is not the only one for which

[132] It is not clear what the correct gloss for *gereed* is. The word etymologically refers to being ordered and installed (cf. the English word *ready*). By extension it also refers to having all the necessary tools to start a task. The word *gerei* is derived from this word (see De Vries & te Winkel 2001 lemma GEREED).

there is variation. Another example is *huiswerk* 'homework'. Below I provide an account for this type of variation (see section 5.3.5).

As collective mass nouns are morphologically complex, they might be instances of compounding or derivational word formation. In this section I argue against the view that they are compounds and I propose that they are derivational word forms.

A textbook distinction between compounding and derivation is that compounds are prototypically built up of base VIs and derivations of bound affixes. Collective mass nouns, however, show both types of VIs as their righthand part. For example, *-werk* can be used as free base VI, whereas *-ij* cannot. Moreover, it has been pointed out that compounding occasionally allows for bound VIs (such as the *berry*-morphs) and derivation sporadically seems to employ a free VI (such as *weg* 'way' in Dutch, which is used to create adverbs). As such, the free or bound status of the righthand VIs in collectives is inconclusive.

The formation of endocentric compounds is fully productive in Dutch (Booij & Van Santen 1998:150; Booij 2002: 142; de Haas & Trommelen 1993:370). An example is given in (66).

(66) tafel-laken
table-cloth
'table cloth

(66) is an endocentric compound with the righthand part as the head: a tablecloth is a type of cloth. If collective mass nouns were such compounds, they should be fully productive. This expectation, however, is not borne out. Regardless whether collective mass nouns have a bound or a free VI as their righthand part, they show lexical gaps. In other words, they do not participate in productive word formation. Example (67) shows a licit form with the bound suffix *-air*. The new forms in (68), on the other hand, are illicit.

(67) meubilair
MEUBIL-AIR
'the furniture'

(68) a. * cuisine-air
cuisine-AIR
Intended: 'everything in a house related to cooking'

b. * electric-air
electric-AIR
Intended: 'everything in a house related to providing electricity'

Collective nouns formed with a free VI as the right-hand part behave on a par. Example (69) shows a well-formed and frequently attested noun with the free VI *goed*. The new forms in (70)-(72), however, do not occur, although they are highly plausible from a semantic or pragmatic point of view.

(69) speel-goed
play-GOED
'toys'

(70) * studeer-goed
study-GOED
Intended: 'study material'

(71) * sport-goed
sport-GOED
Intended: 'sport material'

(72) * schilder-goed
paint-GOED
Intended: 'painting material'

The unproductivity of collective mass nouns can further be illustrated by the following test. Highly productive processes often allow for a full syntactic phrase as its lefthand part in Dutch (see Booij 2002: 123 and 142). A case in point are endocentric compounds (Booij 2002:143).

(73) bruin-e-suiker-fabriek
brown.INFL-sugar-factory
'factory which produces brown sugar'

If collective mass nouns were nothing but endocentric compounds, the two should behave on a par, contrary to fact. Consider, for example, the collective mass noun *suikerwerk* 'confectionery', illustrated in (74). If this collective noun were a compound, it should allow for an analogue structure, contrary to fact. This is shown in (75).[133]

(74) suiker-werk
sugar-WERK
'confectionery'

(75) * bruin-e-suiker-werk
brown-INFL-sugar-WERK
Intended: 'brownsugar-based confectionery'

It may be clear from the lexical gaps and the above example that collective mass nouns are not productive in Dutch. This unproductivity is unexpected under a compounding analysis.

[133] Not all compounds may allow for this recursive pattern. Indeed, compounds which get an idiomatic interpretation may loose their idiomatic interpretation and therefore become nonsensical. For example, the compound *zakgeld* 'pocket money' is not interpretable when *zak* 'pocket' is modified by an adjective, e.g. **kleinezakgeld* (Lit. [[small pocket] money]). However, if *suikerwerk* were a compound, there would be little reason to assume that it gets an idiomatic interpretation. It is very transparent qua meaning.

Summing up, I have shown that the unproductivity of collective mass nouns cannot be reconciled with a compounding analysis. In what follows I will therefore argue that they are derivations.

Lexical gaps as the ones discussed above are not at all surprising under a derivational approach, as many derivational processes are known to be improductive.[134] Note that the degree of productivity of collective mass affixes varies. Some (semi-)suffixes, such as *-ij* and *-raad*, combine with only a few roots, while others, such as *-waar* and *-werk* attach to a larger group (e.g. *eetwaar* 'food', *handelswaar* 'merchandise', *smokkelwaar* 'contraband', *koopwaar* 'merchandise', *winkelwaar* 'shopping goods', …). In this respect collective suffixes do not deviate from other derivational suffixes.

Another property of collective mass nouns which follows directly from their derivational nature is the fact that the selection of the precise suffix is not only determined by the denotation of the affix, but also by convention. This is a well known property of derivational word formation. For example, *sincere* takes *-ity* to form *sincerity*, *jealous* selects *-y* to form *jealousy* and others, such as *sad*, take the default *-ness*. The specific choice is unpredictable; I take it to be dependent upon convention (see Embick and Marantz 2008 for discussion). In the same vein, there are the conventionalized Dutch collective mass nouns *ondergoed* 'underwear', *kledij* 'clothing' and *schrijfgerei* 'stationery', but not the new forms **onderwaar, *kleedgoed* or **schrijfraad.*

5.3.4 The analysis: The semantics of the collective suffix

5.3.4.1 The feature [mass]

In the previous sections I have argued that it is the derivational nature of collective mass nouns that gives rise to their restricted insertion possibilities. More specifically, the collective suffix prohibits a count structure and forces a mass reading. In this section I discuss how exactly this comes about.

The central observation in this chapter is the fact that Dutch collective mass nouns do not allow for a count reading, but only for a mass reading. The

[134] Examples of improductive suffixes in Dutch are *-in* which derives female nouns (e.g. *koningin* 'queen') and the agentive suffix *-(l)ing* (e.g. *zuigeling* 'newborn baby' Lit. suck-ling). See de Haas & Trommelen (1993) for a plethora of examples.

examples are repeated in (76) and (77). Example (76) shows the noun *suikerwerk* 'confectionery' in a mass reading, (77) is an illicit count reading.

(76) veel suiker-werk [mass]
much sugar-WERK
much confectionery

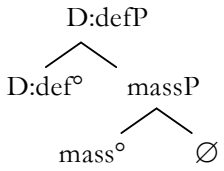
(77) * drie suiker-werk-en [count]
three sugar-WERK-PL

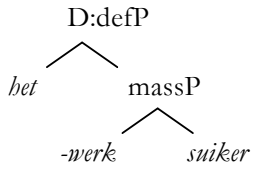
It is clear that it is not the base VI that is causing this restriction. Nothing prohibits *suiker* 'sugar' from occurring in a count reading, as is illustrated in (78).

(78) drie suikers: fructose, glucose en saccharose [count]
three sugars: fructose, glucose and saccharose
'three sugars: fructose, glucose and saccharose'

As the restriction does not come from the base VI, I propose that it stems from the derivational suffix. More specifically, I propose that the collective suffix realizes the feature [mass]. This is depicted in (79). The tree in (79)a shows the syntactic structure; (79)b shows the same structure after Vocabulary Insertion took place.

(79) het suiker-werk
the sugar-WERK

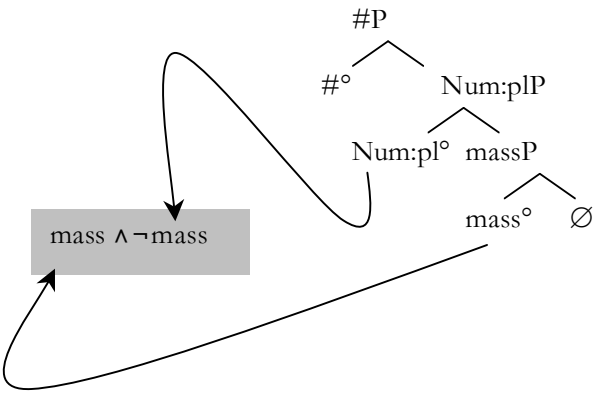
a. 

b. 

It now follows that collective suffixes are incompatible with number marking. The combination of the [mass] feature on the suffix and the count properties of number marking would result in a semantic contradiction; a structure cannot be both mass and non-mass at the same time. In other words, a count structure above a mass suffix is uninterpretable.[135] This is depicted in (80).

[135] Note that the structure is syntactically derivable. The result, however, is uninterpretable (see Gajewski 2009 on the illictness of structural contradictions and tautologies).

(80) * drie suiker-werk-en
three sugar-WERK-PL



Summing up, I have proposed that the collective suffix is marked for the feature [mass]. This prohibits collective mass nouns from entering into a count structure; the result would be a semantic contradiction.

5.3.4.2 The feature [atomic]

Section 5.3.4.1 argues that collective suffixes can force a mass reading. Recall that this is not the only way to arrive at a mass reading in natural language. As is well-known, the absence of number marking or classifiers in a given structure equally result in mass readings (see chapter 3 section 3.2.2.2, Doetjes 1997 and Borer 2005a). Above I have called such structures regular mass NPs (see section 5.3.2 and chapter 3 section 3.2.2.2 for detailed discussion). An example of such a mass reading is given in (81).

(81) veel suiker
much sugar
'much sugar'

In the absence of number marking or classifiers as in (81), the default reading is a mass reading (Doetjes 1997, Borer 2005a).

One may wonder why UG should allow for two ways to derive a mass reading; viz. by means of a collective suffix or via the absence of number marking/classifiers. At first sight, this seems redundant and uneconomical. However, recall that these two mass readings are semantically distinct; collective nouns do not observe divisivity whereas regular mass NPs do. Hence, both readings are not in competition.

Let us take a closer look at the mass reading that results from the absence of number marking. It allows for all nouns to be interpreted as mass. The famous example from Gleason (1965:136-137), which is given in (82), is illustrative in this respect.

(82) Mother termite is concerned over her child: "Johnny is very choosey about his food. He will eat book, but he won't touch shelf."

Note that in such structures, the noun always gets a ground reading. This effect was recognized by Pelletier (1979:5-6) and called the universal grinder. Such ground structures are characterized by divisivity, which states that there is always a proper subset with the same properties (Krifka 1989). For example, a subset of a certain amount of sugar is still sugar. This property, however, does not carry over to mass readings that result from the presence of a collective suffix. I have discussed above tha collective mass nouns have salient subparts that cannot be divided any further (see section 5.3.2). The collective noun *cutlery* served as an example to illustrate this point. Above I pointed out that although one item of cutlery, say a fork, is still cutlery, it is doubtful whether one tooth of a fork can still be called cutlery. I will therefore say that the collective suffix carries the feature [atomic], whereby the salient subparts should be understood as the atoms. In this respect, the two mass readings are semantically distinct; one is always ground and divisive, the other one is atomic and has salient subparts.[136] In conclusion, the syntactic difference between the two mass readings is reflected semantically.

[136] In the same vein it could be argued that the mass readings derived by the prefix *ge-* differ from the default mass readings by having an additional [eventive] feature.

5.3.4.3 Intermediate summary

Let us go back to the explananda which were presented in section 5.3.2 and which are repeated in (83).

(83)

	regular mass DP	collective mass DP
syntactically singular	+	+
allows for fuzzy & universal quantifiers	+	+
cumulative	+	+
divisive	+	-
salient atoms	-	+
necessarily mass	-	+

The grid in (83) states that collective nouns are mass NP in the following respects: they are obligatorily mass, they allow for quantifiers associated with mass readings and they are cumulative. These facts were captured by introducing the feature [mass]. However, unlike regular mass NPs they refer to salient atoms and hence they are not divisive. These observations are accounted for by means of the feature [atomic]. Together both features form the morpheme [mass, atomic] which can be selected from the Dutch Lexicon by the numeration (see chapter 1 section 1.3.1). Finally, the fact that collective mass nouns are obligatorily mass follows from the fact that the derivational suffix is an FVI. It realizes functional features. The structure is therefore not malleable.

5.3.4.4 A note on monosyllabic collective mass nouns

Above I have argued that Dutch collective mass nouns are polymorphemic; they consist of a root and a collective suffix. This suffix realizes functional features which blocks a count reading. In this section, I address a small minority of Dutch collective nouns that is monosyllabic and therefore less transparent in terms of their morphological structure. I conjecture that they are morphologically complex too, despite appearances.

Monosyllabic collective nouns are rare in Dutch. The set probably has less than ten members. All members of this class known to me are listed in (86)-(85).

(84) het vee
the livestock
'the livestock'

(85) het aas
the bait/carrion
'the bait/carrion'

(86) het fruit[137]
the fruit
'the collection of fruits'

(87) het kroost
the offspring
'the offspring'

I want to propose that the remaining collective mass nouns, *vee* 'livestock' and *aas* 'bait/carrion' are marked with a zero affix which fulfills the same role as the overt collective mass nouns. This is illustrated in (88).

(88) het vee-∅
the livestock-∅
'the livestock'

[137] Standard Dutch distinguishes between the collective noun *fruit* 'fruit' and the pluralizable noun *vrucht*, which refers to a piece of fruit. Historically, *fruit* 'fruit' was both used as a collective noun and as a pluralizable synonym for *vrucht*. It is still used as such by some speakers.

(89) het aas-∅
the bait/carrion-∅
'the bait/carrion'

I propose that the collective nouns in (84) and (85) should be analyzed on a par with the ones that show an overt collective suffix. Although overtly they show only one VI, I propose that they contain a phonologically null collective affix.

It is not clear what the structure of *kroost* and *fruit* is. They may contain a zero affix just like *vee* and *aas*. However, as they end in a *-t* an alternative analysis is possible too. *-t* is a(n improductive) Dutch suffix. The suffix *-t* can get a wide variety of meanings and is associated with both common and neuter gender (de Haas & Trommelen 1993:246). Some examples of derivations with this suffix are given below.[138]

(90) de vaar-t
the sail-T
'the speed/navigation/canal'

(91) het span-t
the stretch-T
'the rafter'

(92) het zich-t
the see-T
'the view'

(93) de helf-t
the half-T
'the half'

[138] The morpheme *zich* is an allomorph of *zie* 'see', *helf* is an allomorph of *half* 'half'.

(94) de buur-t
the neigbor-T
'the neighborhood'

As *-t* is a Dutch suffix, a language-learning child might recognize the examples in (86) and (87) as overtly complex.

Summing up, in this section I proposed that collective mass nouns with only one overt VI are derivations too; they take a null affix.

5.3.5 The collective reading and the semi-lexical status of collective VIs

Many derivational suffixes can refer to a collection without having a syntactic anti-count effect. Examples are given below.

(95) over-heid
over-HEID
'government'

(96) liter-atuur
liter-ATUUR
'literature'

(97) maatschap-ij
societ-IJ
'society'

(98) gezel-schap
companion-SCHAP
'company / theater group'

Despite their collective readings, these nouns can occur in a count DP, as shown below.

(99) België heeft **zes** **over-heden**
Belgium has six over-HEID.PL
'Belgium has six governments.'

(100) De Nederlandse en de Vlaamse literatuur zijn
the Dutch and the Flemish liter-ATUUR are
twee heel verschillende liter-atuur-en.
two very different liter-ATUUR-PL
'The Dutch literature and the Flemish literature are two very different types of literature.'

(101) De Nederlandse en de Vlaamse maatschap-ij zijn
the Dutch and the Flemish societ-IJ are
twee heel verschillende maatschap-ij-en.
two very different societ-IJ-PL
'The Dutch literature and the Flemish society are two very different types of societies.'

(102) We hebben **drie** **gezel-schap-en** gezien.
we have three companion-SCHAP-PL seen
'We've seen three theater groups.'

This shows that collectivity as such has no syntactic effect. I therefore assume it is a lexical meaning aspect.

The combination of a functional feature, viz. [mass], and lexical meaning, viz. collectivity, implies that collective suffixes are semi-lexical VIs. In other words, they are FVIs, but they contribute a richer semantics than a purely functional one. The hybrid nature of semi-lexical collective VIs gives rise to three specific predictions. I discuss them in turn below.

Firstly, it is expected that collective suffixes cannot only realize FTNs, they can realize RTNs too. In chapter 2 section 2.4.3 I have suggested that semi-lexical VIs are excellent candidates to realize both FTNs and RTNs in an unmarked fashion. They can realize an FTN because they are essentially FVIs,

but they can easily be recycled to realize RTNs because they have lexical meaning. Consider again some of the examples above, repeated in (103).

(103) a. De Nederlandse en de Vlaamse maatschap-ij zijn
the Dutch and the Flemish societ-IJ are
twee heel verschillende maatschap-ij-en.
two very different societ-IJ-PL
'The Dutch literature and the Flemish society are two very different types of societies.'

b. We hebben **drie gezel-schap-en** gezien.
we have three companion-SCHAP-PL seen
'We've seen three theater groups.'

The examples in (103) contain collective suffixes, viz. *-ij* and *-schap*, yet they do not have a syntactic mass effect. I propose that in these cases they realize RTNs. They have lost their syntactic function, but they are used for their lexical meaning.

Secondly, the view that collectivity is a lexical meaning aspect, whereas the mass effect is syntactic gives rise to a specific prediction. One expects that the lexical meaning aspect of collective nouns, viz. the collectivity, is malleable. This is indeed borne out. Consider the following example.

(104) Draagmoederschap reduceert een kind tot koop-waar.
surrogacy reduces a child to buy-WAAR
'Surrogacy reduces a child to merchandise.'

In (104) a child is compared to merchandise. However, it does not imply that a child is a collection of atoms which can be sold individually. In other words, the collective meaning aspect of collective nouns is not present in (104). This shows that this part of the denotation is malleable.

This contrasts with the fact that collective nouns resist count readings. The fact that they are mass syntactically results from features. Hence, it is rigid.

Consequently, the collective noun cannot be pluralized. This is shown below. Example (105) shows that a collective noun in a singular NP is licit, whereas (106) illustrates the illicitness of the same word form in a plural DP. Example (107) forms a minimal pair together with (106). It shows that a regular noun in a plural DP does not cause unacceptability.

(105) Draagmoederschap reduceert kinderen tot koopwaar.
surrogacy reduces children to buy-WAAR
'Surrogacy reduces children to merchandise.'

(106) * Draagmoederschap reduceert kinderen tot koopwaren.
surrogacy reduces children to buy-WAAR-PL

(107) Draagmoederschap reduceert kinderen tot producten.
surrogacy reduces children to products
'Surrogacy reduces children to products.'

In sum, the examples above show that the lexical meaning aspect of collective suffixes, viz. collectivity, is malleable in contrast to the featural rigidness of the mass effect.

Thirdly, the bifurcation between the syntactic and lexical meaning aspects of collective VIs predicts that the former can occur separately from the latter. This is indeed the case. Collective mass suffixes are not an isolated case in blocking count structures. There is another affix in Dutch which shows similar behavior. This prefix is ge-. It serves to create abstract, pluractional eventive nouns (see also chapter 2 section 2.2.4). These nouns can be paraphrased as 'the continuous or repetitive action in which the denotation of the root is involved' (as in (108)-(111)). The process is highly productive (see De Haas & Trommelen 1993:85 for more details).[139]

[139] These derivations often have a pejorative connotation, as in (109) and (110), but this is not necessarily the case (see (108) and (111)).

(108) het ge-tik van de klok
the GE-tick of the clock
'the ticking of the clock'

(109) het ge-maar van mijn collega
the GE-but of my colleague
'the objections of my colleague'

(110) het ge-babbel van de studenten
the GE-babble of the students
'the babbling of the students'

(111) het ge-fluit van de vogel-tje-s
the GE-whistle of the bird-DIM-PL
'the whistling of the birds'

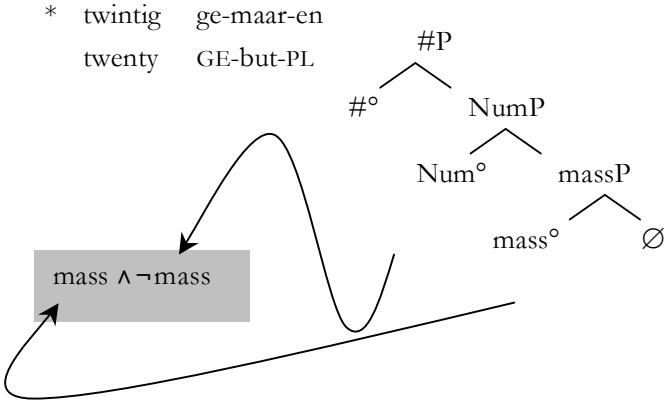
Crucially, such derivations are highly deviant in count structures. Examples are given below. Note that the cardinal numeral and the plural marking force a count reading in these examples.

(112) * de duizend ge-tik-en van de klok
the thousand GE-tick-PL of the clock

(113) * de twintig ge-maar-en van mijn collega
the twenty GE-but-PL of my colleague

These examples can be analyzed on a par with the collective mass nouns in section 5.3.4. If we assume that the prefix *ge-* carries the features [mass], it will give rise to a semantic contradiction in the presence of a count structure.

(114) * twintig ge-maar-en
twenty GE-but-PL



This analysis shows that Dutch derivational processes may restrict the nature of the functional structure and that affixes may be marked for the feature [mass]. As such, it (indirectly) supports the view that it is the derivational status and the [mass] feature of the collective suffix which gives rise to its ungrammaticality in a count structure.

Note finally that the hybrid nature of semi-lexical captures the fact that speakers do not agree on precise set of nouns which are obligatorily mass. For example, for some speakers it is disallowed to pluralize the word form in (115), whereas others consider the plural form, as in (116), to be licit.

(115) huis-werk
home-WERK
'homework'

(116) % drie huiswerk-en
three home-WERK-PL
'three homework assignments'

All speakers probably recognize that *-werk* is a semi-lexical VI. As far as I know the word form in (117) is a collective noun to all native speakers of Dutch, whereas the one in (118) can be pluralized straightforwardly. Hence, all

speakers use *-werk* regularly both as an FTN, as in (117), and as an RTN, as in (118).

(117) vlecht-werk
plait-WERK
'the wickerwork'

(118) drie kunst-werk-en
three art-WERK-PL
'three artworks'

The examples in (117) and (118) are stored as different structures at Encyclopedia. It stores *vlechtwerk* as the realization of an RTN and an FTN marked for a [mass] feature. It stores *kunstwerk* as the realization of two RTNs. Those speakers who consider *huiswerk* to be a collective noun have stored it on a par with *vlechtwerk*, those who do not have listed it on a par with *kunstwerk*.

To conclude, in this section I have pointed out that collective suffixes are semi-lexical VIs which combine a functional meaning, viz. [mass] with a lexical meaning, viz. collectivity.

5.3.6 Conclusion

In this section I have discussed instances of derivational word formation in which the affix clearly realizes a functional feature. This became clear trough the fact that the derivation has a syntactic effect; the derived word resists count readings. I have therefore proposed that the affix realizes a feature [mass]. I have proposed that these collective affixes are semi-lexical FVIs. They are functional as they realize a functional feature, but they have lexical semantics too.

5.4 The structure of derivational word forms

5.4.1 Introduction

Recall from chapter 2 that we[140] have defined an RTN as a by-product of the operation merge. We proposed that merge invariably selects one element from the numeration and includes it in the object under construction. We extended this view to primary merge too, i.e. to the very first step in the derivation. In this case merge selects a first element from the numeration and attaches it to the null derivation. This null derivation becomes a node in the syntactic derivation. It is a default workspace and a such devoid of features. We proposed that this empty node is an RTN. In sum, an RTN is created as the result of the very first merge in the syntactic derivation.

In section 5.2 of the present chapter I showed that derivational affixes have lexical meaning. Given this fact I concluded that they are LVIs in the unmarked case. For example, the derivational affix *-ess* in *princess* has the same status as the LVI *woman*. The derivational word form *princess* thus consists of two LVIs, viz. *prince* and *-ess*. Now recall from chapter 2 section 2.4.3 that LVIs are realizations of RTNs. At narrow syntax the derivational word form *princess* thus consists of two RTNs, one being realized by *prince* at PF and one by *-ess*. In sum, I propose that derivational word forms are concatenations of RTNs. In what follows I discuss the details of such a structure. In the next section I first argue that a functional head concatenates the RTNs. Subsequently, I demonstrate in section 5.4.3 how several RTNs are merged in one structure. Finally, in section 5.4.4 I comment on the semantics of the functional head.

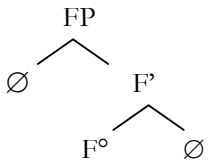
5.4.2 A functional head between the roots

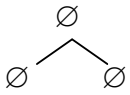
In the previous section I concluded that a derivational word form consists of two or more RTNs. In this section I argue for the existence of a functional head in between those RTNs. In other words, I propose the structure in (119)a.

[140] Recall that the work presented in chapter 2 goes back to joint work with Jeroen van Craenenbroeck. The work presented in section 5.4 goes back to this joint work and to discussions with Dany Jaspers.

I thus argue against the possibility that the two RTNs merge directly with one another as in (119)b.

(119) a. b.





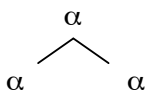
In what follows I first present some general considerations on the structure in (119)b and show that it faces certain problems. Subsequently, I argue that (119)a is a suitable alternative.

Recall from chapter 2 that an RTN is defined by the absence of features and that it is only realized by a VI post-syntactically. In syntax the RTN is thus radically empty. It is an empty node. One of the consequences of this is that there is only one, unique RTN in syntax. From this it follows that the two RTNs in (119)b are completely identical, which in turn implies that (119)b is an instance of self-merge.

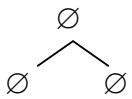
Although self-merge may not be intrinsically excluded in Bare Phrase Structure (see Guimarães 2000, Kayne 2009 vs. Chomsky 1995:320), a derivational word form such as *princess* cannot be the realization of the structure in (119)b. Below I present two arguments which lead to this conclusion.

First of all, merging an element with itself does not create a second instance of this element. First note that the set $\{\alpha,\alpha\}$ is identical to the singleton $\{\alpha\}$, since both sets have the same members (see Partee, ter Meulen and Wall 1987:6). Hence, self-merging α (i.e. $\{\alpha\{\alpha,\alpha\}\}$) as illustrated in (120)a, is indentical to $\{\alpha\{\alpha\}\}$ in (120)b.

(120) a. b.



The tree in (120)b shows that self-merge results in one single TN (see Kayne 2009). Analogously, if we take into consideration the fact that all RTNs are identical it becomes clear that the structure in (121)a is equivalent to the one in (121)b.

(121) a.  b. 

From the structures in (121) one can conclude that merging an RTN directly with an RTN results in one single RTN, not in two RTNs. This shows that although two RTNs can be merged directly with one another, the result is one RTN. The structure in (119)b can therefore not be the syntactic structure of a word form which consists of two RTNs.

The second issue with the structure in (119)b concerns the labeling of this constituent. In chapter 2 we have argued that an RTN cannot project. Projection involves passing features from a daughter node onto its mother. However, given that an RTN is devoid of features, it fails to project. Hence, if an RTN is merged with itself, both terminal nodes are devoid of features and fail to project. As a consequence, the newly created constituent cannot be labeled.

In sum, an RTN never merges with another RTN. Hence, it merges with something else, say a feature [F]. In this case, none of the problems discussed above show up. In particular, the merger of an RTN with [F] does not result in self-merge. [F] can project and label the structure, as it is a feature and as such a member of the Lexicon. Hence, one can conclude that two RTNs never merge directly with one another. A feature necessarily intervenes, as in (119)a.

Now recall that a derivational word form such as *princess* consists of two RTN. One is realized as *prince*, the other one as *-ess*. Given the fact that a functional head is required in between several RTNs, the derivational word form consists of two RTNs and a functional head, as in (119)a.

The question now raises whether this functional head can be spelled out. Di Sciullo (2009) argues that various languages show linking phonemes in

compounds. They are realizations of an F°-head. Now note that Dutch derivational morphology has linking phonemes too. In what follows I adopt Di Sciullo's (2009) suggestion according to which linking phonemes are a spell-out of an F°-head.

The following examples illustrate that Dutch derivational word forms may contain linking phonemes. Each time the *a*-examples show a linking phoneme, the *b*-examples show word forms with the same suffix but without a linking phoneme.

(122) a. aster-**o**-ide
aster-LP-IDE
'asteroid'

b. luc-ide
luc-IDE
'lucid'

(123) a. mens-**e**-lijk
human-LP-LIJK
'human'

b. natuur-lijk
nature-LIJK
'natural'

(124) a. Afghan-**i**-stan
Afghan-LP-STAN
'Afghanistan'

b. Kazach-stan
Kazakh-STAN
'Kazakhstan'

I assume that linking phonemes such as the ones above are realizations of the F°-head in derivational word formation. However, at this point it is not clear to me what determines the distribution of these linking phonemes. I further do not understand why Dutch Vocabulary should contain various linking phonemes.

5.4.3 Building multiple roots into the structure

Above I have argued that derivational affixes realize RTNs and that the relation between these nodes is established via a functional head. However, in chapter 2 section 2.3.4 it has been argued that the merger of each new RTN starts a new syntactic derivation.[141] As a result, there is a one-to-one relation between the number of RTNs and the number of syntactic derivations. A structure which contains more than one RTN thus contains several syntactic derivations. De Belder & van Craenenbroek (2011) therefore propose that the output of one syntactic derivation can be used as an atom in a following (see also Zwart 2010).

Recall from chapter 2 that an RTN is defined as the default workspace. In other words, an RTN is created when an element from the Numeration merges with an empty syntactic derivation. By definition, then, a syntactic derivation can contain only a single RTN. For each new RTN the syntactic derivation has to start from scratch. Therefore, in order to merge a second RTN, the syntactic structure which contains the first RTN is put back into the numeration. As the syntactic workspace is now empty, a member of the numeration will merge with the default workspace. As such, a new RTN is created.

As an illustration, suppose we want to derive the DP *de prinsessen* 'the princesses' in (125).

(125) de prins-es-en

[141] To avoid confusion in this section I refer to the process of deriving a syntactic structure as 'syntactic derivation'. I will call derivation in the morphological sense, i.e. as a type of word formation, 'derivational word formation'. I call the product of derivational word formation 'a derivational word form'.

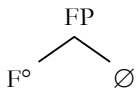
the prince-ES-PL
'the princesses'

Simplifying the functional structure of the DP, the numeration contains the following features:

(126) N = {[F], [Num:pl], [def]}

Merge selects {[F]} and merges it to the empty workspace ∅ (see chapter 2 section 2.3.4). Given that ∅ does not have any properties, {[F]} projects. The revised numeration and the syntactic derivation are illustrated in (127).

(127) N = {[Num:pl], [def]}

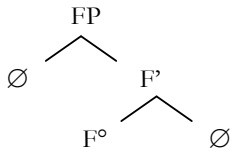


We now want to add another root. Given that each merge operation involving an RTN entails a new syntactic derivation in this model, the existing syntactic structure is put back into the numeration. This step enables a syntactic structure already containing an RTN to merge with the default workspace again, thus creating another RTN. It is shown in (128).

(128) N = {{F,{F, ∅}}, [Num:pl], [def]}

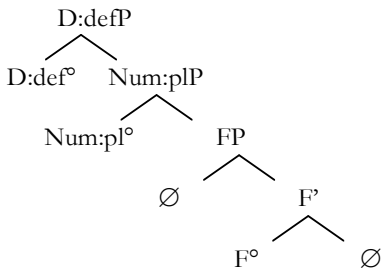
Merge selects {{F,{F, ∅}}} from the numeration and merges it to the empty workspace ∅. Again, given that ∅ is radically empty, {[F]} projects. This is illustrated in (129).

(129)



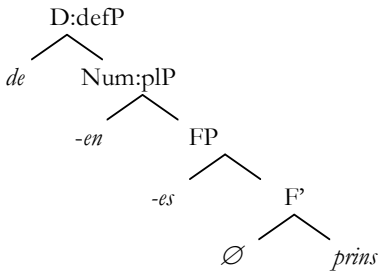
The derivation now reaches the inflectional domain. Merge selects {[Num:pl]} from the numeration and merges it to the existing workspace, with {[Num:pl]} projecting. The same goes for {[def]} and (130) is derived.

(130)



Vocabulary Insertion proceeds completely regularly for both the RTN and the FTN; both proceed via competition (see chapter 2 section 2.4.3). The competition leads to free choice for RTNs. For the FTNs it selects the most suitable FVI. Let us assume without further discussion that the F°-head is realized by a null affix, that the VI *-en* wins the competition to realize [pl], and that the definite article *de* is the best candidate to realize [def] in this structure (see chapter 3 for more details on Vocabulary Insertion for FTNs). Consequently, after Vocabulary Insertion takes place, the structure looks like (131). I will discuss the order of the VIs realizing the RTNs in section 4.5.

(131)



In this section I have discussed the syntactic derivation of structures containing multiple roots. The merger of each RTN implies the start of a new derivation. The default workspace merges with a functional head. As RTNs do not have any features, it is the functional head that projects. This derivation can be put back into the numeration. To add another root to the structure, a new derivation is started. This new derivation can then merge with the one which was re-included into the numeration. In sum, RTNs are combined via the mediation of a functional head. Several RTNs are combined into one structure by allowing derivations to merge with one another.

5.4.4 The functional head which merges RTNs with RTNs

5.4.4.1 Introduction

I will not try to identify the functional head which occurs in between two RTNs precisely. I therefore will continue to use the theoretically neutral name F°. However, I will formulate a suggestion on the featural contribution of this head to the structure. In this section I therefore discuss the semantics of this head. I propose that it expresses intersection. I first discuss the constraints put on a head connecting two RTNs by Encyclopedia. I then propose that these restrictions are met by a conjunctive head. I further show how the conjunction is interpreted at LF.

5.4.4.2 The semantics of F°

Encyclopedia lists the special meaning of VIs realizing RTNs relative to the syntactic context of those RTNs (see chapter 1 section 1.3.1). This is expressed by the definition of Encyclopedia given in (132).

(132) Encyclopedia entries connect (pieces) of the output of the grammar - derivations of PF and LF connections - to noncompositional meanings. These entries are used in the interpretation of linguistic structures, where we take the relevant input to semantic interpretation to be the whole derivation, not simply LF, which is the syntactic representation of compositional meanings. (Marantz 1995:5-6).

Encyclopedia thus stores syntactic structures realized by VIs as idioms and assigns an interpretation accordingly.

I adopt Marantz's (1997) proposal that Encyclopedia does not differentiate between idioms at the word-level and sentential idioms; they are all products of the same modules. Morphological derivations are thus interpreted in the same way as bigger idioms.

The connection between a derivation and the idiomatic interpretation assigned to it is determined by convention; it is learned and arbitrary. In other words, any syntactic structure realized by any random set of vocabulary items may be arbitrarily connected to any interpretation.

However, there is one important restriction. The semantics of functional heads cannot be overridden by Encyclopedia. McGinnis (2002) shows that even if a VP is an idiom, its functional structure is still interpreted compositionally. Idiomatic VPs get the same aspectual interpretation as non-idiomatic VPs with the same structure. For example, a VP which contains an RTN realized by means of the LVI *hang* and a singular DP-object is telic in English. As a result, the VP combines with an *in*-phrase, as shown in (133) (see Dowty 1981 and subsequent literature). If the direct object is a mass DP the VP is atelic. Consequently, an *in*-phrase is illicit, as in (134) (the examples are taken from McGinnis 2002:668).

(133) Hermione hung a picture in five minutes. [telic]
(134) Hermione hung laundry <*in an hour>. [atelic]

These examples are non-idiomatic. However, parallel idiomatic VPs show exactly the same aspectual effects, as illustrated below.

(135) Hermione hung a left in five minutes. [telic]
(136) Hermione hung fire <*in a week>. [atelic]

In (135) the VP contains a singular DP as its direct object and hence is interpreted as telic. Conversely, (136) is atelic as it has a direct object which is a

mass DP. What these examples show is that the semantics associated with syntactic structure is retained even in idiomatic interpretations.

If the functional head in derivational word forms contributes compositional meaning, this meaning should systematically surface. However, as far as I know there is no functional meaning such that it is shared by all derivational word forms. As such, the functional head which combines RTNs with one another should be semantically as neutral and underspecified as possible. Below I propose that an intersective head is the most underspecified functional head possible.

In sum, Encyclopedia can straightforwardly attach any meaning to any arbitrary combination of LVIs. It cannot, however, override the meaning of the functional head.

Above I have pointed out that the functional head which merges RTNs with one another has no salient semantic contribution. Such an underspecified semantics can be achieved by a functional head which has the same semantics as the operation merge itself. Such a head will not bring any additional meaning to the derivation.

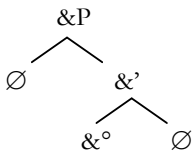
In what follows I adopt the view that the semantics of merge is conjunction, i.e. set intersection (Pietroski 2005 and Dany Jaspers p.c.).[142] As the most underspecified functional head imaginable does not add any meaning that was not already added by merge, it should be conjunctive too. We know independently that a functional head which expresses conjunction exists: the coordinating head is conjunctive by definition (Johannessen 1998 amongst many others, see also Den Dikken 2006:16-17 on the conjunctive semantics of predicational heads).

Let us now see what it means at LF that the functional head in between RTNs is conjunctive, i.e. set intersective. Recall that Vocabulary Insertion is a post-syntactic PF operation. Hence, the syntactic structure which is handed over to LF contains nothing but syntactic elements, not vocabulary items. LF

[142] See also Jaspers (2005) on the negative nature of set demarcation. Jaspers assumes that a structure implies a universal set of possible denotations and each application of Merge reduces the interpretive possibilities of the structure since Merge is intersective. It is therefore negative.

thus reads the syntactic structure of a word form such as *childish* as the structure given in (137).[143]

(137)

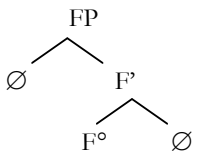


The structure in (137) is the conjuction of two feature sets at LF. As conjuction is set intersection the meaning of (137) will be the meaning of the intersection of the two sets of features. Now recall that RTNs are devoid of features by definition (see chapter 2 section 2.3). LF thus takes the intersection of two empty sets. The result is yet another empty set. As a result, LF will interpret a derivational word form just as it would interpret a single RTN; both are structures devoid of features.

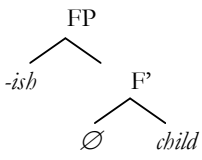
To conclude, in this section I have proposed that the semantics of the functional head which can be found in a derivational word form is conjunction. At LF the conjunction of RTNs is therefore a vacuous operation. The conjunction of two or more empty sets result in another empty set.

As an illustration, let us consider how a specific derivational word form is interpreted. Consider the word form *childish*. Its syntactic structure is given in (138)a. (99)b shows the structure after Vocabulary Insertion took place.

(138) a.



b.



The syntactic structure in (138)a is interpreted at LF. As the functional head stands for conjunction, LF takes the intersection of the two RTNs. As both

[143] √ and ∅ are nothing but notational variants to refer to an RTN (see chapter 2 section 2.3.4), although ∅ expresses more precisely the proposal presented in chapter 2.

nodes are devoid of features, the intersection is devoid of featutes too. LF therefore interprets the structure in (138)a as yet another root. The structure in (138)b, on the other hand, corresponds to stored information at Encyclopedia. This modules provides the information that it refers the property of being silly and immature.

5.4.4.3 Conclusion

In this section I have discussed the semantics of the functional head that merges RTNs with one another. Although the link between structure and meaning is arbitrary at Encyclopedia, the meaning of syntactic features cannot be ignored or overridden. Consequently, If the functional head connecting two RTNs expresses a specific syntactic feature it should be interpretable in all derivational word forms. I conjecture that the meaning which is shared by all derivational word forms is conjunction given that conjunction adds the most basic semantics. It adds nothing to the basic meaning of merge. I thus argued that the functional head in derivation word forms expresses conjunction. As a consequence, it is interpreted as set intersection at LF. The intersection of two RTNs is again an RTN, as the intersection of two empty sets is yet another empty set.

5.5 The linear order of the VIs

5.5.1 Introduction

In this section I discuss the linear order of the VIs which realize the RTNs. I first discuss the order in which they are inserted at Vocabulary Insertion. I then show how the surface order can be derived.

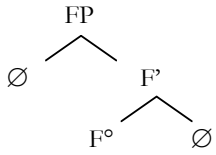
5.5.2 The order of the VIs at Vocabulary Insertion

5.5.2.1 Introduction

Until now I have tacitly assumed that the base VI realizes the most deeply embedded RTN in the structure, whereas the derivational affixes realize the

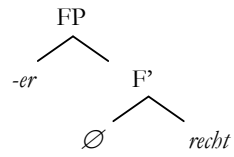
higher RTNs. However, as it stands the reverse order is not excluded on principled grounds. Take for example the derivation in (139).

(139) recht-er
right-ER
'judge'

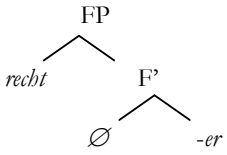


Recall that the insertion principle for RTNs boils down to free choice. In principle one can choose to realize either RTN as *recht* 'right' or as *-er* '-ER'. In other words, there are two options at Vocabulary Insertion. They are represented in (140) and (141).

(140)



(141)



In this section I argue that (140) is the correct representation. In section 5.5.2.2 I present an argument based on idiomatic interpretations to show that (140) is to be preferred over (141). In section 5.5.2.3 I discuss agreement facts which support the same conclusion.

5.5.2.2 The order of the VIs at Vocabulary Insertion and Enyclopedia

Marantz (1984) shows that idioms are constituents. He observes that English has countless object idioms, i.e. combinations of a verb and an object with an unusual semantics as in (142), but that subject idioms that are not full phrasal idioms do not seem to exist. The only subject idioms that can be found are full

clauses, in which case the direct object is also part of the idiom, see (143) (Marantz 1984:27).

(142) a. The chair / the pen / the book / the laptop gathered dust.
b. Mary / Anna / the surgeons / the butterfly kissed the dust.

(143) a. The shit hits the fan.
b. The dust settles.

Marantz concludes that it is a general principle that idioms should not contain gaps in their syntactic representation. They are full constituents.

In what follows I adopt Marantz's (1997) view that there is no crucial difference between idiomatic meaning below and above the word level. We now have a testing ground for etablishing the order of VIs at Vocabulary Insertion: VIs which form an idiom have to be a syntactic constituent to the exclusion of non-idiomatic material.

Consider the following examples. Each *a*-example consists of one base LVI and two suffixes. In all examples two VIs form an idiom. They all show the same pattern. The most righthand part is not contained in the idiom. It is thus the inner suffix which forms an idiom with the base VI, as shown in the *b*-examples.

(144) a. **kop-ig**-aard
head-IG-AARD
'stubborn person'

b. **kop-ig**
head-IG
'stubborn'

(145) a. **recht-er**-achtig
right-ER-ACHTIG
'judge-like'

b. **recht-er**
right-ER
'judge'

(146) a. **achter-lijk**-heid
behind-LIJK-HEID
'retardedness'

b. **achter-lijk**
behind-LIJK
'retarded'

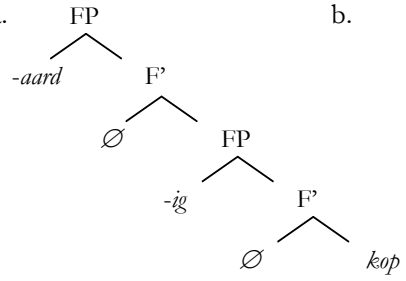
(147) a. **pas-er**-loos
fit-ER-LOOS
'without a pair of compasses'

b. **pas-er**
fit-ER
'pair of compasses'

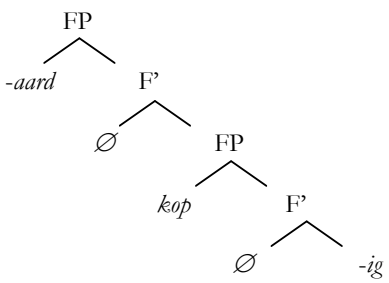
These examples show that the base VI and the leftmost suffix, i.e. the suffix which is closest to the base VI, form an idiom. I conclude therefore that they are a constituent and thus that the righthand suffix realizes the highest RTN. Moreover, Dutch has no idiomatic derivational word forms in which this pattern is disrupted. In other words, there are no comparable idiomatic derivations in which the free VI forms an idiom together with the outermost suffix, skipping the inner one. In sum, we have now established the merge order of the outer suffix with respect to the combination of the inner suffix and the base VI for derivational word formations containing two suffixes.

Note that this test does not allow us to establish the relative order of the base VI and the innermost suffix. They form a constituent and therefore allow for an idiomatic interpretation regardless of their merge order. I come back to their merge order in the next section. The theoretical possibilities for the merge order of the VIs at Vocabulary Insertion established so far are depicted in (148)-(151).[144]

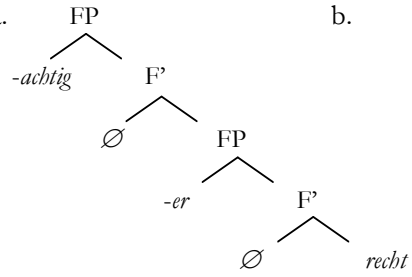
(148) a.



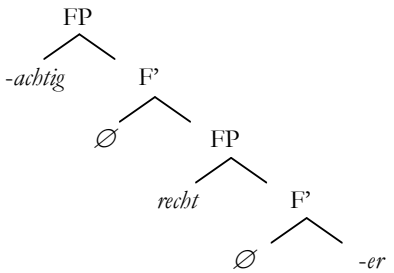
b.



(149) a.

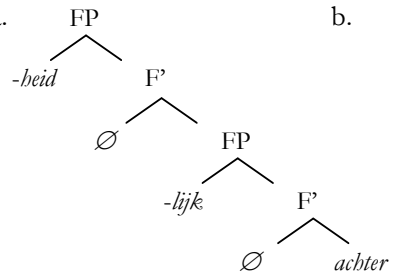


b.

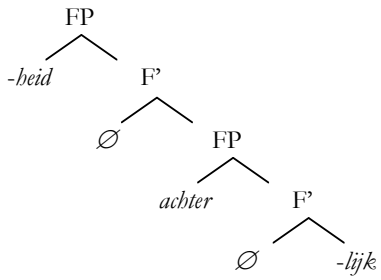


[144] I assume that the third RTN merges as the specifier of a second functional head and not in an additional specifier of the first functional head. This choice is based on the fact that the functional head expresses conjunction and conjuncts are often seen as the complement and the specifier of a functional head (see Thiersch 1985, Munn 1987, Kayne 1994, Johannessen 1998 and Zhang 2006 amongst others, but see Munn 1993 for a multiple specifier view on coordination). As far as I can see, nothing crucially hinges on this assumption. Note, however, that if I am on the right track that linking phonemes realize the intervening functional head (see section 5.4.2), there is empirical evidence for assuming a functional head per affix. After all, each affix may have its own linking phoneme.

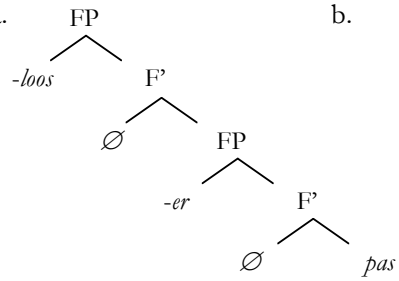
(150) a.



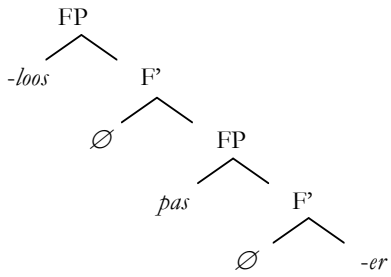
b.



(151) a.



b.



For derivations containing two prefixes the same pattern can be observed. The base VI forms a constituent with the prefix which is linearly closest to it. Because they are prefixes, the two righthand parts can form an idiom. This is illustrated below. The *a*-examples contain two prefixes, the *b*-examples show that the righthand parts form an idiom.

(152) a. her-**be-loov**-en
HER-BE-praise-INF
'to promise again'

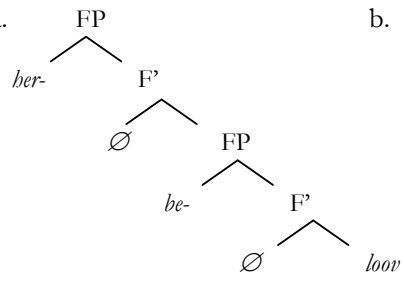
b. **be-loov**-en
BE-praise-INF
'to promise'

(153) a. het on-**ge-luk**
the ON-GE-succed
'the misfortune'

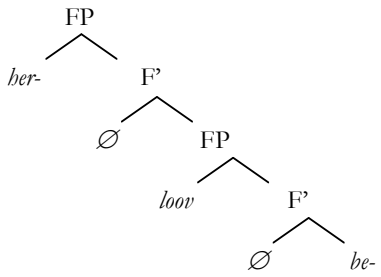
b. het **ge-luk**
the GE-succeed
'the fortune'

I conclude that the idiomatic part forms a constituent and that the outermost prefix realizes the highest RTN. Again, we cannot yet draw a conclusion about the merge order of the two parts of the idiom. The theoretical possibilities are depicted in (154)-(155).

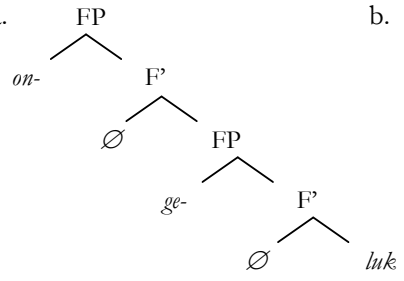
(154) a.



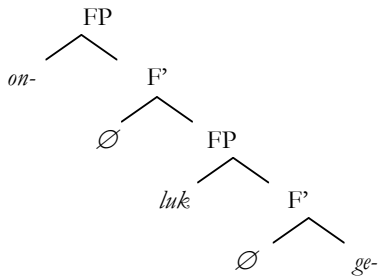
b.



(155) a.



b.



Considering all examples above the generalization is that the base VI forms a constituent with the affix which is linearly closest to it. This generalization also holds when the derivation contains more than three VIs. Consider the word form in (156)a. It contains four VIs of which three form an idiom, as can be concluded from the *b*-example. Again, the affix which is furthest away from the base VI is not part of the idiom. The *c*-examples shows that the *b*-example truly is an idiom as a whole, it is not built up compositionally from the three leftmost VIs.

(156) a. heer-schap-ij-achtig
lord-SCHAP-IJ-ACHTIG
'suzerainty-like'

b. heer-schap-ij
lord- SCHAP-IJ
'suzerainty'

c. heer-schap
lord-SCHAP
'man (pejorative)'

When a derivation contains both a prefix and a suffix both can form an idiom with the base VI. The *a*-examples in (157) and (158) show formations in which the prefix and the base VI form an idiom, as can be seen in the *b*-examples.

(157) a. **be-loov**-er
BE-praise-ER
'promiser'

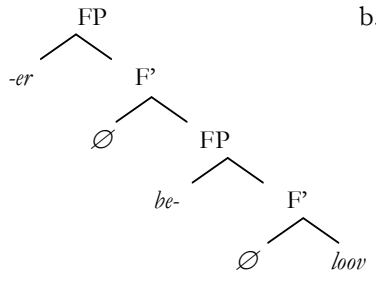
b. **be-loov**-en
BE-praise-INFINITIVE
'to promise'

(158) a. **ont-last**-ing
ONT-burden-ING
'feces'

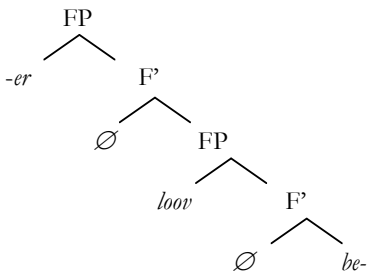
b. **ont-last**-en
ONT-burden-INFINITIVE
'defecate'

I conclude that the suffix merges above the prefix and the base VI in these cases. The possibilities are given in (159)-(160).

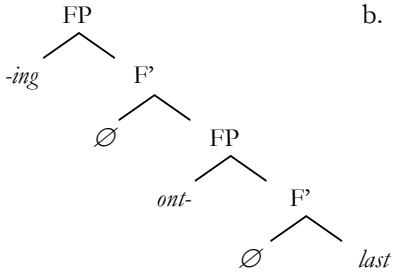
(159) a.



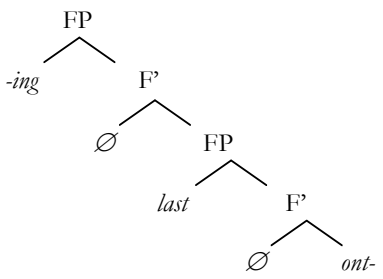
b.



(160) a.



b.



It is equally possible for the base VI to form an idiom with the suffix to the exclusion of the prefix. Examples are given in (161)-(162). Again, the *a*-example shows the formation with both a prefix and a suffix. The *b*-example shows that the base VI forms an idiom with the suffix.

(161) a. ver-**pamp-er-en**
VER-cram.with.food-ER-INFINITIVE
'to spoil till ruined'

b. pamp-er-en[145]
cram.with.food-ER-INFINITIVE
'to spoil'

(162) a. be-**poot-el-en**[146]
BE-paw-EL-INFINITIVE
'to touch' (pejorative)

b. poot-el-en
paw-EL-INFINTIVE
'to touch' (pejorative)

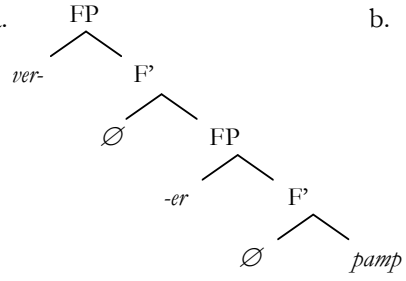
---

145 The base VI *pamp* 'to cram with food' is archaic and only occurs in idiomatized word forms and compounds such as *slampampen* 'to indulge in an excessive meal' and *pampzak* 'obese glutton' in contemporary Dutch.

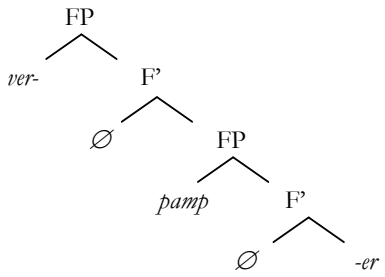
146 The base VI in *potelen* 'to touch' might not be etymologically related to *poot* 'paw', but to another verb *poten* 'to strike', which is not longer used in contemporary Dutch (De Vries et al. 2001). However, contemporary speakers of Dutch recognize the base VI *poot* in the morphological make-up of *potelen*. The word is only used in Belgium. There is no clear difference in meaning or use between *potelen* and *bepotelen*. Both are transitive, pejorative words which mean 'to touch'.

These examples show that the base VI can equally form an idiom with the suffix. It follows that a base VI can form a constituent with a suffix to the exclusion of the prefix. This possibility is shown in (163)-(164).

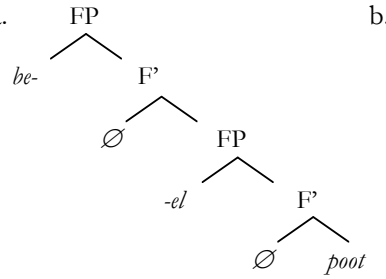
(163) a.



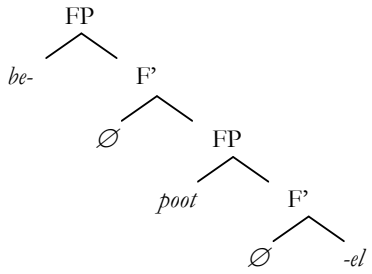
b.



(164) a.



b.



In sum, in this section I have shown that the affix which is linearly closest to the base VI forms a constituent with it. The outermost affix is always merged last. When a derivation contains both a prefix and a suffix, either of them can form a constituent with the base VI. We were not yet able, however, to establish the merge order between the basis VI and the affix with which it is merged first. I address this issue in the next section.

5.4.2.3 The order of the VIs at Vocabulary Insertion and first conjunct agreement

In this section I show that agreement between the determiner and the RTNs can shed light on the relative order between the base VI and the lowest affix. I adopt the view that Agree is an operation which takes place at PF (Bobaljik

2008). Bobaljik's work concerns phi-agreement between the verb and a DP. According to his view agreement selects the highest accessible DP in the agreement domain. Bobaljik defines accessibility in terms of morphological case and the agreement domain as the clause and the edge of the lower clause. Analogously, I assume that within the DP all RTNs are accessible for agreement with the determiner. In other words, I take the DP to be the relevant agreement domain for DP-internal agreement.

If there are two possible controllers of agreement inside the agreement domain, the highest one wins. Bobaljik (2008) gives an example from Hindi-Urdu to illustrate this. In this language the external argument of transitive and some unergative predicates is marked for ergative case by means of the affix *-ne*. Experiencers and goals bear the dative affix *-ko*. All other arguments are unmarked, i.e. they get the default case. Any DP which is marked for the default, unmarked case may determine agreeement (see Bobaljik 2008:18-19 for a detailed discussion). When more than one such DP is present, it is invariably the highest one that wins. An example is given in (165) (Bobaljik 2008:19). The zero affix indicates the default, unmarked case.

(165)	siitaa	kelaa	khaatii	thii
	Sita-∅(**F**)	banana-∅(**M**)	eat.IMPERF.**F**	be.PAST.**F**
	'Sita (habitually) ate bananas.'			

The example above shows that when an agreement domain contains two possible controllers for agreement the higher one wins.

A similar pattern can be found in Tonga. In this language an object marker is part of the verbal inflection. This object marker agrees with the noun class of the noun in the direct object position (Dan Michel p.c.). When the direct object is a coordinated DP, it is always the first, i.e. the highest, conjunct which determines agreement (Dan Michel p.c., see also Van Koppen 2005 on agreement with coordinated DPs). Again, it is the highest accessible NP which determines agreement in case two possible controllers are in competition.[147]

[147] This section does not do justice to the complex nature of conjunct agreement. For a more detailed discussion see Van Koppen (2005).

The examples given above illustrate that when two possible controllers are present in the agreement domain, the highest one wins. This observation presents a testing ground to determine which VI realizes which RTN. If we find syntactic agreement for which one part of a derivational word form serves as the controller of agreement we know it is the highest one.

Such agreement can indeed be found for word forms under a nominal superstructure. As is well known, Dutch shows gender agreement between the determiner and the VI which realize (one of) the RTN(s) in a DP. The examples below illustrate this. Example (166) shows common agreement, (167) neuter agreement.[148]

(166) de kast
the.COMMON $\text{closet}_{\text{COMMON}}$
'the closet'

(167) het touw
the.NEUTER $\text{rope}_{\text{NEUTER}}$
'the rope'

In a derivational word form it is invariably the affix which determines agreement (Booij 2002:121). The example in (168) illustrates this.

(168) de recht-er
the.COMMON right-ER
'the judge'

In (168) the affix *-er* triggers common agreement (de Haas and Trommelen 1993:174),[149] while the VI *recht* 'right' triggers neuter agreement (see (169)).

[148] Note that the fact that one RTN systematically determines agreement shows that this RTN asymmetrically c-commands the other one. The agreement facts therefore support section 5.4.2 in which I argued for the presence of an F°-head in between the RTNs.

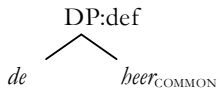
[149] Affixes have a fixed gender in Dutch (Booij 2002:37). For example, the prefix *ge-* invariably triggers neuter gender, the suffix *-heid* triggers common gender.

(169) het recht
the.NEUTER $\text{right}_{\text{NEUTER}}$
'the right'

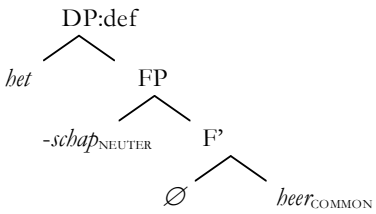
It is thus clearly the affix *-er* which determines the gender value of the whole formation. Recall that the highest possible controller for agreement wins. We can now conclude that the affix is higher in the structure than the base VI.

When a derivational word form contains a base VI and an arbitrary number of suffixes in Dutch it is always the linearly rightmost RTN which determines gender. Consider the following examples. Example (170) contains no suffixes, (171) has one suffix and (172) shows two of them. In each case, an Agree relation is established between the determiner and the RTN that is highest in the structure.[150] The VI *heer* triggers common agreement, the suffix *-schap* neuter agreement and *-ij* common agreement. The trees show the structures after Vocabulary Insertion took place.

(170) de heer
the.COMMON lord
'the lord / gentleman'

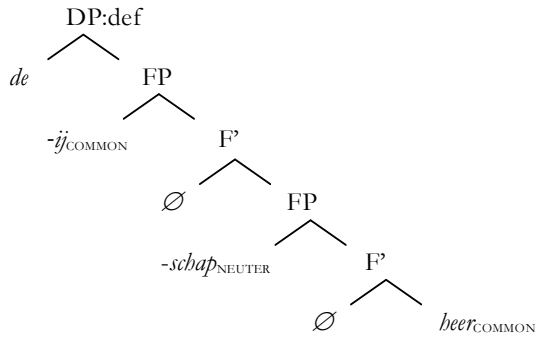


(171) het heer-schap
the.NEUTER lord-SCHAP
'the man'



[150] For ease of exposition I have left out all irrelevant functional projections.

(172) de heer-schap-ij
the.COMMON lord-SCHAP-IJ
'the suzerainty'

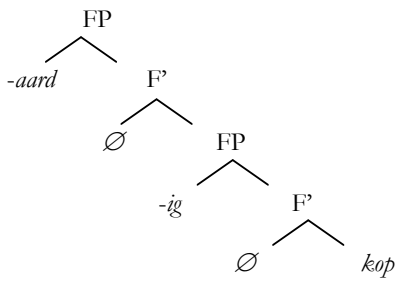


As such, gender agreement sheds light on the order of the VIs in the structure. When a word form contains a base VI and an affix, it is always the affix which determines agreement. As agreement is controlled by the (hierarchically) closest Goal, this implies that the affix is merged higher than the base VI. The VIs are thus merged in the mirror image of their linear order.

5.5.3 The linear order of the VIs

In the two previous sections I have discussed the order of the VIs at Vocabulary Insertion. It became clear that this order is not identical to the surface order. Consider for example (173). The order of the VIs at Vocabulary Insertion is the reverse of the linear order, see (174).

(173)



(174) de kop-ig-aard
the head-IG-AARD
'the stubborn person'

In this section I discuss how the surface order can be derived from the underlying order. In order to do so, I adopt four insights from previous literature. Firstly, I adopt the view that PF is a component which consists of an ordered set of computations on the output of narrow syntax (Embick 2007). One of those computations is Vocabulary Insertion, another one is linearization. Vocabulary Insertion precedes linearization. Secondly, I assume that VIs may come with a subcategorization feature at PF which stipulates whether they are a free or bound base VI, a prefix, a suffix, an infix or a circumfix. In other words, affixation is a requirement of individual VIs (Marantz 1988, Embick 2007). Thirdly, I adopt the idea that linearization proceeds bottom-up and yields a transitive relation between VIs (Fox & Pesetsky 2003). Fourthly, I assume that affixation takes places under linear adjacency in a bottom-up fashion (Embick 2007). These four principles allow us to derive the surface order of derivational word formations correctly. Below I illustrate the linearization of a derivational word form containing multiple suffixes, one with several prefixes and one with both suffixes and prefixes.

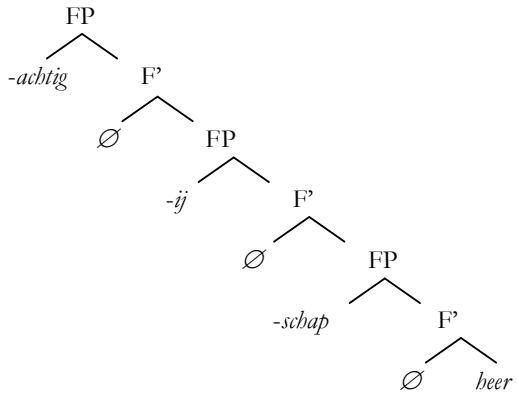
Let us first derive the surface order of a derivational word form which contains only suffixes.

(175) heer-schap-ij-achtig
lord-SCHAP-IJ-ACHTIG
'suzerainty-like'

The derivational word form is first handed over to Vocabulary Insertion. The surface order of the VIs is then derived from the output of this operation, as Vocabulary Insertion precedes linearization.

The derivation of (175) after Vocabulary Insertion but before linearization is depicted in (176) (see section 5.5.2). The VIs are marked with a subcategorization feature indicating whether they are base VIs or affixes. I indicate this with a dash: a left-hand dash stands for a suffix, a right-hand one for a prefix or a bound base VI, no dash means free base VI.

(176)



After Vocabulary Insertion linearization takes place. In what follows I adopt Kayne's (1994) LCA (see Chomsky 1995:334-340 for an LCA compatible with Bare Phrase Structure). I assume that elements which are not spelled out at PF are not linearized (see Chomsky 1995:337). Hence, I ignore the silent functional heads. As this operation proceeds bottom-up, the following orderings are derived for (175):[151]

(177) *-schap* < *heer*
-ij < *-schap*
-achtig < *-schap*

Combined, this yields the following string:

[151] For ease of exposition, I do not include all transitive relations which follow from these basic relations, such as *-ij* < *heer*.

(178) *-achtig* < *-ij* < *-schap* < *heer*

Now each VI has to fulfill its affixational requirements.[152] This operation takes place under string adjacency and in a bottom-up fashion (see footnote 153). The suffix *-schap* therefore first attaches to *heer*, as shown in (179).

(179) *-achtig* < *-ij* < *heerschap*

Subsequently, the next suffix in line, viz. *-ij*, attaches to *heerschap*, yielding (180).

(180) *-achtig* < *heerschappij*[153]

Finally, the suffix *-achtig* satisfies its affixational requirements and the surface order is derived, as illustrated in (181) (cf. (175)).

(181) *heerschappijachtig*

Having established that word forms with more than one suffix can be linearized succesfully, I will now illustrate how to derive the word order for a form with more than one prefix in a similar fashion. Consider the example below.

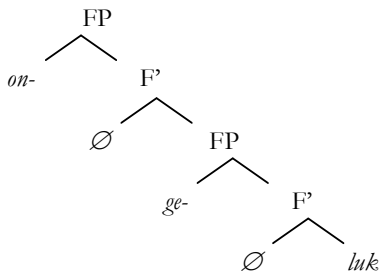
(182) het on-ge-luk
the ON-GE-succeed
'the misfortune'

The output of Vocabulary Insertion is given in (183).

[152] I present affixation as a rule that follows linearization for ease of exposition. I do not intend to imply a chronological order; both rules take place simultaneously.

[153] The second *p* in *heerschappij* stems from a spelling rule which is irrelevant for the discussion at hand.

(183)



Linearization yields the following string:

(184) *on-* < *ge-* < *luk*

The prefix *ge-* first attaches to *luk*, yielding (185).

(185) *on-* < *geluk*

Subsequently, the prefix *on-* attaches to *geluk*. The result is the surface order in (186) (cf. (182)).

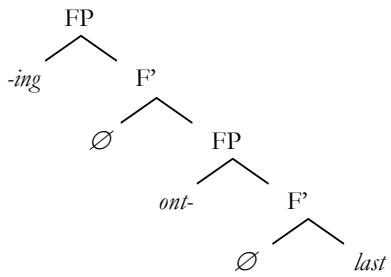
(186) *ongeluk*

Finally, let us consider word forms which have both pre- and suffixes, as in (187).

(187) ont-last-ing
ONT-burden-ING
'feces'

The order after Vocabulary Insertion is given in (188) (see (158)).

(188)



Linearization yields the string in (189).

(189) *ing-* < *ont-* < *last*

As affixation proceeds in a bottom-up fashion, the prefix *ont-* first attaches to *last*. The result is given in (190).

(190) *-ing* < *ontlast*

This is followed by affixation of the suffix *-ing* and the surface order is derived. This is illustrated in (191) (cf. (187)).

(191) *ontlasting*

The example thus shows how the surface order of a word form which contains both a prefix and a suffix is obtained under the present proposal.

In sum, by assuming that linearization proceeds in a bottom-up fashion, that VIs are marked for their individual affixational requirements, and that affixation respects linear adjacency and proceeds bottom-up as well, the surface order of each derivational word formation can be derived succesfully by PF movement.

5.5.4 Conclusion

In this section I have discussed two operations at PF. The first one is Vocabulary Insertion. I have proposed that the base VI merges in the lowest position and that the affixes which surface closest to this base VI are merged lower than the outer affixes. Support for this proposal comes from idiomatic

word forms and gender agreement. I then discussed how the derivation of the surface order is derived. I have adopted the view that VIs may come with requirements about their linearization and that adjacency plays a crucial role when deriving the correct surface order (Marantz 1988, Embick & Noyer 2001 and Embick 2007).

5.5 Conclusion

In this chapter I have argued that derivational affixes express lexical semantics. As such, they are realizations of RTNs in the unmarked case. Subsequently, I discussed derivational affixes which combine lexical meaning with a functional role. It became clear that in collective mass nouns a derivational affix realizes functional features. I analyzed these affixes on a par with *stuk* and *heel* in chapter 3 (see sections 3.4.2 and 3.4.3); I argued that they are semi-lexical VIs. I have then proposed a structure for derivational word forms. I have argued that a conjunctive head merges on top of an RTN. In the specifier of this head another RTN is merged. I have further shown how multiple RTNs can be merged into one structure in light of my earlier claim that the merge of each RTN implies the start of a new derivation. In particular, I have proposed that derivations can be put back into the numeration. In a next section I have examined the order in which VIs are inserted at Vocabulary Insertion and the way in which the surface order can be derived. Idiomaticity and agreement showed that the base VI realizes the lowest RTN and that inner affixes are inserted earlier than outer ones. PF operations then derive the surface order by linearization and fulfilling the particular affixal requirement of each VI. In short, in this section I have discussed the details of an alternative view on derivation. The new proposal entails that derivational affixes realize RTNs by default.

6. *Conclusion and further issues*

6.1 Conclusion

6.1.1 Summary of the proposal

Traditionally, it is assumed that lexical categories are projected from a lexical vocabulary item (LVI) which defines the (sub)category of the (extended) projection (Chomsky 1970, Muysken and van Riemsdijk 1986, Grimshaw 2009).

The framework of Distributed Morphology (henceforth DM) (Halle & Marantz 1993, Harley & Noyer 1999) did away with the idea that LVIs are present in syntax. Instead, Halle and Marantz (1993) argue for one, unique root in the structure. Yet, they still assume that one specific node determines the category of the (extended) projection. The root invariably merges with a categorial head which serves to define the category of the projection.

The Exo-Skeletal Model (Borer 2005 a,b, 2009 a,b,c, henceforth XSM) points out that it is essentially redundant to assume one specific node for the purposes of category assignment. Functional structure suffices to determine the category of the projection (see also Myers 1984). The XSM thus fully subscribes to the idea that roots are categoriless. Furthermore, Borer (2005a,b, 2009a,b,c) does not assume productive null categorial heads. However, she does posit that overt derivational affixes are the spell-out of categorial heads. In other words, the XSM assumes the presence of categorial heads only in those cases for which there is overt empirical evidence for their presence.

Note, however, that a consequence of the Exo-Skeletal line of reasoning is that lexical categorial features can be eliminated from syntax altogether, thus

reducing the set of syntactic primitives. Occam's razor dictates that such a reduction is to be preferred if the empirical coverage of the proposal remains unaffected. However, derivational affixes seem to be the last hurdle. It is commonly assumed that their distribution is determined by the presence of categorial heads in the structure (seem for example Marchand 1969, Williams 1981, Halle and Marantz 1993, Borer 2003 amongst many others). This work has shown, however, that one can account for their distribution without relying on categorial heads with the same empirical adequacy as previous approaches which do assume categorial heads. The result is that lexical categorial features are no longer a primitive of syntax.

In this thesis I have reexamined both sites where categorial features have been postulated, viz. the lexical head or the root, and the categorial head. First I have compared two ways of defining a root as featureless. A lexical definition entails that a root is formed whenever a featureless vocabulary item merges into the structure. A structural one states that a root results from the merger of a featureless terminal node. In chapter 2 I have pointed out that this distinction goes hand in hand with early versus late insertion of vocabulary items. A lexical definition necessitates early insertion, a structural one requires late insertion. I have shown that there is empirical evidence to support a structural definition and hence, late insertion. Evidence came from the use of functional vocabulary items in root positions. This thesis has also demonstrated how the root can be structurally derived from the operation Merge.

The assumption that roots are featureless allows one to capture the malleability of lexical items. The (sub)categorial specification of the structure is not determined by the root, but by the functional structure. Structure thus determines the interpretation of the root. Hence, different syntactic structures may trigger different interpretations of the same LVI. I have explored this property by means of a case study on nominal subcategories in chapter 3. I have illustrated how an LVI is not restricted to one specific nominal subcategory. The case study illustrated that a fine-grained functional structure can derive various subcategories. Moreover, it showed that it successfully captures the attested flexibility of vocabulary items. Furthermore, I have shown that a structurally defined root allows one to account for the hybrid nature of

semi-lexical items. I have characterized those as FVIs with a rich semantic content. As such, they can realize both an FTN and an RTN . More specifically, I have discussed two semi-lexical items, viz. *stuk* 'piece' and *heel* 'whole' Once again, they illustrate the point that structure prevails over properties of VIs as it is the position where they are merged which determines whether these VIs are interpreted as realizations of FTNs or RTNs.

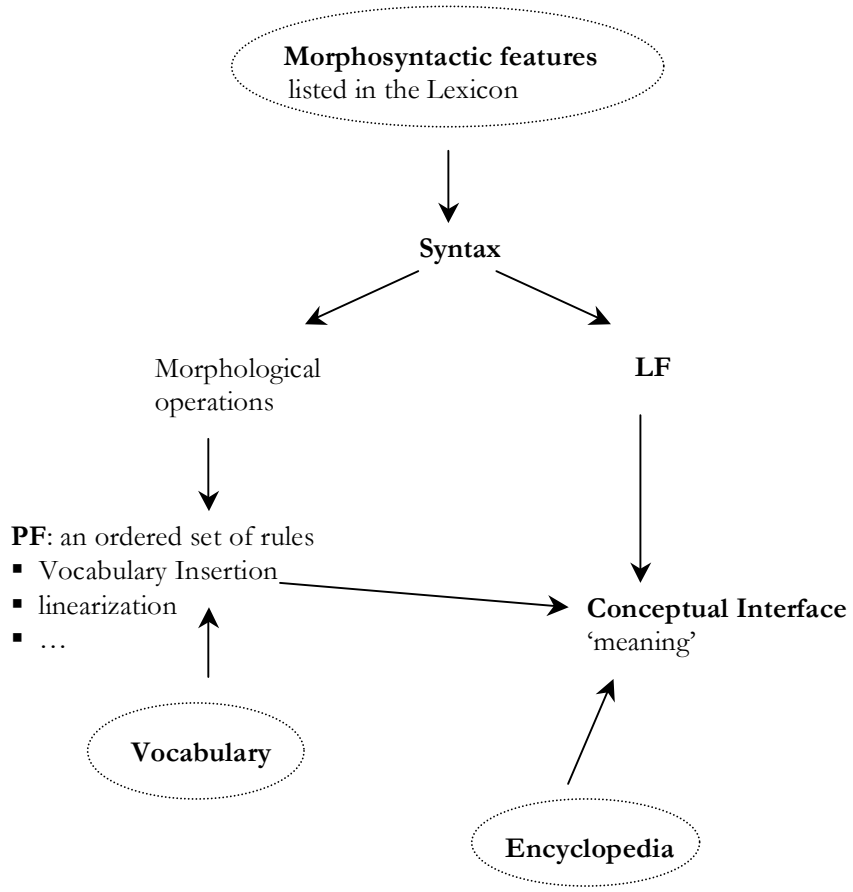
Secondly, I have studied the second locus of lexical categorial features, viz. derivational word formation. I have first explored the empirical consequences of the idea that derivational affixes do not realize categorial heads. It allows us to capture the fact that some derivational affixes are not tied to one specific category, as illustrated in chapter 4. I then considered a potential problem for the proposal, i.e. the potential for overgeneration. I discussed word forms which seem to be tied to a specific category. For example, the word *ugliness* cannot be used as verb. At first sight, this fact seems to be in favor of a conventional approach which states that *-ness* is the realization of a nominal head. However, I have pointed out that the derivation of other words has exactly the same structure. An example is *proposition*. It has exactly the same structure. Yet, this word can be used as verb. As a consequence, traditional approaches have to assume a conversion mechanism to derive the verb *to proposition*. The problem for such approaches is that this conversion mechanism illicitly derives *to ugliness* as well. I have called this problem the conversion paradox. The net result is that traditional approaches also fail to account for the illformedness of *to ugliness*. In other words, conventional approaches are not empirically more adequate. I further conjectured on the basis of nonce formations that the illicitness of *to ugliness* might not be a syntactic problem. In sum, I have shown that a model without categorial heads has the same empirical adequacy as one which does postulate them.

If derivational affixes do not realize categorial heads, they realize something else. I have discussed the lexical semantics of derivational affixes and have proposed that in the unmarked case they realize root terminal nodes. As I have shown that derivational affixes have at least some lexical meaning, they can be semi-lexical vocabulary items too. I have presented a case study on collective

mass nouns showing that derivational affixes may be semi-lexical VIs. The crucial piece of evidence was syntactic; collective nouns resist plural marking.

In what follows I summarize in which respects the present proposal deviates from the Y-model as proposed in DM. DM's Y-model is given in (1) (see also chapter 1 section 1.3.1).

(1)



The present model does not deviate from the one in DM qua general architecture; it assumes the same modules in the same order. However, within these modules it differs in two respects. Firstly, it postulates different syntactic primitives. Secondly, it holds a different view on Vocabulary Insertion. I discuss both points in turn below.

Just like in DM, the Lexicon in my model contains (a subset of) the morphosyntactic features from UG. However, it deviates in two important respects from the list in Halle & Marantz (1993). Firstly, Halle & Marantz (1993) assume that the Lexicon contains a feature [Root], which defines an RTN. In the present thesis we have defined the RTN as a by-product of the operation Merge and have argued that it is devoid of features. Secondly, a central point in Halle & Marantz (1993) and subsequent literature in DM is the existence of categorial heads, such as v° and n°. These heads categorize the (categoriless) RTN. In the present work I have argued against the existence of such categorial heads. As a result, the Lexicon does not contain such features either. In sum, in the present proposal, just as in DM, the Lexicon contains all and only innate morphosyntactic features. However, differently from DM as proposed by Halle & Marantz (1993), a [Root]-feature and categorial features are not part of the Lexicon as they do not exist. Given that the features present in the Lexicon are the only possible building blocks for the syntactic derivation, the present model assumes less syntactic primitives than DM.

Secondly, I have proposed a different mechanism of Vocabulary Insertion. PF is an ordered set of operations. One of them is Vocabulary Insertion. In this thesis I have given empirical support in favor of late insertion. In this respect the present work contrasts with proposals which support early insertion of indices of VIs (see Borer 2005a,b, 2009a,b,c, Harley 2009b and Pfau 2009). In the analyses presented in this dissertation all VIs enter the structure post-syntactically. Consequently, properties of VIs cannot affect the syntactic derivation in any respect. It rather works the other way around; syntactic structure determines how VIs are interpreted, i.e. structure prevails over VIs. This point is particularly important for the RTN. The RTN is syntactically defined as a terminal node devoid of any features. Consequently, this position will invariably be interpreted as a root position, regardless of whether the VI that realizes it is marked for features or not. Given that both FVIs and LVIs can realize an RTN I have modified the mechanism for Vocabulary Insertion such that the features of a terminal node function as a filter for selecting the VIs that can be inserted in that position. If there are no such features -as is the case for RTNs- the filter is vacuous and all VIs can be inserted.

In sum, this model deviates from DM in two modules. Firstly, it does not posit a [Root]-feature or categorial features in the Lexicon. Secondly, it argues for late insertion of LVIs and proposes a different mechanism for Vocabulary Insertion.

6.1.2 Eliminating lexical categories in case theory

In this thesis I have eliminated lexical categories as a primitive of syntax. However, lexical categories have played an important role in case theory. Many traditional proposals on case theory have argued that the features of lexical categories assign case (see Vergnaud 2006 and subsequent literature). However, recent proposals, such as Pesetsky and Torrego (2002) have shown that case may not be dependent on lexical categories after all. In this section I briefly comment on this development.

Since Vergnaud (1977) the assignment of accusative case is linked to certain categories. He proposed that V and P license a complement by assigning accusative case to it, whereas A and N do not. In other words, case assigners were (a specific subset of) lexical categories. Consequently, lexical categories were seen as part of syntax.

This view changed when Chomsky (1981:48, see also Muysken & Van Riemsdijk 1986) proposed that syntactic categories are not the theoretical primitives for case assignment.[154] He argued that categories are defined by feature matrices, i.e. categories are defined by specific combinations of features, as illustrated in (2). The table shows that two binary features, viz. V and N define four lexical categories, viz. V, N, A and P.

[154] In Chomsky (1970:199) it was already suggested that lexical categories may not be a syntactic primitive, but a combination of features.

(2)

	V	N
Verb	+	_
Noun	_	+
Adjective	+	+
Preposition	_	_

Chomsky concluded that the categories which are marked as [-N] assign accusative case. In other words, accusative case assignment hinges on a specific subcategorial feature, not on a lexical category as a whole. The insight that lexical categories are not a primitive of syntax was a milestone in the theory of case and syntactic categories.

A subsequent development in the theory of case was the fact that case assignment became associated with functional projections. Chomsky (1986) proposed that Infl assigns nominative case to a DP, later it is argued that AgrOP assigns accusative case (Pollock 1989, Chomsky 1991). In the same vein, Chomsky's (1995) account of Burzio's generalization entails that the burden of accusative case assignment is placed on functional projections. Burzio (1981, 1986) observed that there is a tight link between the licensing of accusative case and the presence of an external argument. Chomsky argued that this link is not established by V, but by a head higher up in the structure, which he called little v. This head introduces both accusative case and the external argument (see also Wurmbrand 1998 for further support and Kratzer 1996 for a semantic definition of little v (her Voice° head)). In other words, accusative case assignment became associated with a functional head rather than with a lexical terminal node. As a consequence, case theory no longer needs to postulate lexical categories as a primitive of syntax. For the purposes of case assignment, their presence in syntax is not required.

The idea that case assigners are part of the functional structure and that the root terminal node is syntactically inert culminated in the theory on case presented in Pesetsky & Torrego (2002). When it comes to the root, a single

category merges in this position, viz. the category Predicate. For the assignment of accusative case, they propose a lower Tense-head. In the absence of this head the Predicate is defined as an adjective. In the presence of this head the Predicate may either be interpreted as a V or an N depending on the featural specification on this Tense-head. In sum, the atoms of syntax in this theory of case consist of a unique category that merges at the root terminal node, functional features and the operations Merge and Agree. Lexical categories are not a primitive of syntax, nor are lexical vocabulary items, such as *cat* or *light*.

In short, in this section I have shown that eliminating lexical categories from syntax is an evolution which can be found outside of the domain of morphosyntax as well. More specifically, recent approaches to case theory do not require lexical categories as part of syntax.

6.2 Further issues

6.2.1 The functional projections that define a category

Under the present view a lexical category refers to a set of functional features Nominality, for example, is the name we give to a small set of features which are prototypically associated with the NP, such as [D] and [Num]. I take it to be an open issue, however, how this set should be defined. It may be the case that there is a small subset of features that is present in all NPs. However, it may equally well be the case that a specific group of features is prototypically associated with nominality, but that none of the members of this group is by itself a necessary element.

Subcategories are more easily definable and may serve as a starting point for further research. I have argued, for example, that the count unit reading requires the features [Size] and [Num]. Moreover, I have adopted the view that the absence of features can define a subcategory as well (see Pesetsky and Torrego 2002, Borer 2005a). For example, a mass reading results from the absence of a Number°-head in the presence of a D°-head (Borer 2005a).

Apart from the nominal domain, this thesis has devoted little attention to the precise functional projections which define a category. As far as the verbal domain is concerned, it seems plausible that argument introducing projections

and projections which provide information about time, modality and aspect may be crucial to cognitively recognizing an event. Hence, they may very well be involved in defining verbal structure (see Kratzer 1996, Ramchand 1997, Borer 2005b). Degree may be the distinguishing factor for an adjectival functional projection line (Kennedy 1999). Past research has shed some light on these issues (see for example Baker 2003 and references therein) and I leave it as a topic for future research to flesh out this idea in further detail. In sum, I conjecture that a category is a set of functional features.

6.2.2 Categories and conceptual expectations

In chapter 3 section 3.2.5 I have discussed the fact that a specific syntactic structure creates conceptual expectations. For example, using an LVI which most commonly refers to non-edible animates in a mass reading (e.g. *There is poodle in the soup*) is marked. The markedness of this example is due to the fact that the syntax of mass readings creates the expectation that the LVI which realizes the RTN refers to something which is commonly ground.

The view described above dovetails nicely with research on first language acquisition. Experiments in this domain show that children associate specific functional structure with specific concepts (Waxman 1994). It suggests that ontological distinctions are innate. For example, a conceptual distinction between the concepts 'thing' and 'event' may be innate. Furthermore, it may be innate to expect a mapping between some (sub)categories and some concepts. For example, children may expect that a count unit reading refers to a thing. Specific functional structure thus triggers conceptual expectations.

6.2.3 Derivation, inflection and compounding

Morphological theories often make a distinction between derivation, inflection and compounding. Compounding seems to belong to an entirely different realm than derivation and inflection in that it involves the merger of two or more base VIs instead of affixes. Derivation in turn is often taken to be less regular than inflection. This work therefore supports the claim that the traditional threeway distinction in word formation is not real (see Halle 1973,

Anderson 1992, Beard 1995 amongst many others). Derivation resembles compounding in that both involve the merger of RTNs which are realized by LVIs. However, as a subgroup of the derivational affixes, i.e. the semi-lexical ones, may realize FTNs too, the distinction between derivation and inflection is not clear either.

More important than the distinction between derivation and inflection is the one between RTNs and FTNs. RTNs only serve to add pieces of lexical meaning to the structure. FTNs on the other hand, add syntactic features and define a projection. I have shown that derivational affixes can realize both types of nodes (see chapter 5) and that inflection only realizes FTNs (see chapter 3). As such, there is an overlap between derivation and inflection; both can realize FTNs.

As I have argued that derivational affixes have lexical semantics there is in the current theory no syntactic distinction between derivation and compounding. Admittedly, compounds are a combination of base VIs, whereas derivation involves a base VI and one or more affixes, but given late insertion this difference may be completely irrelevant to syntax. If compounds, just like derivational word forms, are a concatenation of two RTN with an intervening functional head (see Di Sciullo 2009), compounds and derivations turn out to be syntactically identical. Further research into the morphosyntax of compounds will need to shed light on this issue (see Lieber and Štekauer 2009 for an overview of the state of the art on compounding).

6.2.4 Vocabulary imposes restrictions on derivational word formation

The present work does not do justice to the restrictions on derivational word formation. In this section I briefly comment on this issue. In syntax the structure for all derivational word forms is identical. In a narrow syntactic sense, then, all derivational word forms are grammatical. Put differently, syntax cannot distinguish between acceptable and unacceptable derivational word forms. To be concrete, compare the word form in (3) with the one in (4).

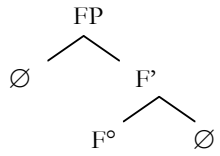
(3) koning-in
king-IN

'queen'

(4) * koning-es
king-ES

These examples show that the Dutch LVI *koning* can co-occur with the affix *-in* to form the word form *koningin* 'queen'. It does not, however, co-occur with the affix *-es* which is also used to refer to females, e.g. in *prinses* 'princess'. Syntactically, however, at syntax, both the licit form in (3) and the illicit one in (4) have the structure in (5).

(5)



The derivational word forms in (3) and (4) only differ after Vocabulary Insertion has taken place. I therefore conjecture that Vocabulary Insertion is generally responsible for distinguishing between licit and illicit derivational word forms. More specifically, VIs can influence the choice for other VIs. For example, in (3)/(4) *koning* specifically selects *-in* to derive the Dutch word form to refer to a queen. However, selection is not restricted to specific VIs. It can also target entire semantic fields. The productive use of the Dutch suffix *-schap*, for example, targets three specific semantic groups of VIs. In other words, *-schap* only co-occurs productively with base VIs which belong to one of the three following groups:.

(6) a. professions
hoogleraar 'professor', *griffier* 'clerk', *schrijver* 'writer', *zeeman* 'sailor', *minister* 'minister', *kunstenaar* 'artist', …

b. highest person in rank
   prior 'prior', premier 'prime minister', *koning* 'king', *paus* 'pope', voorzitter 'chairman', *president* 'president', *directeur* 'principal', *dictator* 'dictator', …

c. social position
   martelaar 'martyr', *moeder* 'mother', *kampioen* 'champion', …

This shows that semantic fields are relevant for the acceptability of derivational word forms, and it meshes well with psycholinguistic findings (Pfau 2009) which state that Vocabulary is organized in such fields. However, it is not clear to me how such restrictions should be defined or what causes them. They may appeal to relevant semantic distinctions or they may be conventional and arbitrary.

In the same vein, a low degree of productivity is an important source for illicit derivational word forms. Productivity is tied to VIs. Some derivational affixes are more productive than others. As productivity is a property of specific VIs, it cannot be a syntactic property.

Similarly, it is well-known that in West-Germanic languages non-native affixes in general do not attach to native base VIs (Bloomfield 1933, Saciuk 1969, Aronoff 1976, Booij 1977, Giegerich 1999, Booij 2002). They only attach to non-native ones. The (non-)native status of a VI is obviously linked to the VI itself. Some base VIs, such as *blind* 'blind' and *doof* 'deaf' are recognized as native, while others, such as *stabiel* 'stable' and *divers* 'divers' are non-native. The same goes for affixes. The suffix *-heid* '-ness' is categorized as native, *-iteit* '-ity' as non-native. A property of a specific VI cannot be syntactic in the present model as VIs are inserted post-syntactically. As such, interactions related to the (non-)native character of VIs represent yet another source of restrictions on word formation imposed by Vocabulary Insertion.

In sum, the considerations raised in this subsection all concern restrictions imposed by specific VIs. They are important because they narrow down the range of acceptable derivational word forms. At the same time, however, they fall outside of the scope of the present work as they do not belong to syntax.

6.2.5 Derivational word formation and cross-linguistic variation

Given that the syntactic structure for derivational word formation I have proposed does not contain any language specific features, there is little reason to assume it is specific to Dutch. In other words, the syntactic structure for derivational word formation may be one and the same cross-linguistically. However, there are two important sources for variation.

Firstly, Vocabulary Insertion may observe very different restrictions cross-linguistically. I have pointed out in section 6.2.4 that such restrictions may hold for individual VIs or for specific groups of VIs. As these restrictions are connected to Vocabulary Insertion, it is expected that they may vary greatly across different languages as Vocabulary is a learned list.

Secondly and most directly relevant for the present discussion, one may expect variation in the domain of semi-lexical VIs. Recall that semi-lexical affixes realize syntactic features (see chapter chapter 3 sections 3.3 and 3.4 and chapter 5 section 5.3).

Languages may therefore show variation in two respects. Firstly, they may differ in their feature inventory. If languages select subsets from the universal set of features provided by UG (see Iatridou 1990 and Giorgi and Pianesi 1997), the inventory of features which play a role in derivational word formation may vary too. For example, it is conceivable that the Lexicon of some languages contains features such as [mass] and [atomic] whereas others do not. It therefore may be the case that collective suffixes realize an FTN in one language and an RTN in another one. To be concrete, I have shown that Dutch collective affixes realize an FTN which is marked for the features [mass] and [atomic]. I have argued that this causes the fact that Dutch collective nouns are obligatorily mass. French collective nouns, however, do not observe a comparable restriction. They can be pluralized (e.g. *deux argenteries* 'two types of silverware'). French collective affixes thus most presumably simply realize an RTN. This may be due to the fact that the French Lexicon lacks the features [mass] and [atomic]. How productive a source this is for cross-linguistic variation is an empirical question I leave for further research. Secondly, even if two closely related languages may consist of the same feature set, it is possible that their Vocabulary inventories of semi-lexical affixes differ. For example,

hypothetically it may be the case that two Dutch dialects both have the required features to form collective mass nouns syntactically (see chapter 5 section 5.3.4), but that one dialect has several productive semi-lexical affixes to realize such a morpheme whereas the other one only has one rare improductive affix to do so. As a result, collective mass nouns may be wide-spread and productive in one variety and marginal in another one.

In sum, in this section I have suggested that derivational word formation may be uniform at syntax cross-linguistically, despite the fact that the surface realizations differ greatly due to independent differences in vocabulary items and morphophonological variation. A potential source for syntactic variation are derivations in which syntactic features play a role. Semi-lexical VIs may therefore be an interesting domain of research.

6.2.6 Derivational word formation and phase theory

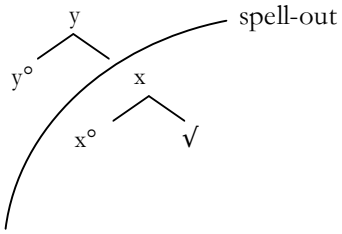
Chomsky (2000) proposes derivation by phase. The idea is that a syntactic derivation is not constructed as one whole, but in stages. In other words, derivation proceeds cyclically. Elements from the numeration are merged bottom-up in syntax. Once it has built a structure which can form a unit at both interfaces, viz. at PF and LF, the derivation is spelled out. Such a unit is called a phase. As the phase forms a unit at LF and PF, it is by definition a semantic and phonetic whole. Chomsky proposes that the relevant phase heads are v° and C°, with vP denoting an event and CP a proposition. Their complements are spell-out domains. When these domains have been sent off to the interfaces, they are no longer accessible to syntax, in contrast to the phase head and its specifier (which together form the so-called edge of the phase). This is called the Phase Impenetrability Condition or PIC (Chomsky 2001).

Marantz (2001) observes that derivational word forms, being as they are independent units of sound and meaning, are excellent candidates for phasehood. Moreover, such an approach would unify the computation below and above the word-level. Therefore, Marantz proposes that categorial heads are phase boundaries. The idea was soon adopted by most proponents of Distributed Morphology. It allows them to account for locality restrictions on

irregular forms and non-compositional meanings. I will discuss these facts below.

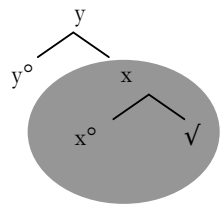
Marantz (2001) and Embick and Marantz (2008) propose that categorial heads are phase heads. Embick (2010a) argues that they trigger the spell-out of other cyclic domains in their complement. This proposal thus assigns a special status to the lowest categorial head. It is the only one which is part of the same phase as the root. This is illustrated in (8).

(7)



This leads Marantz (2001) to make a distinction between inner and outer morphology. Inner morphology is the combination of a root and the first categorial head, i.e. the grey area in (8).

(8)



Outer morphology refers to all other categorial heads Marantz' central claim is now that inner morphology is a potential domain for irregularity involving the root. For example, allomorphy, phonological particularities and idiomatic meaning determined by the root can occur in this domain. For outer categorial heads such irregularities are impossible as they are not in the same spell-out domain as the root.

The idea that categorial heads are phase heads cannot be carried over to the present model, as it argues against the existence of categorial heads. In this section I will briefly comment on this issue.

Empirically, it is not entirely clear whether the distinction between outer and inner morphology is viable. There is still disagreement in the literature as to precisely how large the spell-out domains are in derivational word formation. Lowenstamm (2009) provides phonological evidence against the proposal that derivational affixes realize phase heads and Borer (2009c) discusses counterexamples to the view that non-compositional meaning is restricted to inner morphology. She gives the examples below. They show that an idiomatic meaning may stretch beyond the first derivational affix. For each example the meaning of the entire derivation is more specific than the one provided by inner morphology.[155]

(9) react-ion-ary, glob-al-ize-ation, natur-al-ize-ation, organ-ize-ation, act-ive-ism, protect-ion-ism, exist-ent-ial-ism, differ-ent-ial (as a mathematic notion), fest-i-val, except-ion-al (i.e. excellent)

In sum, whether phase heads are relevant to the domain of derivational word formation is still under debate. In light of the conflicting data, I remain agnostic on the issue.

Note that doing away with categorial heads does not imply that one should give up on cyclic domains in derivational word formation as well. It might well be the case that the functional head which intervenes between two RTNs is a phase head. It is further not entirely clear what the relation is between opacity (see chapter 2 section 2.3) and phases.

6.2.7 The definition of a vocabulary item

In this work I have used an informal concept of VIs. I have assumed they can be identified on the basis of phonological features (see for example chapter 4

[155] With respect to these examples Embick (p.c.) argues that the interpretation of the whole is still a transparent combination of one of the polysemic meaning aspects of the inner derivation with the outer affix.

section 4.2.2.2). However, this picture may be too simple. As it stands, there is no consensus in the literature as to what defines a VI.

To understand the extent of the puzzle, consider the following data. Although intuitively a native speaker often has little trouble identifying a VI, it is not straightforward to give a formal definition of this notion. Consider for example the following pairs.

(10) a. mow
b. sky

(11) a. go
b. went

(12) a. **toxic**
b. **poison**-ous

(13) a. marry-**age**
b. refuse-**al**

(14) a. re-**ceive**
b. de-**ceive**

(15) a. de**ceive**
b. de**cept**ion

(16) a. bak-**er** [Dutch]
bake-ER
'baker'

b. molen-**aar**
mill-AAR
'miller'

(17) a. bak-**er** [Dutch]
bake-ER
'baker'

b. klap-**er**-en
clap-ER-INFINITIVE
'to flap'

The words *mow* and *sky* in (10) are clearly two different VIs. They have both a different meaning and a different phonological form. Based on these examples, then, it seems easy to define a vocabulary item: the relevant criteria are meaning and form (de Saussure 1916). The data in (13)-(16), however, considerably complicate this picture.

For example, based on their overlapping semantics Marantz (1997) and Harley (2009b) argue that *go* and *went* in (11) are variants of a single abstract VI, even if they do not share any phonological characteristics. However, treating *poison* and *toxic* in (12) as instantiations of one and the same VI on the basis of this same criterion seems intuitively wrong. The affixes *-age* and *-al* have a different form and in terms of their meaning it is not clear whether they are identical. Yet, Embick (2010) treats them as allomorphs. The VI *-ceive* in (14) does not have a clearly defined meaning in and of itself, which means that its semantics does not serve to characterize this VI. That said, however, Harley (2009b) takes all instantiations of *-ceive* to be allomorphs, i.e. variants, of the same VI. In fact, even *-ceive* and *-cept*, as in (15), may turn out to be the same VI, despite the fact that their meaning is vague and they only share an onset. In the same vein, *-er* and *-aar*, as in (16) may be identified as two surface realizations of the same underlying VI. The suffixes *-er* and *-er* in (17), on the other hand, do not seem to be the same VI. Although their form is identical, their meaning strongly deviates (see chapter 4 section 4.2). The data are summarized in the table below.

(18)

	Same meaning?	Same form?	Same VI?
mow vs. *sky*	no	no	no
-age vs. *-al*	not clear	no	not clear
-ceive vs. *-ceive*	not clear	yes	yes
-er vs. *-er*	no	yes	no
-ceive vs. *-cept*	not clear	partially	yes
go vs. *went*	yes	no	yes
-er vs. *-aar*	yes	partially	yes
poison vs. *toxic-*	yes	no	no

The table in (18) shows that meaning and form may be neither necessary nor sufficient criteria for identifying a VI. However, doing away with these criteria entirely seems to be the wrong way to go. In sum, the data show that a formal definition of what constitutes a VI is still lacking. It is thus still an open question what the defining characteristics of a VI are.

The possible answers to this question seem to be situated on a scale between two extreme positions. On one end of the scale we find the idea that a VI is an abstraction over more than one—potentially very different—surface form. For example, *-ceive* and *-cept*, and maybe even *-duce* (as in *produce*) and *-duct* (as in *product*) might be instantiations of one and the same abstract VI. Under this view, what Vocabulary contains are indices. For example, it may contain an index, let us call it index #371, which can be spelled out as *-ceive*, *-cept*, *-duce* or *-duct*. The other extreme possibility is that VIs faithfully correspond to surface forms. In that case forms such as *go* and *went* bear no relation whatsoever to one another in Vocabulary; they are independent VIs. In between these two extremes lies the possibility that a VI corresponds to one surface form, but that other surface forms may be parasitically derived from it. For example, *-ceive* may be stored as the basic form with *-cept* as its allomorph. Although the field is well aware of and speculates on these hypothetical possibilities (see Marantz 1997,

Borer 2005, Harley 2009b amongst others), a consensus on this issue is still lacking. I leave it as an issue for further research.

6.2.8 Conclusion

This work raises several further issues, some of which have been discussed above. Most importantly, I concluded that categories are not syntactic atoms; they are composed of functional features. However, I did not address the question how such a feature set should be defined. Furthermore, it eliminates the three-fold distinction between inflection, derivation and compounding. Instead, it argues that the most crucial distinction in word formation is the contrast between FTNs and RTNs. Finally, it places the burden of accounting for restrictions on derivation and for cross-linguistic variation mostly on PF, i.e. on a post-syntactic level.

Two issues which have not been tackled in the present work concern the definition of vocabulary items and the relevance of phases in word formation. Given that a proper definition of VIs is lacking in the field at large, its absence here does not constitute a problem specific to the present proposal. Whether assuming cyclic domains in word formation is desirable is an empirical problem. A proper discussion will have to await further study.

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