Particle verbs and a theory of late lexical insertion*

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1. Introduction

It is a well-known fact that the verb-particle construction is a phenomenon at the interface between morphology and syntax. On the one hand, particle verbs in German and Dutch look like morphological objects, since they productively provide the input for further word formation processes. This is illustrated for German in (1) and (2) (cf. Booij 1990; Neeleman & Weerman 1993; Neeleman 1994 for Dutch):[1]

(1)		particle verb		derived nominal
	a.	*einführen* ("introduce")	-	*Einführung* ("introduction")
	b.	*aufnehmen* ("record")	-	*Aufnahme* ("recording")
	c.	*ausreißen* ("run away")	-	*Ausreißer* ("runaway")

(2)		particle verb		derived adjective
	a.	*aufblasen* ("inflate")	-	*aufblasbar* ("inflatable")
	b.	*ausweichen* ("evade")	-	*unausweichlich* ("unevitable")
	c.	*annehmen* ("accept")	-	*unannehmbar* ("unacceptable")

On the other hand, particle verbs are syntactically transparent. For example, the particle is always separated from the verb in verb second (V-2) contexts (cf. van Riemsdijk 1978; Booij 1990; Neeleman 1994 for Dutch):

(3) a. *Peter lädt*$_i$ *das Heu ab* t_i
Peter loads the hay Prt
"Peter loads off the hay"

b. *Peter trinkt*$_i$ *sein Bier aus* t_i
Peter drinks his beer Prt
"Peter drinks up his beer"

The heterogeneous properties of particle verbs raise problems for a theory that regards syntax and morphology as independent modules of grammar with different sets of rules and different sets of atoms. Under this view, objects derived in the word formation component of grammar are syntactic atoms, and their internal structure is not relevant for syntactic operations. The idea that words are "atomic" (Di Sciullo/Williams 1987, 49), and that morphology is not "visible" to syntax is at the core of the principle of Lexical Integrity, formulated as in (4) by Lapointe (1980):

(4) Lexical Integrity:
Generalized Lexical Hypothesis (Lapointe 1980):
No syntactic rule can refer to elements of morphological structure

The main implication of (4) is that the syntax can never "look inside" complex heads. The structure below X° belongs to morphology and is only accessible to rules of this component. If particle verbs are derived morphologically, as the data in (1) and (2) suggest, their separa-

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[1] Throughout this paper I will provide examples primarily from German, if not indicated otherwise. Dutch particle verbs behave similiarly in most respects, and the relevant arguments carry over to this language as well. If differences occur, they will be pointed out in the text.

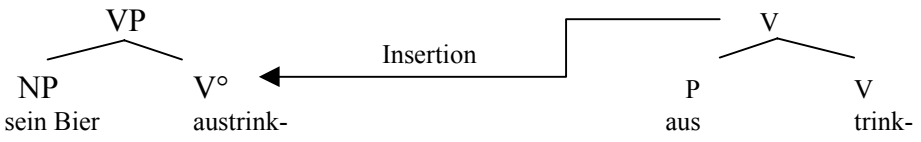
bility runs counter to the principle in (4).

In the following, I will propose an analysis that accounts for the properties of the verb-particle construction without having to relinquish the principle of Lexical Integrity. I subscribe to the view that only morphological rules operate below X°. The syntactic transparency of particle verbs is hence not compatible with the assumption that they are represented as V°s in overt syntax. In section 2, I will therefore argue that particle verbs must be analyzed as syntactic constructions, which explains their separability as well as a number of other syntactic properties. This, however, does not contradict the claim that particle verbs are also morphological objects. My main concern in this paper is to show that the apparent conflict between morphological and syntactic properties of particle verbs results from a misconception of lexical insertion. In section 3, I will outline an alternative theory of (late) insertion that provides the basis for my analysis of particle verbs. Relying on recent work by Borer (1988, 1991, 1993), Halle & Marantz (1993), Marantz (1995), and Jackendoff (1997), I will suggest that (i) the terminal nodes of syntax are supplied with phonological and semantic features of lexical items *after* syntactic operations have been performed, and that (ii) a complex X°-head can be derived both syntactically as well as pre-syntactically (morphologically). In section 4 I apply this theory to particle verbs. I will suggest that particles should be analyzed as semantically bound morphemes that have to undergo abstract incorporation into the verb at LF. This explains that, although the particle and verb are independent syntactic elements in overt syntax, they are part of a complex V° at LF. This head serves as the target for late insertion of the semantics of both the particle and the verb. Finally, the morphological properties of particles are discussed in section 5. I will suggest that words that are derived by syntactic head movement can alternatively be formed prior to syntactic operations. Therefore, this option is also available for particle verbs. A pre-syntactically derived complex V° whose terminal elements correspond to the particle and the verb may then be subjected to further adjectival or nominal word formation. In contrast to what is assumed by most authors who advocate a "lexical" analysis of particle verbs, the morphological properties of these elements are compatible with a syntactic representation in which the particle is the head of a phrase.

2. Particle verbs as syntactic constructions

The morphological properties of particle verbs illustrated in (1) and (2) have led some researchers to argue that particle verbs are morphological objects and that they are therefore formed in the word formation component of grammar.[2] This explains that particle verbs can undergo further derivational processes. However, these morphological analyses also have an unwelcome consequence. According to the traditional view of lexical insertion, the output of morphology provides the input to syntax. Therefore, it is a common aspect of all morphological/lexical accounts that the particle verb is inserted as a V°-head:

(5) a. Syntax b. Morphology



As noted in the introduction, (5) poses a problem with respect to the syntactic separability of particle verbs. The internal structure of the verb in (5a) should not be accessible for syntactic

[2] For English cf. Johnson (1991); for German cf. Stiebels & Wunderlich 1994; Stiebels 1996; for Dutch cf. Koster (1975), Booij (1990); Neeleman & Weerman (1993), and Neeleman (1994).

movement rules; moving only the verbal part out of V° violates the principle of Lexical Integrity in (1). If the particle verb is inserted as a V°, we expect the whole complex V to move to Comp in V-2. This expectation, however, is never borne out.

The syntactic representation of the particle verb in (5a) has always proved to be highly problematic for proponents of a morphological analysis that presume that lexical insertion proceeds as in (5). This concept of insertion forces them to explain why syntax may have access to the verbal part of the word in (5), although grammar usually does not allow for this option. In order to maintain the claim that the particle verb is a V°, its syntactic separability has to be restated in morphological terms. The strategy that has been chosen by most authors is to assume that the structure of V° in (5a) is *formally different* from the structure of other complex words. This undesirable assumption has often led to otherwise unmotivated stipulations.

For example, to account for the syntactic separability of particle verbs, Stiebels & Wunderlich (1994) and Stiebels (1996) introduce a morphological feature [+max], together with a universal condition that requires elements marked with this feature to be syntactically visible. Stiebels and Wunderlich then stipulate that particles are always marked [+max] and therefore have to remain visible in syntax. For the particle to be visible, the complex V° dominating the particle must be transparent. It therefore does not block movement of its verbal part. Notice that in Stiebels's and Wunderlich's analyses, the claim that particles are the only elements inside X°-categories that receive the feature [+max] does not follow from any independently motivated properties. It only becomes necessary because the syntactic status of particle verbs is taken to be V°.[3]

Another example of the general dilemma that morphological accounts run into is the analysis suggested in Booij (1990). Due to their word-formation properties, Booij considers particle verbs to be derived in the word formation component, whereas their syntactic separability forces him at the same time to assume that particle verbs are phrasal constructs. However, this observation does not lead Booij to question the traditional concept of insertion that makes the situation look paradoxical. Instead, Booij suggests that morphological rules in Dutch not only create complex words dominated by an X°-category, but that they also can form a specific kind of phrasal construct which he labels V*. Booij's V*-projection is the node immediately dominating the particle verb. It has word-like properties (input for deverbal word formation) as well as syntactic properties (separation under verb movement). However, I do not know of any other phenomenon with which the existence of a V*-projection is attested. Again, this label is only motivated by the syntactic properties of particle verbs. Like

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[3] There are also empirical problems with Stiebel & Wunderlich's (1994) theory. The assumption that [+max] elements are always syntactically visible entails that words derived from particle verbs may never include [+max] elements, since they are never syntactically transparent. This, however, leads to the paradoxical situation that nouns and adjectives derived from particle verbs may not include particles. This is in fact the solution that Stiebels and Wunderlich suggest. They propose that a noun like *Einführung*, "introduction", does not have the expected morphological structure in (i), but rather the structure in (ii):

(i) *[[[ein]$_P$ [führ-]$_V$]$_V$ -ung]$_N$

(ii) [ein [[führ-]$_V$ -ung]$_N$]

Stiebels & Wunderlich are hence forced to argue that nominals such as *Einführung* are compounds that are not formed by deriving the noun from the respective particle verb, but by attaching a prepositional element to a noun derived from the base verb. A strong argument against the this view has been given by Groos (1989). Groos points out that the Dutch nominal affix *-ing* is sensitive to the aspectual specification of the base verb it attaches to; the base verb has to be specified for terminative aspect. Certain particles can turn non-terminative verbs into terminative ones. (i) shows that *-ing* can attach to a terminative particle verb even if the base verb is non-terminative:

(i) (a) **drijving*, but: *aandrijving*, *uitdrijving*

(b) **schrijving*, but: *inschrijving*, *aanschrijving* (Groos 1989, 56)

(i) clearly proves that what has been nominalized is the terminative particle verb, not the non-terminative base verb.

the feature [+max], the introduction of a V*-projection only becomes necessary because the traditional concept of insertion requires morphological objects to be derived before syntactic operations apply.

Neeleman (1994) also offers his account for the separability of particle verbs on the basis of a structure like (5a). He contrasts a Dutch particle verb like *uitzuigen*, "out-suck", with the complex verb *stofzuigen*, "dust suck". Crucially, the latter is non-separable:

(6) a. *Jan zuigt$_i$ de wond* [*uit* t$_i$] (particle verb)
John sucks the wound out
b. **Jan uitzuigt*$_i$ *de wond* t$_i$
John out-sucks the wound

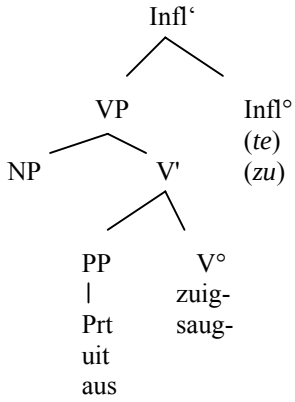
(7) a. **Jan zuigt*$_i$ *de kamer* [*stof* t$_i$] (non-separable prefix verb)
John sucks the room dust
b. *Jan stofzuigt*$_i$ *de kamer* t$_i$
John dust-sucks the room (Neeleman 1994, 293)

To account for (6) on the basis of the assumption that particle verbs are V°s, Neeleman assumes that the principle of Lexical Integrity does not exist. He instead suggests that the effects of this principle be reduced to independent principles of grammar, like Baker's (1988) *Stray Affix Filter*.[4] Crucially, in order to be able to explain the difference between (6) and (7), Neeleman suggests that particle verbs such as *uitzuigen* consist of two X°-elements combined in the word formation component, whereas complex verbs of the *stofzuigen*-type are morphological objects derived from X^{-1}-elements. According to Neeleman, X°s can be moved out of a word ((6a)) but X^{-1}-elements cannot ((7a)). Therefore, only the verb in (6) can be split in syntax.

Note that I adhere to Di Sciullo & Williams' (1987) assumption that Lexical Integrity does not have to be stated as an independent principle but rather that it follows from the incapability of syntax to analyze morphological structure. Since syntax and morphology are different components, the fact that the structure below X° is invisible for syntax directly results from the modular organization of grammar. Nevertheless, I do not want to discuss the problematic consequences of Neeleman's proposal to dispense with Lexial Integrity. I rather want to emphasize the fact that Neeleman is forced to assume that syntax can look inside X°-categories and that the complex verbs in (6) and (7) are two different kinds of *morphological* constructs only because Neeleman analyzes particle verbs as V°s. However, instead of assigning different kinds of morphological structures to complex verbs it seems much more natural to attribute the difference between (6) and (7) to a *syntactic* difference between these constructions. Suppose that only complex verbs of the *stofzuigen*-type are syntactically represented as V°s. The fact that they move to Comp as one complex follows straightforwardly and does not require additional stipulations about the morphological elements that form the complex verb. Now suppose further that, in contrast to these verbs, the underlying structure of a verb-particle construction in German and Dutch looks (more or less) like (8) (I am assuming, in contrast to Zwart (1994) and Kayne (1994), that the underlying word order of German and Dutch is SOV):

[4] *Stray Affix Filter*: "*X if X is a lexical item whose morphological subcategorization frame is not satisfied at S-structure." (Baker 1988, 140).

(8) Dutch: *uit*(te)*zuigen*
German: *aus*(zu)*saugen*
Prt-to-suck
"(to) suck out"



The claim that particle verbs should be represented as in (8) is of course not new. Since Emonds (1972), the idea to analyze particle verbs in the Germanic languages as syntactic rather than as morphological constructions has gained many adherents.[5] It is clear that the syntactic separability of particle verbs follows directly from this structure. In (8), the particle is the head of a phrasal complement of the verb and has to be stranded when the verb moves to Comp; I repeat the relevant examples from the introduction in (9) for convenience:

(9) a. *Peter lädt*$_i$ *das Heu ab* t_i
Peter loads the hay Prt
"Peter loads off the hay"

b. *Peter trinkt*$_i$ *sein Bier aus* t_i
Peter drinks his beer Prt
"Peter drinks up his beer"

Moreover, (8) also accounts for the fact that in German, the infinitival prefix *zu* (*te* in Dutch) intervenes between the particle and the verb:

(10) a. (*Peter versucht*) *das Heu ab<u>zu</u>laden*
Peter tries the hay Prt-to-load
b. (*Peter versucht*) *sein Bier aus<u>zu</u>trinken*
Peter tries his beer Prt-to-drink

If one adheres to the view that the infinitival marker is located in Infl (cf. Giusti 1989; Grewendorf & Sabel 1994; Sabel 1996), the examples in (10) also follow from (8). The verb moves to Infl° and right-adjoins to *zu* while the particle remains *in situ* and therefore precedes *zu* in the phonological string (cf. Zeller 1997). Note that the syntactic properties of particle verbs are the same as those of other complex verbal constructions. Resultative phrases and PP-complements show the same syntactic distribution as particles in V-2 contexts and in infinitives:

(11) a. *Peter redet*$_i$ *sich heiser* t_i (resultative predicate)
Peter talks himself hoarse
b. (*Peter versucht*) *sich nicht heiser <u>zu</u> reden*
Peter tries himself not hoarse to talk

(12) a. *Peter lädt*$_i$ *das Heu auf den Wagen* t_i (PP-complement)
Peter loads the hay onto the wagon
b. (*Peter versucht*) *das Heu auf den Wagen <u>zu</u> laden*
Peter tries the hay onto the wagon to load

[5] For English cf. Kayne (1985), Di Sciullo & Williams (1987); Den Dikken (1995), Jackendoff (1997); for Norwegian cf. Taraldsen (1983), Afarli (1985), for German cf. Grewendorf (1990); Zeller (1997), for Dutch cf. van Riemsdijk (1978), Hoekstra (1988), Groos (1989), Hoekstra & Mulder (1990), Booij (1990), and Koopman (1995), among many others.

The adjectival predicate in (11) and the PP in (12) are both stranded when the verb moves to Comp. Both predicates precede the infinitival marker *zu*. The syntactic similiarity between (11)-(12) on the one hand and (9)-(10) on the other strongly suggests that the particle is a phrasal complement of the verb, and not part of a word. I therefore adopt the syntactic approach and assume that the overt syntactic representation of a particle verb looks like (8).

Of course, (8) does not yet provide an explanation for the word-like properties of particle verbs depicted in (1) and (2) above. Prima facie, these properties are not compatible with a syntactic representation, since morphological rules cannot operate on larger syntactic structures. However, as noted above, I assume that this apparent incompatibility only results from a misconception of insertion which locates all morphological operations before syntax. In the next section I will therefore propose an alternative analysis of lexical insertion that accounts for the morphological properties of particle verbs on the basis of a syntax like (8). Before I turn to this proposal, let me finally provide a strong empirical argument against the claim that particle verbs are heads. Interestingly, this argument is usually presented as an argument in favor of a morphological analysis. Consider (13):

(13) a. **An hat Peter das Mädchen gelächelt*
Prt has Peter the girl smiled
"Peter smiled at the girl"
b. **Auf hat Peter damit gehört*
Prt has Peter with that heard
"Peter stopped that"

(13) shows that particles cannot be topicalized. If particles are phrases, then this observation is surprising, for PPs and resultative phrases can undergo topicalization in German:

(14) a. *Auf den Wagen haben sie das Heu geladen*
onto the wagon have they the hay loaded
b. *Heiser hat er sich geredet*
hoarse has he himself talked

The contrast between (13) and (14) has been taken as evidence against a syntactic treatment of particle verbs (cf. Neeleman & Weerman 1993; Stiebels & Wunderlich 1994). However, this argument is based on the assumption that syntactic movement can only be excluded syntactically; since only phrases can be topicalized, it has been concluded that elements that do not allow topicalization cannot be phrases. However, in Lüdeling & Zeller (in prep.) we show that the incapability of particles to topicalize follows from *semantic* rather than from syntactic properties of these elements. Consequently, the examples in (13) do not argue against a syntactic representation of particle verbs. In contrast, the following data provide evidence that particle verbs *must* be syntactic. As shown in (15), particles can undergo topicalization if a contrastive reading is available (cf. Lüdeling 1997; Hoeksema 1991 and Bennis 1991 for Dutch):

(15) a. *<u>Auf</u> geht die Sonne im Osten* (*aber <u>unter</u> geht sie im Westen*)
Prt (up) goes the sun in the east but Prt (down) goes it in the west
"The sun rises in the east but sets in the west"
b. (*Angola führt viele Güter <u>ein</u>.*) *<u>Aus</u> führt es nur Kaffee*
Angola moves many goods Prt (in). Prt (out) moves it only coffee.

(15) proves that the inability of most particles to undergo topicalization is in fact the result of their semantic defectiveness. If the ungrammaticality of (13) was really caused by structural

constraints, then the grammaticality of (15) would be hard to explain. Since only phrases can be topicalized, elements that *do* allow topicalization must be phrases. The topicalization pattern of particle verbs, originally used to support the claim that particle verbs are heads in overt syntax, now turns out to be a strong argument against it.[6]

3. The syntax-morphology interface and late insertion

According to the traditional understanding of the syntax-morphology interface, insertion applies pre-syntactically at the initial stage of the derivation. Morphology creates words prior to syntax; the computational system draws items from the lexicon or the WF-component to form derivations. However, it has also been suggested in the literature that insertion can apply at later stages of the derivation, after syntactic operations have been performed. In the following sections I will discuss some of the recent proposals and combine them in a model of late insertion that provides the basis for my analysis of particle verbs in sections 4 and 5.

3.1 Distributed Morphology and Representational Modularity

The concept of insertion in GB-theory (Chomsky 1981, 1986) and in the Minimalist Program (Chomsky 1995) is based on the assumption that words are inserted into the syntax in their entirety, with all their phonological and semantic information being "carried through" the syntax. This traditional view has been challenged by Halle & Marantz (1993) and Marantz (1995) in their theory of *Distributed Morphology* (DM) as well as in Jackendoff's (1997) model of *Representational Modularity*.

Halle and Marantz (1993) argue that there are no phonological features in syntax. Instead, the phonological realization of syntactic nodes is executed through an operation of "Vocabulary Insertion". This occurs at the interface to the phonological component, a syntactic level that Halle and Marantz call Morphological Structure (MS). Vocabulary Insertion connects the phonological feature bundles of lexical entries with bundles of morphosyntactic features that are associated with nodes in the syntax. All that is required for insertion is that the features of the lexical item are nondistinct from the features of the syntactic node; lexical items can be underspecified for the morphosyntactic features they realize. Different vocabulary items compete for insertion, and the entry that matches the most features wins.

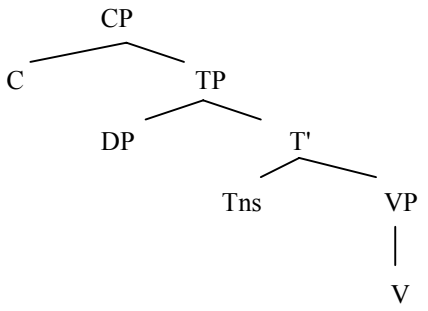
The terminal nodes at MS may be created by syntactic head movement, but also by post-syntactic operations that take place at the interface between syntax and morphology. These operations at MS (*merger*, *fusion*, or *fission*) provide Halle and Marantz with a means to account for all kinds of mismatches between the phonological and the syntactic representation of terminal elements. Crucially, "word formation" in DM comprises both late insertion of PF-features as well as all kinds of syntactically constrained operations that manipulate the syntactic tree. Morphology is hence "distributed" among syntax and phonology; a "morpheme" in Halle and Marantz's theory is a terminal element at MS both before and after it is associated with its phonological features.

Let me illustrate this aspect of DM with an example. In English, the main verb does not move to Tns in overt syntax. Nevertheless, a finite verb in the past tense shows the respective affix. In order to create a node which can be associated with the phonological fea-

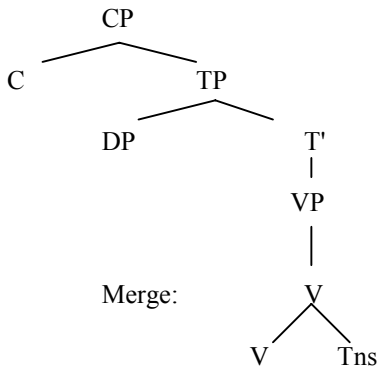
[6] Some proponents of the syntactic approach assume that the particle overtly incorporates into the verb, thereby deriving a complex V° from an underlying structure like (8) in overt syntax. Since this idea raises problems similiar to those that arise with the morphological approach with respect to excorporation of the verbal part of the particle verb, I do not discuss it here. However, see section 5.1 and Zeller (1997) for a criticism of the overt incorporation approach to particle verbs.

tures of an inflected verb, the V and the Tns nodes *merge* at MS before insertion takes place:[7]

(16) a. Syntax:



b. Morphological Structure:



Merge is like head-to-head movement in that it maintains two independent terminal nodes under one single node. Hence at MS, the verb and Tns are both individually supplied with phonological features. However, since both terminal elements are dominated by the same head position, they are located within a domain where morphological operations can apply. In DM, the insertion of features into terminal nodes is *context-dependent* and takes into account the syntactic environment of the targeted node. The relevant context for insertion of phonological features into the V- and Tns-positions in (16b) is defined by the verbal head that dominates both terminal nodes. The Tns node carries the morphosyntactic feature [_ [+past, - participle]]. Since it is located within the same X°-position as V, the insertion of phonological features of a particular tense-morpheme depends on the choice of the verb ("conditioned allomorphy"). At the same time, the choice of the verbal stem is also context-dependent. Consider a verb like *go*, which has an irregular past tense form. It is part of the listed entry of the verb *go* that a [_ [+past, - participle]]-context requires the insertion of an extra stem /*wɛnd*/. This insertion in turn produces the right environment for the association of the entry /-t/ with the Tns node, since *wend* is one of the verbs that /-t/ is subcategorized for (like *send*, *build* etc.). Readjustment-rules which apply to the resulting morpheme after Vocabulary Insertion finally delete the stem-final /-d/ of *wend* and derive *went*, the correct past tense of *go*.

The verbal head that dominates V and Tns at MS may also be fully supplied with the phonological features of a completely idiosyncratic entry. For example, if the verb *be* is chosen, V° is associated with the phonological features of *am*, *was*, *were* etc., depending on the specification of the Tns- and agreement features within V°. The domain of morphological operations like conditioned allomorphy or full suppletion is X°, as required by the principle of Lexical Integrity. The only way in which syntax and morphology interact in DM is that the operations that create this morphological domain are syntactic in nature.

Marantz (1995) further elaborates DM in suggesting that not only the phonological, but also the semantic features of words should be kept distinct from the information that is relevant to the computational system. According to Marantz, late insertion involves both Vocabulary Insertion (i.e the association of phonological features with terminal nodes of the syntactic tree), and insertion from the "Encyclopedia", the list of idiosyncratic, non-compositional meanings that are associated with syntactic nodes at LF. Marantz points out that the semantic and phonological information that is associated with a word only becomes relevant at the interface levels with the phonological and semantic components of grammar. It

[7] I ignore the fact that in English, the Tns node *fuses* with the Agr node at MS, which means that features of both nodes are interpreted by a single morpheme in this language (whereas for example in German and Russian, Tns and Agr remain separated and are associated with separate phonological feature bundles).

is therefore not necessary to have any of these features present during the syntactic derivation. All that is needed by the syntax is the *syntactic* information that is provided by the elements that participate in the derivation. Only when the derivation enters the phonological component are terminal nodes associated with phonological material; it is only at LF (the interface level with the semantic component) that semantic features are inserted.

A similiar view is advocated in Jackendoff's (1997) theory of lexical licensing. According to Jackendoff's model of Representational Modularity, the mind/brain consists of different modules, each a formal system that encodes information according to its own specific properties. These "languages of the mind" are individuated by the representations they generate. Since the representations of syntax, semantics, and phonology differ from each other, these components are considered different modules with their own primitives and principles. "Mixed representations" are not permitted in this theory. Consequently, Jackendoff argues that phonological, syntactic, and semantic representations should be strictly segregated. They are only coordinated through correspondence rules that are part of the interfaces between the three components. Jackendoff points out that lexical items are mixed representations by their very nature, since they combine syntactic, semantic, and phonological information. Insertion of these elements with all this information present at once would automatically violate Representational Modularity. Therefore, lexical items in Jackendoff's theory are ("small-scale") correspondence rules that mediate between the three modules of grammar, and the lexicon as a whole is part of the interface modules between these three components. According to Jakkendoff, a lexical item is therefore not inserted; it rather *licenses* three independent derivations performed in syntax, semantics, and phonology.

3.2 Parallel Morphology

A different concept of late insertion is advocated in Borer's (1988, 1991, 1993) theory of *Parallel Morphology* (PM). According to Borer, the operations of the word formation component can access the output of every syntactic operation. Syntax and morphology run parallel to each other, and every string is simultaneously subject to conditions both internal to the syntactic as well as to the morphological component. Consequently, although syntactic head movement (restricted by rules of syntax) does not itself create words in Borer's theory (word formation is only possible through morphological operations), a word can be inserted wherever the syntax provides the appropriate position for this insertion. "Late insertion" in PM means to superimpose a complex morphological object on a syntactically complex head which has been derived via head movement, but importantly, the very same morphological object may also be inserted pre-syntactically.

As an example of how PM works, compare (17a) and (17b), adopted from Borer (1993, 3):

(17) a. The (frequent) collection of mushrooms for six months finally gave rise to a heavenly meal
b. The collection was complete

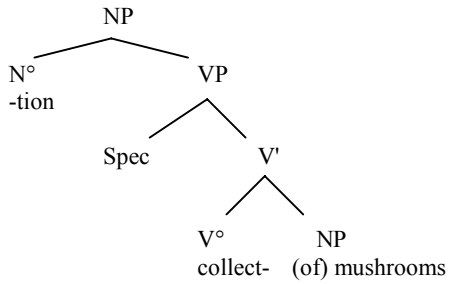
(17) illustrates the difference between *process* and *result* derived nominals (cf. Grimshaw 1990; Borer 1993). In both sentences, a noun *collection* is derived from the verbal stem *collect-*. In (17a), the noun refers to the event of collecting. In this reading, the internal argument of the verb is obligatorily realized[8], and adverbials like *frequent* can modify the singular form of the noun. In contrast, the noun in (17b) refers to the result of the collection; no arguments of the verb are possible, and adverbials like *frequent* can only occur with the plural form of

[8] This analysis involves a passive-like operation that deletes the external argument of the verb inside the process nominal. For details, see Borer (1993).

the noun.

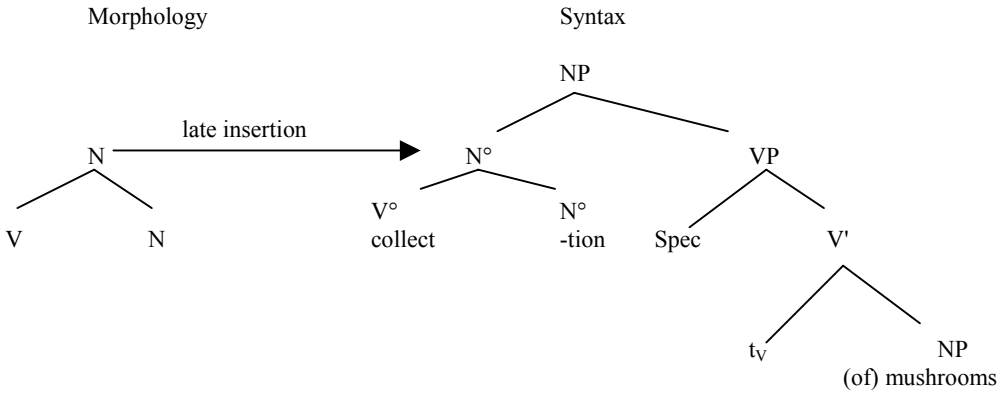
The difference between (17a) and (17b) follows from the two options of insertion provided by PM. According to Borer, the noun *collection* is a word which can be inserted pre- or post-syntactically. If it is inserted pre-syntactically, it is realized as an N° (cf. the model of insertion illustrated in (5) in section 2). The verbal part of the derived nominal is therefore not accessible to syntactic rules, and the syntactic tree does not contain any verbal projection of *collect*. As a consequence, the noun in (17b) has the semantic properties of a result nominal, and adverbials and arguments that are linked to the presence of a VP are absent. However, complex words in PM may alternatively be inserted "lately". In this case, both the verbal stem and the nominal suffix are realized as independent N°- and V°-heads at the initial stage of syntax. The verbal head projects a VP which licenses the occurence of adverbs like *frequent*, and the internal argument of the verb is realized within this maximal projection. The structure in (18) illustrates this situation:

(18)



According to Borer (and in contrast to what is assumed in DM), the phonological properties of the nominal *-tion* are present in the syntax. The structure in (18) therefore requires incorporation of the verb into the nominal head position in order to meet the m-selectional requirement of the affixal N-head. The resulting structure is given in (19). Since PM permits the insertion of morphological objects at every syntactic level, (19) now allows late insertion of the nominal *collection*:

(19)



The morphologically complex nominal in (17) above is phonologically the same word in (17a) and (17b). Its semantic properties depend on the syntactic environment. Late insertion presupposes a syntax with a VP; this projection is absent when the nominal is inserted pre-syntactically.

Borer's theory also accounts for the the difference between construct state and compound nominals in Hebrew (cf. Borer 1988; 1995) and for the causative/inchoative alternation found with deadjectival verbs (cf. Borer 1991). Furthermore, Kratzer (1994) shows that PM can also be used to account for the difference between morphologically and syntactically derived adjectival participles. This model thus proves to be a means to capture a number of interesting phenomena at the syntax-morphology interface. In the following sections, I will out-

line a theory of late insertion that combines the advantages of PM with the crucial assumptions of DM.

3.3 Towards a theory of late lexical insertion

3.3.1 *The lexicon*

Let me start this section with a note on the relation between morphology and the lexicon. It is sometimes assumed that the former is a theory of the latter. For example, Jackendoff (1975) assumes that all morphological objects are lexically listed and that morphological rules are redundancy rules that range over these elements. Words that are derived by productive rules of word formation are stored in the lexicon along with elements whose properties are completely idiosyncratic. To account for the intuition that listing regularly derived elements "costs less" than listing completely idiosyncratic information, Jackendoff suggests that informational cost should be measured in terms of nonredundancy. Therefore, it is "cheaper" to list elements that are derived productively.

In contrast, Di Sciullo & Williams (1987) draw a clear distinction between the lexicon and morphology, and it is their position that I adopt in the following. According to this view, the lexicon includes all and only elements whose properties do not follow from recursive definitions of the objects of a language. The nature of these elements is immaterial to the fact that they are stored. The basic units of morphology, i.e stems and affixes, and irregularly formed X°-elements[9] are listed as lexical entries, but idiosyncratic information which is associated with syntactic structures (i.e. phrasal idioms) is also stored in the lexicon. To use Di Sciullo & Williams' (1987, 3) famous metaphor, "[t]he lexicon is like a prison – it contains only the lawless, and the only thing that its inmates have in common is lawlessness". In the following, I will proceed from this assumption.

3.3.2 *Where's morphology?*

Although both theories challenge the traditional concept of insertion that caused problems with respect to the properties of particle verbs, PM and DM do not share all theoretical assumptions. Borer assumes that word formation takes place in a separate morphological component that runs parallel to syntax. Morphology in Halle and Marantz's theory involves the formation of complex heads and the association of feature bundles with terminal elements. Crucially, both theories differ with respect to late insertion. In PM, late insertion only refers to the post-syntactic option of associating an object from the word formation component with a syntactically derived head position. In DM, semantic and phonological features are always "late" inserted, since they always interpret terminal elements at the interface levels after syntactic operations have been performed.

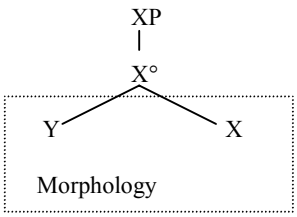
With respect to the place of morphology, I adopt the central idea behind DM; i.e. that morphology is distributed among syntax, semantics, and phonology. The "syntactic" part of morphology involves the creation of complex heads that include terminal elements; semantic and phonological features are inserted at LF and MS. This (context-dependent) late insertion counts as a morphological process if the terminal nodes that are supplied with these features are dominated by an X°-element. The domain of morphology is X°, and the internal structure of complex X°-elements is irrelevant to syntactic operations. Syntax can never look below X°.

However, it is an important feature of both PM and DM that the operations of syntax

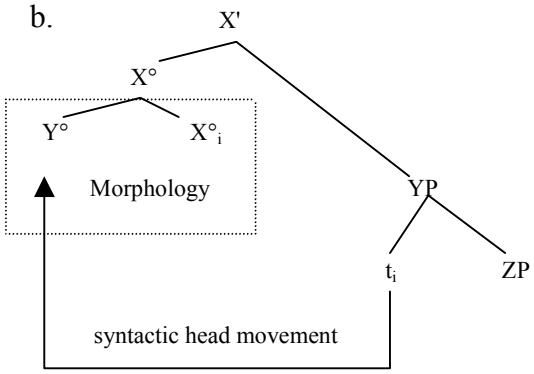
[9] Jackendoff (1997) departs from Jackendoff's (1975) "full entry theory" in suggesting that words derived by productive rules of morphology do not have to be stored. However, he still assumes that semiproductivity has to be listed in the lexicon. Relying on the full entry theory, he proposes that lexical rules can render parts of semiregular entries redundant and therefore reduce the price of listing elements derived by semiproductive rules.

and morphology, although strictly separated with respect to the X°-boundary, can interact in a well-defined manner. Syntactic processes like head movement (or merger and fusion at MS) create X°-elements and therefore count as operations of word formation. But importantly - and this is where I adopt the core idea behind PM –, word formation does not have to be fed by syntactic operations. Following Borer, I assume instead that complex X°-categories that are interpreted by the features of lexical items can also be created pre-syntactically by a morphological operation. This means that for two elements X and Y that are stored in the lexicon, two options exist. They can be combined morphologically, and the result is an X°-category at the initial stage of syntax (cf. (20a)). Alternatively, X and Y can both project syntactic phrases, and head movement creates a complex X° (cf. (20b)) whose internal morphological structure is formally not distinct from the X° in (20a).[10]

(20) a.



b.



Note that syntactic word formation as in (20b) does not contradict the strict separation of the two domains in which morphology and syntax operate. In accordance with the principle of Lexical Integrity, only the internal structure of X° is invisible to syntax. But if an X°-category is not part of a complex head, it is of course syntactically legible. The head of YP in (20b) is a syntactic atom. It therefore can be moved like other syntactic categories and may be adjoined to X°. However, this adjunction counts as word formation. It has the consequence that the moved as well as the targeted element now become part of a complex X°. Therefore, they cannot be moved any further. In accordance with Baker (1988), but in contrast to, for example, Rizzi & Roberts (1989), Guasti (1991), or Neeleman (1994), I therefore assume that any form of excorporation is ruled out by the principle of Lexical Integrity.

Although I adopt Borer's assumption that word formation may exploit the two options in (20), keep in mind that I part company with PM in assuming that only the syntactic features of X and Y are involved in the syntactic derivation. There are no phonological or semantic features present below the heads in (20); this information is only added at MS and LF. Recall that "mixed representations" are also excluded in Representational Modularity. Following Jackendoff (1997), I take the lexicon as being part of the interface between syntax and phonology/semantics; a lexical item is a correspondence rule that mediates between different modules of grammar. Syntax provides two interface levels to which the interfaces have access; insertion of lexical information at MS and LF counts as an interface operation that unifies phonological and semantic (conceptual) structures with syntactic representations. According to Jackendoff (1997, 90), "[w]hat it formally means to say that lexical items are 'inserted' at some level (...) is that the licensing of syntactic terminal symbols by lexical items is stated over this level of syntax". The concept of "late" insertion that I outlined here can be

[10] I will leave open the question whether the productive rules of combination in syntax and morphology are distinct from each other (as argued in lexicalist theories, cf. Lieber 1980; Di Sciullo & Williams 1987), or governed by the same principles (as argued by Sproat 1985; Lieber 1992; Ackema 1995; Jackendoff 1997). Even if the latter possibility proves to be right, the fact that X°s are syntactic atoms prevents syntax to move elements out of words.

reinterpreted in Jackendoff's terminology by saying that a lexical item licenses the correspondence between a semantic/phonological structure and a syntactic structure at the interface levels.

Let me illustrate the derivation of deverbal nominals in the light of the distribution of the several components of morphology. (20) represents the structural difference between result- and process nominals in PM (with X=N and Y=V). Consider the verbal stem *collect-* and the nominal affix *–tion* that a noun like *collection* consists of. Both elements are listed in the lexicon with their syntactic, semantic and phonological features. The rules of the system that combines the two elements have only access to their syntactic (categorial) features. Either morphology creates a complex N°, or both V and N project and combine according to syntactic principles.

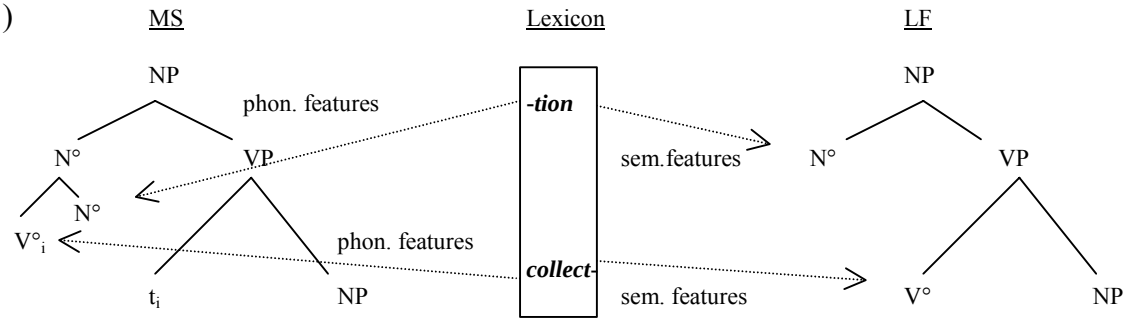
The derivation of a result nominal like *collection* is straightforward. Since N° is a syntactic atom, the nominal head cannot be split up by syntactic operations and maintains its structure throughout the syntax. At MS, the terminal nodes N and V, dominated by the syntactic N°-head, are supplied with their respective phonological feature bundles; the morphologically complex word *collection* is "late inserted" into N°. Phonological requirements, such as the need for affixes to be attached to a host, are met in the domain constituted by this head; the suffix *–tion* is bound within the word *collection*.

Now consider the derivation of a process nominal. Postponing the question of what triggers incorporation of V° into N° to the next section, let me assume with PM that V° moves to form a complex head with N°. This node serves as the target of Vocabulary Insertion at MS in the same way as the terminal node involved in the derivation of a result nominal. At MS, the complex N° includes the terminal nodes V° and N°, and these terminal nodes are associated with phonological feature bundles. This morphophonological operation derives the same PF representation for the process nominal as for the result nominal.

However, process nominals differ semantically from result nominals, and this follows from this analysis. In the case of the result nominal, the N° node that is interpreted by Vocabulary Insertion at MS corresponds to a complex N° at LF, and "Encyclopedic" information is associated with the two nodes below N° (*collect-* and *–tion*). As a result, N° refers to an individual-type entity in the world; in this example to the result of a collecting-event. Process nominals, on the other hand, look differently at LF. It is commonly assumed that overt incorporation that feeds derivational morphology has to be undone at LF. Von Stechow (1995, 100) quotes Manfred Pinkal to illustrate this point: "At the surface, the affixes briefly meet for a photograph and then they go home again". In the case of a process nominal like *collection*, the verb "goes home" into its base position inside the VP. Insertion of semantic features at LF still associates both V° and N° with their respective semantics; however, the operations that interpret LF now combine the verb first with its argument (e.g. *the mushrooms*) before the whole predicate combines with the semantics of the nominal. It is exactly the interpretation of V and N in their base positions that yields the event reading associated with process nominals.[11]

[11] The details of this operation remain to be made precise. First, it has to be ensured that reconstruction of the verb does not count as a violation of Lexical Integrity (strictly speaking, when the verb "goes home" at LF, it is moved out of a complex X°). Second, the meaning of the affix *–tion* has to be formulated in a way that captures both the individual-type reference of result nominals and the event-type reference of process nominals. One may suggest that the semantics includes an event variable that is involved in the process reading. This variable is probably associated with VP, but not with bare V. Third, it must be noted that all functional structure is omitted from the representations in (21). Since functional structure is relevant for the licensing of arguments and for the difference between verbal and nominal interpretation of stems, this aspect also requires further investigation. See Borer (1996) and Marantz (1995) for discussion.

(21)



A result nominal like *collection* is a word both in the phonological and in the semantic sense, whereas according to (21), the process nominal *collection* only becomes a word phonologically, while the semantics does not interpret V° and N° as being part of the same N°. A lexical item like *collection* is ambiguous, because it licenses the correspondence between a phonological word on the one hand and two different semantic structures on the other. This challenges the traditional view that words are inextricable combinations of a specific sound and a specific meaning. The analysis proposed here also requires a reconsideration of our understanding of the basic units of morphology, like "affix" and "bound morpheme". The affixal or non-affixal status of an element cannot be determined absolutely, but only relatively, depending on whether its phonological or semantic properties are under discussion. Although the suffix *–tion* is clearly an affix in the phonological sense, it is a free morpheme with respect to its semantics. As I will show in section 4, we also find the opposite case: particles are semantic affixes, but phonologically free.

3.3.3 *What triggers incorporation?*

I have assumed with PM that the derivation of a process nominal involves head movement of V° to N°. However, recall that Borer still proceeds from the assumption that words enter the computation with all their phonological and semantic features specified. This means that in Borer's theory, the nominal head in (18) literally hosts the affix *–tion* in the phonological sense. According to Borer, incorporation of the verb is triggered by the m-selectional properties of *–tion*; without incorporation, the resulting structure would violate Baker's (1988) *Stray Affix Filter*. In contrast, I have adopted the view that phonological and semantic features are not present in syntax. Therefore, the *Stray Affix Filter* is vacuous as a syntactic condition: the N°-head in (18) and (19) above is only identified as an affix when phonological features are inserted. This now raises the question whether it is still appropriate to say that head movement is "triggered" by the affixal properties of an element if phonological features only become available at a "later" level.

I think that this question can be answered in the affirmative. It is a crucial property of affixes that they must be bound by a lexical host at PF (cf. *Lasniks Filter* (Pesetsky 1989)). But moreover, recall that in DM, morphological conditions require that the terminal nodes of the affix and its host are part of the same X°-category at MS. The operations of morphology are constrained by locality conditions, and the competition among different lexical entries that match the features of the terminal nodes at MS takes into account the syntactic context of these nodes. The insertion of an affix depends on the phonological features of its host, and therefore, both terminal elements must be part of the same head at MS. An affix requires a complex head, and this head may be derived pre-syntactically or by syntactic operations like head movement.

Suppose the syntactic derivation has reached a stage in which N° selects a VP. If head movement does not apply, no syntactic constraint is violated, and the derivation reaches MS. But in this situation, insertion of phonological features of an affix is not possible, since MS

does not provide the right syntactic context. Of course, any other element of category N could be inserted, but for the insertion of *–tion*, morphology must be able to see that a verbal node is present (whereas, for example, an affix like *-ness* requires an adjective). Only if the verb incorporates into N and derives a complex N° that includes both terminal nodes, can the right affix be chosen. This means that the verb must be moved, but incorporation is not forced by m-selectional properties that are checked in syntax. It rather has to apply in order to fulfill morphological conditions that hold at the interface to phonology.

This situation seems to come close to the view that is taken in Chomsky's (1995) Minimalist Program. Chomsky argues that the movement operations that are performed by the computational system are caused by "bare output conditions" that hold at the interfaces to the human sensory and motor apparatus. Chomsky assumes that all "displacement" properties of language can be reduced to morphology-driven movement. In the Minimalist Program, syntactic operations are performed by the computational system in order to create derivations that converge at the interfaces. Crucially, these operations apply "before" the derivation reaches the interface, but they are nevertheless triggered by conditions imposed at this stage. Strictly speaking, the computational system "looks ahead" in order to perform the right steps; it has to know "in advance" whether the derivation requires these steps and if it will crash otherwise.

One may object that what this actually means is that for each step of the derivation, all possible alternatives have to be computed as well. At the interfaces, only the convergent derivations are chosen, and non-convergent derivations are filtered out by bare output conditions. According to Chomsky (1995, 230), "(t)he language L thus generates three relevant sets of computations: the set D of derivations, a subset D_C of convergent derivations of D, and a subset D_A of admissible derivations of D" (where economy conditions determine which derivations of D_C are admissible). This view seems to entail that the grammatical system massively overgenerates, which causes conceptual problems with respect to computational complexity (cf. Johnson & Lappin 1996). However, this objection actually results from the view that operations of grammar are linearly ordered with respect to each other. We tend to think of grammar as the successive application of rules, where one step follows another (it is also in this tradition that I have used the common notion of "late" insertion to indicate that the result of syntactic word formation is associated with lexical feature bundles). This linear view may be helpful in describing and understanding the properties of the grammatical system; however, it is the wrong way to look at how grammar works. This point is also addressed by Chomsky (1995) and Jackendoff (1997). Chomsky (1995, 380; note 3) points out that "the ordering of operations is abstract, expressing postulated properties of the language faculty of the brain, with no temporal interpretation implied". And Jackendoff (1997), who takes grammar to be a set of constraints that determine whether certain structures are well-formed, argues that these structures are created by *parallel* derivations in syntax, phonology, and semantics. If these structures are derived in a parallel fashion, the interaction between these components is simultaneously constrained by the licensing conditions that are imposed over their representations. If only a particular syntactic derivation (e.g. one involving head movement) is licensed by a lexical entry (e.g. an affix), the syntax has to perform this operation. Otherwise, no correspondence can be established. From this perspective, the problem of overgeneration disappears, since interface conditions imposed by morphological properties of lexical items do not become relevant at some "later stage", but restrict the syntactic derivation throughout.

3.3.4 *Chains and the interpretation of Vocabulary*

The dissociation of syntactic, phonological and semantic features and the ban on mixed representations raise the question of how the semantic and the phonological realization of a syntactic head are related to each other. It is of course not enough to let the syntax build a deriva-

tion and then perform two completely independent operations of insertion at the terminal nodes, one phonological and one semantic in nature. There has to be a mechanism in the system that guarantees that the information associated with a terminal node at PF corresponds to the intended interpretation. The theory has to be formulated in a way that avoids a situation in which a syntactic head, say N°, is associated with the phonological features of *cat*, whereas the meaning of *dog* is inserted at LF.

Both Marantz (1995) and Jackendoff (1997) address this point. Marantz argues that Encyclopedic knowledge does not only relate a specific meaning and a syntactic node at LF. Rather, he argues that what the semantic interpretation looks at is the whole representation, including the choice of vocabulary made at PF. However, he is not explicit about the exact mechanisms that are involved in the interpretation of the "whole representation".

Jackendoff (1997, 89) suggests that the three derivations of phonology, syntax, and conceptual structure are linked through subscripted indices. A word like *cat* is represented by three parts of information that are related by the same index:

(22) a. Word_b b. N_b c. $[_{\text{Thing}}\ \text{TYPE: CAT}]_b$

According to Jackendoff, it is this index that unifies the relevant parts of the syntactic, phonological, and semantic structures that correspond to the word *cat*. However, notice that Jackendoff argues for a model with only one syntactic level that is related to both phonology and semantics via the respective interface modules. In contrast, I have assumed in accordance with standard assumptions of generative grammar that syntax generates two (possibly distinct) interface levels; i.e. MS and LF. The representations at these levels are accessed by correspondence rules that are part of the syntax-phonology and the syntax-semantics interface. Nevertheless, the phonological and semantic information of a lexical entry, although not inserted at one and the same point, must be linked to each other. What I want to suggest is that this link can be established through a *chain*.

Chains are linguistic objects that relate a moved element to its trace in the position from where it has been moved. This relation is expressed by *chain coindexing* (cf. Chomsky 1986b). Given that all positions of a chain bear the same index, the phonological information that is associated with a syntactic head can be recovered by the semantics via the index of the syntactic positions in the chain. This, however, requires that the notion of chain be extended to the operations that apply at MS. After all, operations like merger and fusion in DM form new *syntactic* trees and are similiar to head movement operations in this respect. I therefore assume that terminal nodes at MS can be related to terminal nodes at LF via an index which is created by all operations that modify the syntactic tree. This index guarantees that the phonological features associated with elements at PF belong to the same lexical element whose semantic features are relevant for the semantic interpretation. This is my understanding of how the interpretation at LF "looks at" the whole representation, including the choice of vocabulary at MS. The index of a syntactic chain links the syntactic representation of a lexical entry to its phonological and semantic specification.

Jackendoff (1997) argues against the identification of a movement index and a lexical index. He claims that "the linking index's only proper role is an interface function: it serves to link syntax to phonology (...) and to semantics (...) If we were also to use it to keep track of lexical items through a syntactic derivation, this would in effect be admitting that all the steps of the derivation (...) are also accessible to phonology and semantics" (1997, 93). Jackendoff

assumes that there is only one syntactic representation that functions as the interface level of both the syntax-phonology and the syntax-semantics interface. This claim may be conceptually more attractive than the traditional understanding of syntax involving different levels of representation.[12] However, I do not see that his objections seriously challenge the assumption that the connection between phonological and semantic features can be established through the syntactic index of a chain. In particular, there seems to be no reason why this view should entail that *all* steps of the derivation become accessible to both components. The phonological component has only access to the representation at MS, and the semantics only to LF. The syntactic index of a terminal node functions as the mediator between the two interpretive components. At both levels, a syntactic subscript identifies a particular feature bundle with the same index. Even though the index of the phonological/semantic feature bundles is formally distinct from the syntactic movement index, recall that it is exactly the job of an interface to relate two formally distinct representations. Since unification of phonological/semantic features with syntactic structures takes place at the interface, the fact that there are two distinct syntactic interface levels does not create conceptual problems.

Jackendoff suggests that the only way in which the lexical linking index and the syntactic index of a chain could be related is through the postulation of a separate well-formedness condition that guarantees that terminal nodes with the same syntactic index are interpreted by the phonological and the semantic features of the same word. However, Jackendoff also rejects this alternative, pointing out that such a condition would invoke "a mechanism whose only purpose is to track otherwise unindividuated lexical items through the derivation" (1997, 93). However, it is a major claim of my analysis that the phonological information of a lexical entry is associated with a syntactic representation which may be different from the representation that the semantic features of this entry are linked to. This assumption involves by its very nature that a lexical item is "tracked through the derivation". Therefore, if Jackendoff is right and a separate well-formedness condition is really needed in order to avoid problems with mixed representations, then I would be willing to accept such a condition (despite the loss of conceptual attractiveness that this may imply).

Let me summarize the theoretical assumptions made in this section. Complex heads may be formed morphologically or by syntactic or post-syntactic operations. They are interpreted at the interfaces to the phonological and semantic components; lexical items license the correspondence between phonological/semantic structures and the representations at the two syntactic interface levels. A complex head that is interpreted as a word at one level may correspond to two separate heads at the other. The insertion of semantic features depends on the syntactic index of the terminal node that links it to the choice of Vocabulary inserted at MS. This link, established via a chain, therefore allows the semantics to "look at" the whole representation and to relate the sound of words to their meaning.

4. Particle verbs and insertion at LF

As illustrated in section 2, the structural properties of the verb-particle construction clearly suggest that the particle and the verb are represented syntactically as two independent heads of their respective phrasal projections. Nevertheless, the word formation properties of particle verbs indicate that they are at the same time morphological objects. In this and in the following section, I want to show that the theory of late insertion outlined in section 3.3 provides a

[12] Alternatively, one may argue that there is in fact only one syntactic level whose basic elements are (sometimes trivial) chains (cf. Brody 1995; Groat & O'Neill 1996). The syntactic representation of a lexical entry would then be the whole chain rather than the information given in (22b), and indexation has to specify which position of the chain is interpreted phonologically and which one semantically. This may in fact be another possible implementation of the core ideas of this paper; however, I cannot explore this option further here.

natural explanation for the heterogeneous properties of particle verbs. The proposal that I want to make is that, although the syntax of the verb-particle construction is complex, a particle verb is a word in the morphosemantic sense, since its meaning is associated with a single syntactic head position at LF. In section 4.1 I will suggest that particles are semantic affixes, i.e. that the insertion of their semantic features requires the syntactic node of the particle to be part of a complex V° when supplied with semantic features. In section 4.2 I discuss the process of abstract incorporation through which this complex head position is derived, and section 4.3 addresses the problem of argument projection with particle verbs from the perspective of late insertion.

4.1 Particles as semantic affixes

In this section I want to suggest that particles are prepositional elements that need a semantic host. It is difficult to provide evidence for this claim. Most of the properties that I assume to be the direct result of the affixal status of particles may also be caused by different factors. However, I will illustrate a number of interesting differences between particles and other predicative complements of the verb (resultative predicates and PPs) and argue that these differences are best explained by the morphosemantic boundedness of particles.

First, note that both particles and resultatives form a complex predicate with the verb and may introduce new arguments. However, in contrast to resultatives, particles always require a full verb to be present. They cannot be used as a predicative complement of the copula *sein*, "be":

(23) a. *Peter arbeitet* [*sich müde*] (resultative phrase)
Peter works himself tired
b. *Peter arbeitet* [*seine Schulden ab*] (particle verb)
Peter works his debts Prt (off)

(24) a. *Peter ist* [*müde*]
Peter is tired
b. **Die Schulden sind* [*ab*]
The debts are Prt (off)

Second, particles also differ from PP-complements of the verb. As mentioned in section 2, although many (maybe all) particles are intransitive prepositional elements (cf. van Riemsdjk 1978; den Dikken 1995) and mostly carry a directional meaning, topicalization is very restricted with particles, whereas it is always possible with directional PPs and postpositions:

(25) a. *Nach Frankreich sind sie gefahren*
to France are they driven
"they drove to France"
b. *Hinauf sind sie gestiegen*
up are they climbed
"They have climbed up"

(26) a. **Ab sind sie gefahren*
Prt are they driven
"they departed"
b. **Auf sind sie gestiegen*
Prt are they climbed
"they ascended"

Recall that in contrastive contexts, particles can be topicalized. Therefore, the ungrammati-

cality of (26) must have semantic reasons.

Third, although a directional PP can productively combine with every possible verb of motion, this possibility is much more restricted with particles:

(27) *Peter ist in die Schule gefahren/gegangen/gelaufen*
"Peter drove/went/walked to school"

(28) a. *Das Schiff ist eingelaufen*
the ship is Prt-run
"the ship has entered the harbor"

b. **Der Bus ist eingefahren*
the bus is Prt-driven

(29) a. *Der Bus ist abgefahren*
the bus is Prt-driven
"the bus has left (driving)"

b. **Der Mann ist abgegangen*
"the man has left (walking)"

(28) and (29) show that not every verb of motion is equally acceptable with a particular particle. A specific particle can only combine with specific verbs. This fact is related to a fourth observation. In certain contexts, directional PPs can be combined with their external argument by the use of a copula (like the resultative predicate in (24a)):

(30) a. *Peter ist in die Kirche* (can mean: Peter has gone to church, has driven
Peter is into the church to church, has walked to church, etc.)

b. *Peter ist in den Garten* (can mean: Peter has gone into the garden, etc.)
Peter is into the garden

c. *Peter ist auf eine Party* (can mean: Peter has gone to a party, etc.)
Peter is to a party

The data in (30) show that the path-reading associated with the respective PP suffices to interpret the sentences; the semantics does not need to be specific with respect to the event of traversing this path. As shown by van Hout (1996), particles are similiar to directional PPs from an event-semantics point of view. Both predicates express the transition and/or the resultant state of an event. One would therefore expect that the verb can also be omitted in directional verb-particle constructions. However, this expectation is not borne out:

(31) a. **Peter ist ein* (intended meaning: *Peter ist eingelaufen*; "Peter has arrived")

b. **Peter ist ab* (intended meaning: *Peter ist abgefahren*; "Peter has departed")

The observations in (23)-(31) follow directly from the assumption that a particle is semantically licensed only in the context of a verbal predicate. I therefore want to argue that particles are *semantically* bound morphemes. As affixes, particles are subject to morphological conditions. I have argued in section 3.3.2 that a terminal element that is supplied with the features of an affix must appear inside the same X°-category as its host at the syntactic interface level. This means that the semantic features of a particle can only be inserted if the prepositional head supplied with these features is part of a complex verb at LF.

This explains that particles can never occur without a base, as illustrated by the ungrammaticality of (24b) and (31). Furthermore, it is a typical property of affixes that they impose restrictions on their possible bases. For example, the English suffix *–ity* can only attach to latinate adjectives. If particles are analyzed as affixes, the data in (28)-(29) are not surprising, but expected. Finally, the fact that particles are affixes may also be the reason behind the

restriction on topicalization illustrated by (26). Since the particle must appear inside a complex verbal head at LF when its semantic features are inserted, the phrase of which the particle is the head cannot be displaced. Suppose the particle were inside a PP at LF in order to license the topic- or focus-interpretation that is associated with a topicalized element (cf. Büring 1996). Then its semantics would be seggregated from the semantics of the verb. This, however, would violate the morphological condition that semantic affixes need to be bound. Like phonological affixes, that have to be part of a complex head at MS, particles therefore have to be part of a complex head at LF.

Interestingly, the condition that phonological affixes must have a host at PF (*Lasniks Filter*, cf. section 3.3.3) can be violated under certain conditions. Prefixes like *be-*, *ent-*, and *ver-* in German are bound morphemes and need a verbal stem as a phonological host. However, in right node raising contexts, a prefix can remain unbound at PF if a contrastive reading is available:

(32) a. *Peter hat den Wagen erst ent- und dann wieder beladen*
Peter has the wagon first Pref- and then again Pref-loaded
"Peter first unloaded the wagon and then loaded it again"
b. *Peter hat mich erst be- und später verraten*
Peter has me first Pref- and later Pref-advised
"Peter first advised, and later betrayed me"

The question is if similiar exceptions to the rule that affixes must be bound are also found with particles. But the answer has already been given in section 2. If a given context allows the particle to be used contrastively, then the morphological condition that the particle must be part of a complex head at LF can be circumvented, and the particle can be topicalized. I repeat example (15a) from section 2 in (33) for convenience:

(33) *Auf geht die Sonne im Osten* (*aber unter geht sie im Westen*)
Prt (up) goes the sun in the east but Prt (down) goes it in the west
"The sun rises in the east but sets in the west"

As in the case of phonological affixes, semantic affixes may occur as "free" morphemes if a contrastive reading is available. I take this similiarity between the prefixes in (32) and particles as further evidence for the claim that particles are affixal prepositional elements and need a host to display their semantic potential. Nevertheless, they are phonologically free morphemes and can be separated from their base in syntax. In this sense, particles are in fact "separable prefixes", as traditional grammars label them. The affixal property of particles also lies behind the claim made in Stiebels & Wunderlich (1994) that (prepositional) elements become particles whenever they combine with a verb. In my account, the head of a PP must form a complex head with the verb if its semantic features are affixal and define it as a particle. This condition triggers head movement of the particle at LF, a topic to which I now turn.

4.2 Post-syntactic word formation

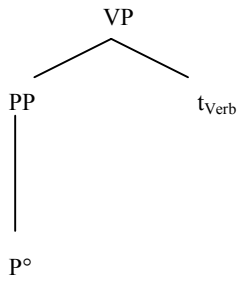
4.2.1 *Abstract incorporation*

Baker (1988) suggests that head movement can take place not only in overt syntax but also in "covert" syntax at LF. The idea behind this operation, which Baker labels "abstract incorporation", is that two heads that are syntactically separated nevertheless form some kind of semantic complex. Since LF does not feed into the phonological component of grammar, abstract incorporation allows a semantic relation to be captured between two elements that are

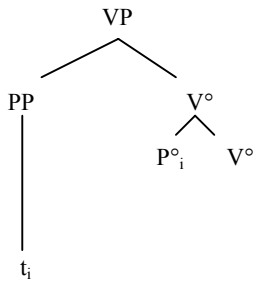
phonologically non-adjacent. For example, Baker assumes that the embedded infinitival verb in Romance causative constructions undergoes abstract incoporation. This accounts for the fact that the subject of the embedded verb behaves like a direct object of a complex predicate with respect to cliticization and passivization. Baker's proposal has also been adopted by Grewendorf & Sabel (1994), who suggest that long scrambling out of infinitival clauses in German is possible if the matrix verb triggers abstract incorporation of the infinitive. Stowell (1991) argues that heads of small clause (SC-) complements incoporate into the verb at LF in order to explain why the direct object in SC-constructions shows both properties of objects (of the complex verb at LF) and properties of subjects (of the SC in overt syntax). In all these cases, it is assumed that complex head formation takes place in the covert component of grammar; the fact that two heads form a complex predicate is phonologically "invisible".

The verb-particle construction is another example of two elements that are separated in overt syntax, but that are nevertheless interpreted as a semantic unit. I therefore assume that particles undergo abstract incorporation into the verb at LF. A prepositional head of a PP-complement of the verb incorporates at LF and derives a complex V° (I assume syntactic reconstruction of the verb before the particle incorporates):

(34) a.



b.



The complex V° at LF includes two terminal nodes that are supplied with the semantic features of the particle and the verb. Head movement at LF, like overt incorporation, is a word formation operation, and late insertion of semantic features counts as the morphological derivation of a particle verb. According to the theory outlined in section 3.3, I assume that morphological objects that are derived by head movement may also be derived pre-syntactically. (This latter point is discussed in detail in section 5.)

(34) accounts for the fact that particles are words in the morphological sense although they are separated in syntax. A particle verb consists morphosyntactically of a [+P]-element and a verb. In line with Borer's PM-model, both elements may project their own phrases in syntax. Since particles never incorporate overtly (see Zeller (1997) for particles in German; Kayne (1985) and den Dikken (1995) for English), verb movement leaves the particle behind (cf. (34a)). At MS, the phonological features of the particle and the verb are inserted, and PF may find both elements non-adjacent (as, for example, in V-2). At LF, abstract incorporation derives (34b). The terminal elements inside the complex V° are coindexed with the separate P- and V-heads at MS. The verbal node at LF is the foot of a chain whose head is interpreted phonologically (= reconstruction of the verb), and the particle is the head of a chain at LF whose foot is associated with its phonological features (= abstract incorporation). This guarantees that the semantic and the phonological features of the same lexical element are inserted; the lexical entries of both the verb and the particle license the correspondence between phonology and semantics through syntactic chains. Finally, when the terminal elements inside V° are associated with semantic features, the particle has a semantic host and fulfills the requirement that affixes must be bound.

There is an interesting observation that provides a strong argument for the assumption that the verb and the particle form a complex head at LF. As shown in (35), prefixes in German can attach to adjectives and nouns and turn both into verbs:

(35) a. *ver*-[[*langsam*$_{Adj}$]-*en*]$_{Verb}$ (but: **langsamen*$_{Verb}$) - "slow down"
Pref - slow
b. *be*-[[*herberge*$_{Nom}$]-*n*]$_{Verb}$ (but:* *herbergen*$_{Verb}$) - "put up"
Pref - inn

As it has been argued by Booij (1990) and Neeleman & Schipper (1992), the prefixes in (35) do not attach directly to adjectives or nouns, but to verbs that are derived from adjectives and nouns by zero-conversion. However, notice that the base verbs in (35) from which the verbs *verlangsamen* and *beherbergen* are derived do not exist without the prefix. Their occurence is only licensed in the context of a complex verbal node that also includes the prefix.

Importantly, particles also derive verbs from adjectives and nouns (cf. Lüdeling & Zeller (in prep.); Booij (1990) for Dutch):

(36) a. *an*-[[*reicher*$_{Adj}$]-*n*]$_{Verb}$ (but: **reichern*$_{Verb}$) - "enrich"
Prt - richer
b. *ein*-[[*bürger*$_{Nom}$]-*n*]$_{Verb}$ (but: **bürgern*$_{Verb}$) - "settle"
Prt - citizen

Like the base verbs in (35), the base verbs in (36) do not exist independently. They are only licensed together with a particle. The most natural assumption would be that they obey the same morphological requirement as the base verbs in (35); i.e. that they be part of a complex V°. However, note that this requirement does not hold at MS: In V-2, the verbs in (36), although never licensed without a particle, are phonologically independent words and non-adjacent to the particle:

(37) a. *Der Wissenschaftler reichert*$_{Verb}$ *die Lösung mit Schwefelstoff an*
The scientist riches$_{Verb}$ the solution with sulphuretted hydrogen Prt
"The scientist enriches the solution with sulphuretted hydrogen"
b. *Der Staat bürgert*$_{Verb}$ *neue Ausländer ein*
The state citicens$_{Verb}$ new foreigners Prt
"The state settles new foreigners"

(37) raises the question of how the particle licenses the occurence of verbs which are not part of a morphologically complex head at MS. The analysis suggested in this section provides a straightforward answer to this question. Phonologically, verbs like *reichern* and *bürgern* are well-formed. No particle is required at MS for their phonological features to be inserted, and a Tns- and an Agr-node provide the right context for morphophonological operations. However, the *semantics* of these verbs is only licensed in the context of a particle. Since the relevant (morphosyntactic) context for licensing is X°, and the relevant level of insertion of semantic features is LF, the well-formedness of (37) provides strong evidence that the verbs in (36) are part of a complex verb at LF. This complex verb must have been derived by abstract particle incorporation.

There is also syntactic evidence that particles undergo abstract incorporation. I have argued above that, although the topicalization of particles is semantically restricted, their phrasal syntactic status sometimes allows them to be topicalized. But even when a contrastive reading is available, the particle-PP cannot be freely moved. There is a clear contrast between topicalization of particles and scrambling:

(38) a. [*Auf*] *geht die Sonne im Osten, aber unter geht sie im Westen*
Prt (up) goes the sun in the east but Prt (down) goes it in the west

b. **weil* [*auf*] *hier noch keiner die Sonne hat gehen sehen*
since Prt (up) here still nobody the sun has go see
"Nobody here has ever seen the sun rise"

c. [*An den Strand*] *gehen die Touristen im Sommer, aber in die Kneipe im Winter*
to the beach go the tourists in the summer but to the bar in the winter

d. ?*weil* [*an den Strand*] *hier noch keiner einen Touristen hat gehen sehen*
since to the beach here still nobody a tourist has go see
"Nobody here has ever seen a tourist going to the beach"

(39) a. *Die Bauern luden das Heu ab.* [*Auf*] *luden sie nur Stroh.*
the farmers loaded the hay Prt (off) Prt (onto) loaded they only straw

b. **weil* [*auf*] *hier noch keiner was geladen hat*.
because Prt (onto) here still nobody something loaded has
"because nobody has ever loaded anything (onto something)"

c. *Die Bauern luden das Heu in die Scheune.* [*Auf den Wagen*] *luden sie nur Stroh*.
the farmers loaded the hay into the barn onto the wagon loaded they only straw

d. *weil* [*auf den Wagen*] *hier noch keiner was geladen hat*
because onto the wagon here still nobody something loaded has

The (a)-examples show particles that can be topicalized, due to the contrastive reading provided by the context. The (b)-examples show that the very same particle phrase nevertheless cannot be scrambled, although scrambling of full PPs is generally well-formed, as illustrated by the (d)-examples. Since the semantics of (38)-(39) allows topicalization, the ungrammaticality of the scrambling-examples is genuinely syntactic. It follows straightforwardly from the assumption that the head of the particle-PP has to undergo abstract incorporation. It is a well-known fact that both overt and covert movement out of adjoined categories is generally ruled out (Baker 1988; Sternefeld 1990; von Stechow 1992; Grewendorf & Sabel 1994). Since scrambling of the particle-PP in (38)-(39) is adjunction to IP, this movement excludes LF movement of the head of the PP. As a result, the particle cannot become part of a verbal head at LF. Insertion of the particle's semantics would leave this affix unbound, and the derivation would crash at LF. The impossibility to scramble particles that can be topicalized hence provides further evidence for the claim that particles do indeed undergo abstract incorporation.

4.2.2 *Particles versus resultatives*

I have already mentioned the syntactic and semantic similiarities between the verb-particle and the verb-resultative construction. Like particles, resultative predicates are stranded when the verb moves to Comp in V-2, and they also form a complex predicate with the verb. One may therefore suggest that resultative predicates also undergo abstract incorporation into the verb.

I want to argue against this suggestion. The first argument against covert movement of resultative predicates is the absence of any semantic trigger. Adjectival resultative predicates are not semantic affixes. No morphosemantic condition requires them to be part of a complex verb at LF. As shown in section 4.1, an adjectival resultative predicate like the one in (40a) does not require the presence of a full verb ((40b)), it allows topicalization ((40c), and it can even be scrambled ((40d)):

(40) a. *Peter streicht die Tür rot*
Peter paints the door red
b. *Die Tür ist rot*
The door is red
c. *Rot hat Peter die Tür gestrichen*
Red has Peter the door painted
d. ?*weil rot keiner die Tür streichen will*
because red nobody the door paint wants
"because nobody wants to paint the door red"

Second, in contrast to the case of particle verbs, the composition of the semantics of a resultative predicate and the semantics of the verb always proceeds in the same fashion. The resultative predicate always expresses the end state of the event expressed by the verb (for semantic implementation, cf. von Stechow 1995; Zeller 1996). The interpretation can directly be read off from the overt syntactic representation; no LF-movement is necessary.

The strongest argument against abstract incorporation of resultatives is provided by phrasal resultative predicates like the ones in (41):

(41) a. *Peter schlägt das Klavier* [*in Stücke*]
Peter hits the piano to pieces
b. *Peter wäscht sich die Seife* [*aus den Augen*]
Peter washes himself the soap out of the eyes
"Peter washes the soap out of his eyes"

Since incorporation at LF is restricted by the same syntactic principles as overt incorporation, it is clear that the resultative predicates in (41) cannot undergo abstract incorporation. As phrases, they are not allowed to adjoin to a head position. But if abstract incorporation is not a suitable method to explain how a verb and a phrasal resultative predicate form a complex expression, then it can be concluded that the semantic relation between these two elements must be derived from some other mechanism.

The question of what kind of operation derives complex predicates like *rot malen*, "red paint", and *in Stücke schlagen*, "to pieces hit" remains open at this point. Notice, however, that unlike abstract incorporation that applies obligatorily, this operation is optional. This is illustrated by the following sentence, discussed in Dowty (1979), who mentions Barbara Partee (p.c.) as his source:

(42) The carpenters were pounding me deaf

As Dowty notes, (42) is ambiguous. It can mean that my deafness was brought on by the carpenters' pounding on me or by their pounding on something else. This ambiguity can be explained by assuming that only the first reading has the subject of the adjective (*me*) as the direct object of a complex verb *deaf pounding*. The second reading, in contrast, would follow from a SC-representation in which the object saturates the adjective's argument position before the meaning of the whole SC combines with the meaning of the verb. In the latter case, there is a simple causative/resultative relation between the pounding-event and my deafness which does not entail that the object is directly affected by the pounding. Since such ambiguities never occur with particle verbs, I conclude that the formation of resultative constructions does not involve abstract incorporation, whereas the formation of particle verbs does.[13]

[13] This claim raises the question about other cases of abstract incorporation that are discussed in the literature (cf. section 4.2.1). I do not want to explore whether causative constructions, control infinitives, and *consider*-type constructions do indeed involve the formation of complex predicates with a complex argument structure (as it

The consequence of this view is that compositional verb-particle constructions still differ formally from compositional resultative constructions, even if their semantic composition precedes in the same way. The crucial difference between particle verbs and resultatives is that the semantics of the former is associated with two terminal elements within the same V°-category at LF, whereas the semantics of the latter is associated with a verbal head and a phrasal resultative predicate. At LF, particle verbs are morphological objects, whereas resultative constructions are still syntactic. This distinction has always been made by proponents of morphological approaches to particle verbs (cf. Neeleman & Weerman 1993; Stiebels & Wunderlich 1994), but always with the result that particle verbs were analyzed as complex heads at *every* syntactic stage. As shown in section 2, these theories fail to derive the syntactic similiarities of the verb-particle and the resultative construction from similiar syntactic representations. In contrast, the theory that I argue for in this paper provides a straightforward account for the fact that both resultatives and particle verbs are verb+complement constructions in overt syntax, although only the latter are morphological objects.

4.3 Late insertion and argument structure

The theory of late insertion outlined in this and in the previous sections relies heavily on the assumption that phonological and semantic features are not relevant to syntactic derivations. This raises questions about the projection of the verb's arguments. In GB-theory, it is assumed that the information about the number and the kind of arguments that a verb takes is part of its lexical entry. This aspect of the the verb's lexical semantics is then mapped onto a syntactic structure; the verb projects its arguments in the syntax. However, if the semantic features of the verb are not present in syntax, then how can the syntax "know" how many argument positions it has to provide?

This question becomes particularly relevant with respect to particle verbs. Many particles are predicates which take their own arguments. If they combine with an intransitive verb, they derive a transitive particle verb:

(43) a. **Peter lacht den Lehrer*
Peter laughs the teacher
b. *Peter lacht den Lehrer aus*
Peter laughs the teacher Prt
"Peter laughs at the teacher"

The direct object in (43b) is clearly introduced by the particle. However, the argument structure of a particle verb is not always the sum of the arguments of the verb and the particle. Sometimes it seems that a predicative particle can also combine with a transitive verb without adding a new argument:

(44) a. *Peter spült das Geschirr*
Peter washes the dishes
b. *Peter spült das Geschirr ab*
Peter washes the dishes Prt

---

has been argued, for example, by Di Sciullo & Williams (1987) and Bierwisch (1990) for causatives; Bach (1979 and 1980) and Larson (1991) for certain control infinitives; Williams (1983) and Neeleman (1994) for *consider*-type constructions). However, I doubt that these examples truely involve abstract incorporation and the formation of complex heads at LF. I rather concur with von Stechow (1992) that what is called abstract incorporation in these examples is rather syntactic coindexation of two predicates that stand in a particular semantic relation to each other. This coindexation has the same syntactic effects as true incorporation (overt or abstract), but does not involve LF-movement.

Although *ab* is a one place predicate with the meaning "to become clear/clean" (cf. Stiebels 1996 and section 5.3), it seems that it does not project its argument in (44). The argument of the particle apparently matches with that of the verb. The problem posed by (44) is that whatever determines the argument structure of the complex particle verb is a morphosemantic operation that only takes place at the interface between syntax and semantics. From the perspective of syntax, there is no difference between the particle in (43) and the particle in (44). But why is the particle's argument projected in (43), and not in (44)?

This problem is discussed in greater detail in Zeller (in prep.), and for reasons of space, it is not possible to elaborate on this question here. However, it may be instructive to mention the seminal argument. In a theory of late insertion, there are no "pre-syntactic" principles like the θ-criterion or the Projection Principle that govern the syntactic realization of arguments. The interface level between the lexicon and syntax which is relevant for the interpretation of predicate-argument relations is LF. Thematic relations can only be checked at this level, since only here, the semantic features of a predicate and its argument are inserted. This implies that syntactic constraints on predicate-argument structures can only be imposed by structural conditions like X-bar theory. I assume that it is a principle of X-bar theory that for each head, there is only one complement position. This principle restricts the possible argument structures of particle verbs. Since the particle is represented inside a PP-complement of the verb in syntax, it follows that verbs that combine with particles can never take any other internal syntactic complements; their only complement position is occupied by the particle phrase. Inside this PP, however, both the specifier and the internal complement position of the particle may be filled.

This means that particle verbs may have not more than two internal arguments. Syntactically, these arguments are always projected as arguments of the particle (i.e. within its maximal projection). However, since selectional restrictions only become relevant after semantic insertion, the latter fact is immaterial to the interpretation. For example, in the case of transitive particle verbs, the particle and the verb form a complex verb at LF, and morphosemantic operations derive its argument structure. Semantically, the particle verb is now a two-place function that combines with all arguments that are present in the structure. It is irrelevant whether these arguments are represented inside a PP or inside a VP; a syntactic argument of the particle always becomes the semantic argument of the particle verb. With respect to the sentences in (43) and (44), this implies that in both (b)-examples, the verb only takes the particle-PP as its internal argument. The verb in (44) does not select an internal NP-argument; the object-NP is the syntactic argument of the particle, although semantically, it is the argument of the derived particle verb.

An important implication of this claim is that the internal argument of a transitive verb and the internal argument of a particle verb derived from this verb do not have to be identical. The semantic combination of a particle and a verb may derive a particle verb which imposes different conditions on the semantics of its direct object than does its transitive base. In fact, it can be shown that the internal argument of a particle verb almost always obeys different selectional restrictions than the internal argument of the respective base verb. The fact that the NP *das Geschirr* in (44) is a possible argument of both the verb *spülen* and the particle verb *abspülen* is therefore an exception rather than a necessity. Insofar as all particle verbs are derived from an underlying structure in which the particle phrase is the single complement of V, we can conclude that the argument structural properties of particle verbs do not raise problems for the account suggested in this paper (I refer the reader to Zeller (in prep.) for a more extensive discussion of this issue).

5. Particle verbs as words

In section 3.3 I have adopted the central idea of PM that complex head positions can be created both (post-)syntactically and pre-syntactically. In this section I will focus on the pre-syntactic derivation of particle verbs. In section 5.1 I show how this option allows particle verbs to undergo further adjectival and nominal word formation. The semantic properties of compositional and idiosyncratic particle verbs are discussed in section 5.2, and in section 5.3, I address the question of how syntactic and pre-syntactic word formation is restricted.[14]

5.1 Pre-syntactic word formation

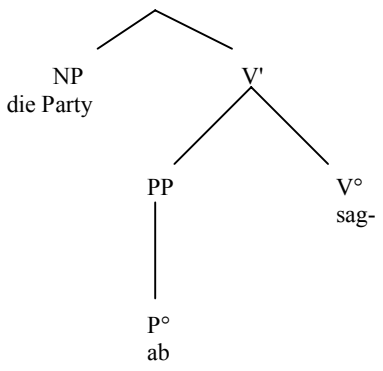
As discussed in section 2, particle verbs can feed further word formation. For example, the nouns in (45) are process nominals, the nouns in (46) are result nominals:

(45)	a.	*die häufige Anhebung der Steuern* the frequent raising of taxes	(cf. *anheben*, "raise")
	b.	*die Ausbeutung der Armen* the exploitation of the poor	(cf. *ausbeuten*, "exploit")
(46)	a.	*die Absage* the declining	(cf. *absagen*; "decline")
	b.	*die Anfrage* the inquiry	(cf. *anfragen*; "inquire")

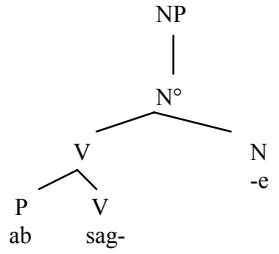
Since particles are never separable from their base in derived nominals (or adjectives), the particle verbs involved in the derivations in (45)-(46) must be words in the morphophonological sense. In the preceding sections I have focused on word formation at LF, and I have provided an account for the fact that the particle does not have to be part of the same syntactic head as the verb at MS. However, whenever the particle verb is part of a more complex (nominal or adjectival) morphological structure, the phonological features of the particle and of the verb are associated with terminal nodes within the same V° at MS. In contrast to the syntax of the particle verb in a finite clause as in (47), which is given again in (48a), the syntactic representation of the result nominal in (46a) looks like (48b):[15]

(47) *weil Peter die Party absagt*

(48) a.



b. *die Absage*



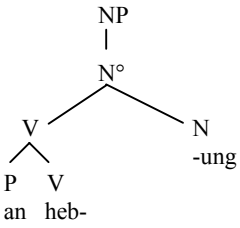
[14] The possibility to use Parallel Morphology to account for the properties of particle verbs is mentioned in passing by Neeleman (1994) and Den Dikken (1995). However, to my knowledge nobody has ever offered a fully elaborated account.

[15] Keep in mind that syntactic heads do not dominate phonological and semantic features; I only use the traditional representation here for ease of exposition.

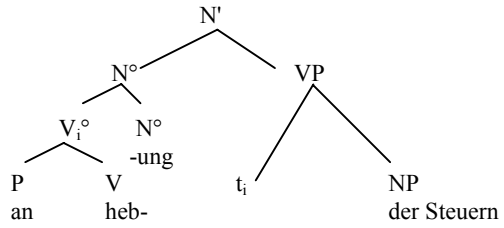
As argued in the previous section, (48a) is the input to abstract incorporation. Covert head movement derives a complex verbal head that is supplied with the semantic features of the particle verb. This operation counts as syntactic word formation; the particle verb is a morphological object. According to the theory outlined in section 3.3, morphological objects can alternatively be derived pre-syntactically. This option is illustrated in (48b). The P- and the V head are combined morphologically, i.e. prior to syntactic operations. This explains why particle verbs can feed further word formation processes: The complex verbal node in (48b) is further selected by a nominal affix, and the result nominal is the head of an NP in syntax. Since syntactic rules cannot look inside an X°-category, the particle remains unseparable. At MS and LF, the respective features are associated with the terminal nodes P and V which are part of a complex V° at *both* interface levels.

Note that the pre-syntactic formation of particle verbs is independent of whether the nominal or adjective that includes the particle verb is itself derived syntactically or pre-syntactically. Instead of adjoining the particle verb to a nominal affix morphologically, the particle verb may as well project a VP and incorporate into N° in overt syntax. Both options are illustrated in (49):

(49) a.



b.



The nominal *Anhebung*, "raise", in (49a) is a result nominal; in (49b) the same noun is a process nominal whose event reading is derived when the particle verb is reconstructed back into VP at LF (cf. section 3.3). In both derivations, the particle verb itself has been formed pre-syntactically.

I have shown in section 4.2.2 that resultative predicates do not undergo abstract incorporation. This means that a resultative adjective and the verb do not form a morphological object at LF. Consequently, we expect that the pre-syntactic option to combine a resultative predicate and a verb does not exist either. This expectation is borne out. Resultative constructions, in contrast to particle verbs, do not allow further word formation, as shown by the contrastive pairs in (50)-(52) (cf. Stiebels & Wunderlich 1994; Kratzer 1994 for German; Neeleman & Weerman 1993 for Dutch):

(50)	a.	*das Haus anstreichen* the house Prt-paint	(verb-particle construction)
		Anstreicher Prt-painter	(derived nominal)
	b.	*das Haus rot streichen* the house red paint	(verb-resultative construction)
		*?*Rotstreicher* red-painter	(derived nominal)
(51)	a.	*den Slogan aufschreiben* the slogan Prt-write	(verb-particle construction)
		Aufschrift Prt-writing	(derived nominal)

	b.	*den Slogan fertig schreiben* the slogan ready write	(verb-resultative construction)
		**Fertigschrift* ready-writing	(derived nominal)
(52)	a.	*die Tür abschließen* the door Prt-lock	(verb-particle construction)
		die Tür ist unabgeschlossen the door is un-Prt-locked	(*un*-prefixed adjectival participle)
	b.	*die Tür zuschließen* the door closed-lock	(verb-resultative construction)
		**die Tür ist unzugeschlossen* the door is un-closed-locked	(*un*-prefixed adjectival participle)[16]

Since grammar does not permit the formation of a complex verbal head that includes the terminal nodes of a resultative adjective and of a verb, neither pre-syntactic word formation nor abstract incorporation are possible with resultatives. The late insertion-approach accounts for the fact that particle verbs, although they are syntactically complex constructions *like* resultatives, allow further word formation *in contrast* to resultatives.

Let me now address an alternative proposal to account for the morphological properties of particle verbs which is also based on the assumption that the particle is the head of a phrase, but which does not assume abstract incorporation. According to such an analysis, the particle would be located inside the PP-complement of the verb at all levels of syntax. The next node that dominates both the particle and the verb is a non-minimal verbal projection. To account for the fact that particle verbs can form nouns and adjectives, proponents of this analysis would have to give up the assumption that only X°-elements are subject to morphological rules. Instead, they would have to assume that phrases can undergo word formation as well.

In fact, this is what Lieber (1992) suggests. She discusses examples from Tamil (cf. Subramanian 1988) where the derivational affix *-tal* is used to derive nouns from VPs. Lieber notes that *–tal* can only attach to transitive verbs if their internal subcategorized argument is present ((53a)); furthermore, derived *–tal*-nominals may even include VP-adverbs ((53b)):

(53)	a.	*nilatt-ai uRu* land-Acc plow	*nilatt-ai uRu-tal* "plowing the land"	
	b.	*kaTinamaaka uRai* hard work	*kaTinamaaka uRai-ttal* "working hard"	(Lieber 1992, 18)

An extensive discussion of whether Lieber's data really provide evidence for the claim that phrases can freely occur in words would go beyond the scope of this paper. In general, I think that the possibility to have phrases in words is much more limited than Lieber's theory suggests, at least in the Germanic languages. There certainly exist phrasal compounds and other instances of "syntactic words"; however, many of them are probably derived by "a nonmorphological word-creating rule of the periphery of the grammar", as argued by Di Sciullo & Williams (1987, 82). With respect to word formation from particle verbs, it is particularly unlikely that the nominals in (46) include full VPs. If this was the case, we would expect that the internal argument of the particle verb should be present inside the nominal, since it is part of the VP-structure. Recall that the Tamil affix *–tal* in (53a) *requires* the internal argument of the transitive verb to be realized. In contrast, the nouns in (46) are result nominals and there-

[16] As shown in Kratzer (1994), the prefix *un-* never projects in syntax and can only attach to morphologically derived elements. I therefore use *un*-prefixed adjectives here in order to show that these elements are not derived syntactically.

fore do not license any arguments. It is not clear at all how these nouns could be derived under the assumption that a full VP is embedded under a nominal head. Furthermore, if VPs could really productively undergo word formation, we would expect nouns and adjectives to be derived from *all* kinds of verb+complement constructions. In particular, since the verb and the resultative predicate are dominated by the same non-minimal verbal projection as the particle verb in overt syntax, we would also expect to find word formation with verb-resultative constructions. However, the discussion above has shown that word formation is not possible with resultatives. We cannot account for the difference between particle verbs and verb-resultative constructions if we allow all phrases to be part of words. In contrast, the theory of late insertion captures this difference between particle verbs and resultative constructions in a straightforward way, because it is based on the traditional assumption that only X°-elements can undergo word formation. In the light of the conceptual and empirical advantages of my proposal, I reject the alternative solution that relies on a theory of word formation along the lines of Lieber (1992).

There is another alternative. One may suggest that nominals and adjectives are derived via *overt* particle incorporation in syntax. According to this view, a derivational affix selects a VP-complement that includes the particle phrase and the verb. The particle incorporates overtly into V°, and the whole complex V° moves further to combine with the affixal head in overt syntax. However, this account does not provide any means to explain the difference between pre-syntactic and (post-)syntactic word formation. For example, if *all* derivational affixes take a VP-complement, it is falsely predicted that all nouns derived from particle verbs are process nominals. In a theory that does not allow for a pre-syntactic option to derive particle verbs, the difference between process- and result nominals remains unaccounted for. Therefore, such a theory must also be rejected.

So far, I have concentrated on cases where the pre-syntactic formation of particle verbs always involved further nominal and adjectival word formation. Evidence that the pre-syntactic formation of particle verbs is not restricted to these cases is provided by Dutch. In Dutch, certain verbs (like modals, perception and causative verbs) trigger raising of an embedded infinitive into the matrix clause and adjunction to their right, an operation called Verb Raising (VR) (cf. Evers 1975; van Riemsdijk 1978). Interestingly, if the embedded infinitive is a particle verb, two options exist:

(54) a. *dat ik Jan op* t_i *wil bellen*$_i$
that I Jan Prt want call
b. *dat ik Jan* t_i *wil opbellen*$_i$
that I Jan want Prt-call
"that I want to call Jan up"

In (54a), the matrix verb *willen* has triggered movement of the base verb, stranding the particle. In contrast, the particle verb in (54b) moves as one word. The two derivations in (54) follow from the two options of word formation provided by PM. In (54a), the particle is the head of a PP and only moves at LF. VR, like verb movement in V-2, only affects the base verb. (54b) shows the pre-syntactic alternative. The verbal node that includes the verb and the particle is formed prior to syntax. Since VR triggers raising of the embedded infinitive, and Lexical Integrity excludes movement out of X°s, the whole particle verb has to move into the matrix clause.

There is further evidence that (54b) depicts the pre-syntactic derivation of a particle verb which is only available for morphological objects. Dutch (like German) not only has particles, but also "real" intransitive prepositions. The difference between these elements and particles is that only the latter are semantic affixes. Intransitive prepositions do not incorporate at LF; they are interpreted like any other PP- complement of the verb. Now consider (55),

adopted from van Riemsdijk (1978, 55):

(55) a. *omdat hij* [*voor te staan*] *schijnt* (underlying structure)
because he (it) in front to stand seems
"because it seems to stand in front" (intransitive preposition-reading)
"because it (the team) seems to be leading" (particle reading)

b. *omdat hij* [*voor* t_i] *schijnt te staan*$_i$ (both readings)
c. *omdat hij* t_i *schijnt* [*voor te staan*]$_i$ (only particle reading)

The prepositional element *voor* in (55a) is ambiguous between a particle and an intransitive preposition. This ambiguity is preserved in (55b), a VR-construction in which only the base verb has undergone raising. At LF, the prepositional element *voor* may undergo abstract incorporation and be interpreted as a particle. Alternatively, it may be interpreted *in situ* as an intransitive preposition. Consequently, (55b) has both readings. In (55c), however, we find the prepositional element inside the VC. According to my analysis, this derivation presupposes pre-syntactic formation of a complex verb which moves as a V° in overt syntax. The complex verb is a morphological object, and therefore, the prepositional element *voor* in this derivation can only be a particle. It is hence predicted by my analysis that (55c) is unambiguous, because the intransitive preposition *voor* can never form a word with the verb. This prediction is borne out; (55c) has only the particle reading.[17]

5.2 Compositional and idiomatic particle verbs

Recent work has shown that for a large number of German verb-particle constructions, a compositional analysis is available (cf. Stiebels 1996). Some examples are given in (56)-(58):

(56) meaning of *an*: the event is directed towards an individual
a. (*jemanden*) *anlächeln* - Prt-smile, "smile at (somebody)"
b. (*jemanden*) *anschreien* - Prt-shout, "shout at (somebody)"
c. (*jemanden*) *anschreiben* - Prt-write, "write to (somebody)"
d. (*jemanden*) *ansprechen* - Prt-speak, "address (somebody)"

(57) meaning of *ab*: the event causes something to become clean or clear
a. (*den Tisch*) *abputzen* - Prt-scrub, "clean (the table)"
b. (*das Geschirr*) *abspülen* - Prt-rinse, "wash (the dishes)"
c. (*den Boden*) *abfegen* - Prt-sweep, "sweep (the floor)"
d. (*den Wagen*) *abladen* - Prt-load, "unload (the wagon)"

---

[17] In Dutch, postpositions can be modified by adverbials in the specifiers of their phrasal projections (cf. *pal* in (ia)). In some exceptional cases, these postpositions may also appear inside the verb cluster ((ib)), which suggests that they are reanalyzed as particles. However, if they appear inside the verb cluster, the modifier can neither be stranded in its base position ((ic)) nor can it occur inside the verb cluster ((id)):

(i) a. *dat Jan de bal* [pal *over*]$_{PP}$ t_i *heeft geschoten*$_i$
b. *dat Jan de bal* t_i *heeft* [*over geschoten*]$_i$
c. **dat Jan de bal* [pal t_i]$_{PP}$ t_j *heeft* [*over*$_i$ *geschoten*]$_j$
d. **dat Jan de bal*$_i$ t_j *heeft* [t_i pal *over geschoten*]$_j$
that John the ball right Prt has (Prt) shot (Den Dikken 1995, 108)

(ic) shows that the complex verb that underwent VR cannot have been derived from (ia) by overt incorporation, for in that case we would expect that the modifier is stranded. (id) excludes an analysis according to which the verb cluster is derived by scrambling of the embedded object, followed by extraposition of the entire embedded clause, since then we expect the adverbial to be licensed within the verb cluster. Consequently, the complex verb in (ib) must have been derived pre-syntactically. It has undergone VR as a V° in (ib).

(58) meaning of *los*: start doing something

a.	*losarbeiten*	-	Prt-work, "start working"
b.	*losschreiben*	-	Prt-write, "start writing"
c.	*losrennen*	-	Prt-run, "start running"
d.	*losmalen*	-	Prt-paint, "start painting"

The derivation of compositional particle verbs like the ones in (56)-(58) follows straightforwardly from the theory of late insertion advocated here. The choice of vocabulary at MS picks out a particular verb and a particular particle that are identified at LF through the chains created by abstract incorporation. The meaning of the respective lexical entries is inserted into the terminal nodes that correspond to the verb and the particle, and the interpretation associated with the complex V° is therefore that of a compositionally formed particle verb.

Idiosyncratic particle verbs, however, are of much more interest. I give some examples in (59):

(59) a. *anfangen*, lit. Prt-catch, "begin"
b. *ausbilden*, lit. Prt-form, "instruct, train"
c. *einrichten*, lit. Prt-judge, "furnish"
d. *abnehmen*, lit. Prt-take, "decrease"

In contrast to the examples in (56)-(58), the meaning of the verbs in (59) is not a function of the meaning of its parts. Rather, the idiosyncratic properties of these verbs are listed in the lexicon and are associated with the whole verb-particle construction. My account shares with other morphological approaches the advantage that the analysis of non-compositional particle verbs follows directly from the assumption that particle verbs are words.

In the theory of late insertion where semantic and phonological features of lexical entries are associated with terminal elements at the interface levels, idiomatic particle verbs can simply be analyzed as instances of *morphosemantic suppletion*. Recall that DM accounts for cases of morphophonological suppletion by assuming that the compositional interpretation of a complex node at MS is overridden by idiosyncratic phonological information. For example, if the English verb *be* merges with Tns and Agr at MS, the whole complex verbal node is supplied with idiosyncratic phonological features (*am*, *was*, *were* etc.). Correspondingly, semantic suppletion with particle verbs occurs when the semantics of the particle and the verb inside a complex V° is overridden by idiosyncratic semantic features that are associated with the whole V° at LF. For example, the node that dominates *an* and *fangen* (identified by their phonological features through their respective chain indices) at LF is associated with a listed entry that interprets the combination of this particular particle and this particular verb as "begin" (cf. (59a)).[18] As in phonology, suppletion in semantics is the process of associating idiosyncratic information with complex morphological structure at a syntactic interface level.

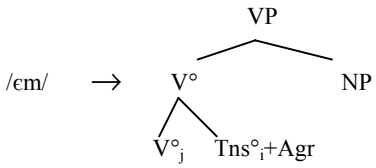
Jackendoff (1997) illustrates suppletion through the distinction between *lemmas* and *lexical forms* (cf. Levelt 1989). A lemma is the association of semantic and syntactic information, a lexical form is a linkup between syntactic and phonological information. Suppletion is characterized by a mismatch between the number of lemmas and the number of lexical forms that are associated with a particular part of the structure. Cases of phonological supple-

[18] I leave open the question whether this operation should be analyzed as partial or total suppletion. Total suppletion overrides the meaning of the whole complex verb at LF with idiosyncratic information. Partial suppletion in semantics is the mirror image of the derivation of *went* in DM illustrated in section 3.1. In partial suppletion, the particle retains its meaning, and only the verbal node is supplied with idiosyncratic information in the context of this particular particle. Such an analysis may be applicable to particle verbs like *anrufen*, "call up", which have an idiosyncratic meaning although the particle still carries the "directed towards"-meaning given in (56).

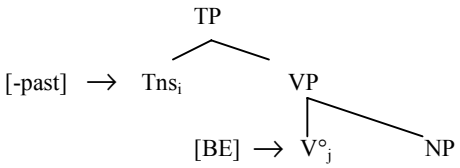
tion involve one lexical form and two lemmas; semantic suppletion associates one lemma and two lexical forms:

(60) Phonological Suppletion

a. MS:

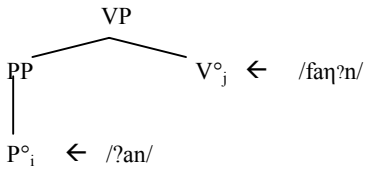


b. LF:

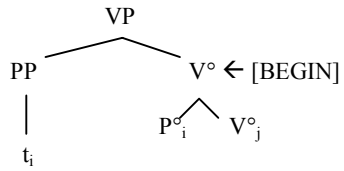


(61) Semantic Suppletion

a. MS:



b. LF:



Idiosyncratic forms like *am* in (60) link a syntactic complex into *one* idiosyncratic morpho-phonological unit, but into two regular lemmas (the verbal node and Tns are independently interpreted at LF). Idiomatic particle verbs like *anfangen* are the mirror image, since they connect *one* piece of idiosyncratic semantic information (the meaning of "begin" which is associated with a complex V° consisting of the particle and verb) with two lexical forms (two terminal elements at MS that are interpreted by the phonological features of *an* and *fangen*).

Let me emphasize that idiomatic verb-particle constructions pose further problems for syntactic accounts which do away with abstract incorporation. In contrast to my proposal, the irregular semantics of a particle verb cannot be associated with a syntactic head position in these accounts. Instead, idiosyncratic information has to be assigned to non-minimal syntactic structure. Therefore, some authors have suggested that non-compositional particle verbs be analyzed as *phrasal idioms* (cf. e.g. Emonds 1972; Di Sciullo & Williams 1987; Jackendoff 1997 for English). As noted in section 3.3.1, lexical listedness is not only a property of morphemes. Since listed phrases do exist, there is nothing wrong in principle with the idea that in assigning an interpretation to the particle verbs in (59), a whole VP is associated with a listed idiomatic meaning. However, this idea is seriously challenged by the observation that in German and Dutch, non-compositional particle verbs feed nominal and adjectival word formation in exactly the same way as compositional particle verbs do. Some examples from German are given in (62)-(63):

(62) Derived nominals

a. *anfangen*
"begin"
der Anfang
"the beginning"

b. *einrichten*
"furnish"
die Einrichtung
"the furniture"

(63) Derived adjectives

a. *abnehmen*
"decrease"
abnehmend
"decreasing"

b. *ausbilden*
"instruct", "train"
unausgebildet
"untrained"

The same objections that I raised in section 5.1 against the claim that word formation with particle verbs is a morphological operation on phrases now also apply to analyzing non-compositional particle verbs as phrasal idioms. Since non-minimal projections are generally not accessible to morphological operations, we do not expect phrasal idioms to productively undergo word formation processes. (62)-(63) hence provide strong evidence against a phrasal account to idiomatic particle verbs.[19] In contrast, the word formation pattern found with idiomatic particle verbs is unproblematic for my account. Idiosyncratic particle verbs are morphological elements. Their semantics is associated with a head position in syntax. If this head is derived pre-syntactically, derivational affixes may attach to it and form nominals and adjectives in a straightforward and unexceptional manner, as specified by morphological rules.

5.3 Syntactic and pre-syntactic word formation

In arguing that the V° that dominates the terminal elements of the particle verb can be derived at LF, I have attributed its syntactic separability to the fact that in overt syntax, the particle is the head of a phrasal complement of the verb. Moreover, I have argued that the respective V° may also be derived prior to syntax, and I suggested that this possibility accounts for the formation of nouns and adjectives from particle verbs. The fact that particle verbs in Dutch VR-contexts may both be split and move as one word supports the claim that both options do in fact exist. In this section I want to address the question of which contexts restrict the availability of the syntactic and pre-syntactic option.

Notice that up to this point, the theory only explains *why* the particle verb can be split in V-2. But thus far no explanation has been given for why the particle verb *must* be split. Why is the pre-syntactic formation of the particle verb definitely excluded in V-2?

(64) a. *Peter trinkt sein Bier aus*
Peter drinks his beer Prt (up)
b. **Peter austrinkt sein Bier*

Before we can search for an explanation for the ungrammaticality of (64b), we have to clarify which further syntactic contexts exclude the pre-syntactic option of deriving the particle verb. What about particle verbs in sentence-final position?

(65) a. *weil Peter die Tür abschließt*
because Peter the door Prt (up)-locks

It is not immediately obvious which structural representation must be assumed for (65). One may suggest that the adjacency of the particle and the verb follows from both elements forming a pre-syntactically derived complex head at MS. According to this suggestion, (65) must be represented as in (66a). However, in Zeller (1997) I have argued against the idea that in sentences like (65), the particle and the verb form a complex head, showing that a structural account like (66b) is also compatible with the data:

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[19] This is not to deny that there are true phrasal idiomatic constructions that include particle verbs. For example, the productive particle construction in (i) is only possible with the verb *kommen*, "come", in combination with the particle *an* + past participle of a verb of motion:
(i) *Peter kommt angeschwommen/angelaufen/angewankt* etc.
"Peter approaches by swimming/walking/staggering"
The VP in (i) is probably best analyzed as a "constructional idiom" (cf. Jackendoff's (1990, 1997a) account of the *way*- and the "time-*away*"-construction).

(66) a. $[_{C'}$ weil $[_{IP}$ Peter $[_{I'}$ $[_{VP}$ die Tür t_i [abschließt]$_i$]]]]
b. $[_{C'}$ weil $[_{IP}$ Peter $[_{I'}$ $[_{VP}$ die Tür $[_{PP}$ ab] t_i] [schließt]$_i$]]]

We cannot tell by the phonological form of (65) if the verb has moved to Infl, stranding the particle inside the PP, or if the whole particle verb has moved to Infl. Since the theory adopted in this paper allows for the syntactic as well as the pre-syntactic formation of heads, we may take this as a welcome result and assume that (65) is syntactically ambiguous. Both (66a) and (66b) may be possible representations for (65); in (66a), the verb is derived morphologically and moves as a whole; in (66b), the particle heads a full PP and incorporates at LF. In contrast to VR, where these two options create two different PFs, this structural difference between (66a) and (66b) is not phonologically visible.

Although this solution looks attractive at first sight, it is not unproblematic. There is evidence from Dutch that the pre-syntactic option (66a) is excluded for sentences like (65). Neeleman (1994, 294) notes that non-separable complex verbs in Dutch are inflected regularly, whereas a particle verb always adopts the verb's irregular inflection (cf. also Paulissen & Zonnefeld 1988; Booij 1989; Bennis 1992):

(67)	a.	*zuigen*	*zoog*	*gezogen*
		suck	sucked	sucked
	b.	*stofzuigen*	*stofzuigde*	*gestofzuigd*
		dust-suck	dust-sucked	dust-sucked
	c.	*uitzuigen*	*uitzoog*	*uitgezogen*
		out-suck	out-sucked	out-sucked

Recall that in DM, the syntactic context of terminal nodes plays an important role for the insertion of phonological features. At MS, the verb and the inflectional nodes Tns and Agr are part of the same head. The insertion of phonological features into the Agr- and Tns-nodes therefore depends on the choice of the verb. In (67a), the simplex verb *zuigen* triggers insertion of irregular inflectional feature bundles. In (67b), we have the complex prefix verb *stofzuigen* at MS; therefore, regular inflectional Tns- and Agr-morphemes are inserted. The difference between (67b) and (67c) now follows straightforwardly if (66b) is the correct representation for particle verbs in sentence final position. According to this structure, the context for insertion of inflectional morphemes in (67c) is determined by the same (simplex) verb as in (67a), since the particle does not form a complex head with the verb at MS. Consequently, the particle verb in (67c) is inflected irregularly. However, if pre-syntactic word formation was a second possibility to derive sentences like (65), we would expect that the inflection of particle verbs may also follow the regular pattern that is found with other complex verbs.

I therefore assume that the pre-syntactic option is also excluded when the verb moves to Infl. At the same time, the syntactic alternative is excluded whenever particle verbs undergo processes of derivational morphology (recall that a particle verb is never separable if it appears in a derived word). Finally, both options are available when the verb undergoes VR. (68) sums up these observations (with respect to further morphological processes, I will restrict myself to derived nominals):

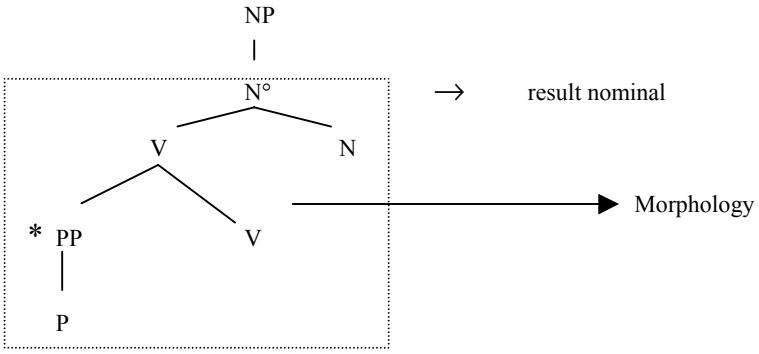
(68)	a.	verb moves to Infl:	√post syntactic formation of V°
			*pre-syntactic formation of V°
	b.	verb moves to Comp:	√post syntactic formation of V°
			*pre-syntactic formation of V°
	c.	verb moves in VR:	√post syntactic formation of V°
			√pre-syntactic formation of V°

d.	particle verb inside a result nominal:	*post syntactic formation of V° √pre-syntactic formation of V°
e.	particle verb inside a process nominal:	*post syntactic formation of V° √pre-syntactic formation of V°

(68) shows that the pre-syntactic option is excluded whenever the verb moves to a functional category, whereas the syntactic alternative is ruled out when the particle verb undergoes further word formation. In the remainder of this paper I would like briefly to point to some proposals and possible solutions for these restrictions on word formation.

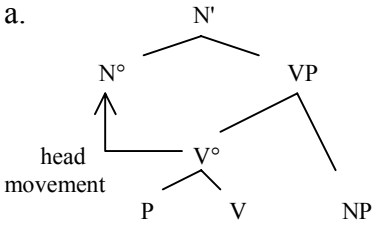
First, consider (68d) and (68e). I have argued above that morphological operations do not apply to non-minimal projections. This immediately explains why the pre-syntactic formation of a nominal automatically rules out the possibility to derive the included particle verb syntactically. If the verb and the derivational affix are combined in morphology, the verb must also be a morphological element and therefore cannot include a phrase:

(69)

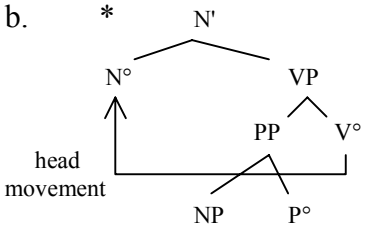


In contrast, we know that the the structural representation of a process nominal includes a VP, which accounts for the eventive properties of this noun. Why is it not possible to derive the particle verb inside this VP syntactically? Why is only (70a) a possible syntax for a process nominal?

(70) a.



b. *



Recall that the verbal part of a process nominal incorporates into N in overt syntax. The particle, however, only incoporates into the verb at LF. If (70b) was a possible derivation, the complex nominal head that is interpreted phonologically at MS would not include the particle. The particle would not form a morphological object together with the complex nominal; it would not even precede the derived nominal at PF. But this would mean that a derived result nominal and a process nominal were different elements. The only way to derive syntactically a complex nominal head position that is identical to the one that represents a result nominal at MS is to form the particle verb pre-syntactically, as in (70a).

Let me now turn to (68a) and (68b). Why is the pre-syntactic option excluded here? A possible solution may be found in the following condition, proposed in Neeleman & Weerman (1993) and Neeleman (1994):

(71) *Complexity Constraint*
The head of an X° may not be complex

According to Neeleman and Weerman, the moved V becomes the head of Comp and as a result, must not be complex. (71) therefore prevents the whole particle verb from moving to Comp as a V°. If we assume that a verb which moves to a functional category *always* becomes the head of this category, it follows that the pre-syntactic derivation of the particle verb violates the Complexity Constraint whenever the verb moves to Infl or Comp. There is only one way to allow the verb in a verb-particle construction to move to a functional head position: the particle verb must be derived *after* overt verb movement has taken place, i.e. at LF. The particle hence has to project, and the PP is represented as a complement of V°. Now the simplex verb can move to Infl and Comp without violating (71). Since the head of a complex verb derived by VR is always the matrix verb, the Complexity Constraint does not rule out the possibility that a verb that undergoes VR may be complex. Consequently, VR allows both the syntactic and the pre-syntactic option of word formation.

However, (71) cannot be maintained in the theory that I argued for in this paper. Apart from empirical problems of the Complexity Constraint that I do not want to discuss here (but see Stiebels & Wunderlich (1994) for some discussion), it is clear that the Complexity Constraint runs counter to the core idea behind the principle of Lexical Integrity. According to this principle, syntax can never look inside complex heads. It is therefore impossible to argue that movement of X°-elements is restricted by the morphological structure of these heads. X° is a syntactic atom; everything below X° is of no relevance for syntactic rules that trigger verb movement to Comp or Infl.

Therefore, instead of adopting a solution along the lines suggested by Neeleman and Weerman, I rather like to end this section with a descriptive generalization that becomes evident from (68). Notice that the pre-syntactic derivation of a particle verb implies that the particle and the verb are represented inside V° at MS, whereas the syntactic derivation finds both elements in different head positions at this level. If we look at those examples in (68) again that permit the pre-syntactic derivation of the particle verb, we find that in these cases, the particle verb is always *located inside a non-functional head position* of category N, A (nominal and adjectival word formation), or V (the verb cluster derived by VR). Whenever a "pure" particle verb is associated with functional heads at MS, the derivation crashes. It seems that morphological rules only allow a particle verb in the context of N, A, or V at MS, but never in the context of a functional category like Tns or Agr. It is hence very likely that the answer to the question of why particle verbs are excluded from Comp and Infl may be found by further investigating the properties of functional structure and derivational morphology. However, I have to leave this a task for future research.

6. Conclusion

The theory of late insertion that I outlined and used in this paper is based on the view that morphology is distributed among syntax, semantics, and phonology. Representations at the syntactic interface levels MS and LF are interpreted by phonological and semantic features of lexical items and then accessed by correspondence rules of the interfaces with the phonological/semantic component. The rules of insertion that apply to terminal elements of complex heads are morphological operations, since the inherent structure of X° is the domain of morphology. However, syntax can interact with morphology, because complex X°-categories are not only derived prior to syntactic operations, but may also be formed by syntactic head movement. This is how syntax contributes to word formation.

This theory provided the framework for my analysis of the properties of particle verbs.

Their syntactic separability follows from the option to project the particle as a PP in syntax. Abstract incorporation derives a complex V° at LF whose terminal elements may be associated with the semantics of the particle and the verb. The complex verbal head may also serve as the target of insertion of idiosyncratic semantic features ("semantic suppletion") to derive idiomatic particle verbs. Because the head that corresponds to the particle verb at LF can also be formed pre-syntactically, the wordlike properties of the particle verb also follow from this theory.

Since it is possible to account for the problematic properties of particle verbs within a theory of late insertion without having to give up the view that the rules of morphology and syntax operate in different domains of grammar, I conclude that this theory is superior to those that are based on the traditional concept of insertion. According to the latter view, the output of morphology is the input to syntax. However, in this paper I have argued that this constitutes a misconception, which we may find to account for many of the problems of morphological theory. The arguments developed in this paper therefore provide good reason for further elaborating the theory of late insertion.

7. References

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