

Bracketing paradoxes and particle verbs: a late adjunction analysis

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It is well known that words like *unhappier* give rise to bracketing paradoxes (Pesetsky 1979, 1985; Kiparsky 1982; Sproat 1992; Lieber 1992; Hoeksema 1987, among many others): their phonological structure seems to be in conflict with their semantics. This paper will propose that the solution to this puzzle rests on the following generalization: all morphological bracketing paradoxes must involve a morphological adjunct. It is argued here that all morphological bracketing paradoxes involve one morpheme whose contribution to the word involves no projection of features.

1. Introduction

This paper concerns itself with two widely written about topics in the linguistic literature; the bracketing paradox, and the particle verb. These topics are related by the fact that there are two competing yet seemingly simultaneously necessary structures involved in the proper analysis of each.

Here let us briefly look at these necessary representations, leaving in-depth discussion for the remainder of this work. First, consider the bracketing paradox. A typical bracketing paradox can be exemplified by the word *unhappier*.

- (1) a. [un [happier]]
b. [[unhappy] er]

In (1a) we have the morpho-phonologically necessary structural representation of the word. It is well known that the comparative morpheme *-er* can only surface if the stem it attaches to is no larger than two syllables.¹

- (2) a. *beautifuler
b. *intelligenter

¹ More in-depth restrictions (e.g. the phonological properties of the second syllable) are not relevant here.

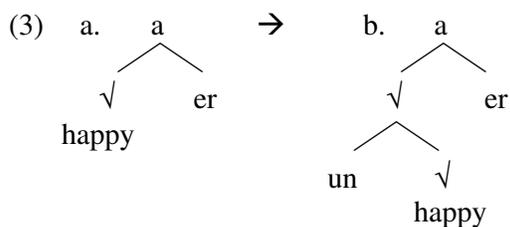
As the stem *unhappy* is three syllables long, it therefore cannot be the base to which *-er* has attached. Attachment to *happy*, however, obeys the robust phonological restriction on *-er* affixation.

In (1b) we have the semantically motivated structural representation. The meaning of *unhappier* is ‘more unhappy’. The reading ‘not more happy’ — predicted by a step-by-step concatenation of the meaning of each morpheme in (1a) — is not a possible parse for this word.

The confound here is that each structure in (1) is required to explain one aspect of the construction of *unhappier*, yet each structure is blatantly at odds with the other, leading to the paradox.

This paper expands upon the proposal put forth in Nissenbaum (2000), namely that bracketing paradoxes dissolve under the assumption that certain morphemes may be late adjoined. The extension of the theory of late adjunction (Lebeaux 1988; Nissenbaum 2000; Fox & Nissenbaum 1999; Stepanov 2001) to X^0 elements is argued here to be inevitable within a realizational theory of morphology, such as Distributed Morphology (Marantz 1997, 2001; Halle & Marantz 1993, 1994, among others). This analysis invokes general restrictions on the ordering of the merger of syntactic elements (following Stepanov 2001) to account for the restrictions on and properties of bracketing paradoxes, which I claim favours this analysis over those that need extra machinery such as QR (Pesetsky 1985) or autosegmental structure (Falk 1991) to account for the same data.²

Specifically, I argue that the solution to bracketing paradoxes is as follows. The morpheme *un-* is a morphological adjunct. This adjunct status causes *un-* to be merged late, and allows its merger to a non-root node, as in (3b). Prior to the merger of the adjunct, we have the structure in (3a). Following Marvin (2002), the structure in (3a) constitutes a phase (c.f. Chomsky 1999), and is therefore submitted to the PF component, where the phonological restrictions on *-er* affixation are computed and met. Subsequent merger of *un-* inside this structure cannot alter the already established phonological relationship between the root and the comparative. Therefore neither the phonological nor the semantic restrictions on *unhappier* are violated in the course of its derivation.



This analysis rests on the proposal that morphological elements, such as *un-*, are merged by adjunction and therefore do not need to obey the cycle (Lebeaux 1998; Chomsky 1993; Stepanov 2001).³ In the remainder of this paper I will argue that this is indeed the case, and that bracketing paradoxes can occur iff a structure involves a morphological adjunct.

We will also see how the above analysis solves the bracketing paradox invoked by nominalized particle verbs such as *herumgerenne* ‘acts of aimless running’, as seen in Müller

² Unfortunately, due to space restrictions, other analyses of bracketing paradoxes will not be discussed herein. I refer the reader to the literature cited.

³ See also Bacharach & Wagner (2005) for an analysis of Brazilian Portuguese diminutives that relies on the notion of morphological adjunction.

(2003). Turning then to particle verbs in general, we will then see how this late adjunction analysis allows for a complex X^0 analysis of particle verbs, while avoiding the question of how one element of a complex head may excorporate.

Take the German *einflecht* ‘insert’, constructed of the verb *flecht* ‘braid’, and the particle *ein* ‘in’. Here the idiomatic semantics of the particle verb seem to indicate that it should be treated as a word, as does the fact (under theories assuming a separate pre-syntactic morphological component) that it can be subject to further morphological processes.

- (4) die **Einflechtung** des Buchstaben
 the in.braid.ing of.the letter
 ‘the insertion of the letter’

This word-like behaviour comes into question though, in cases (which are common) where the verb and the particle are separated syntactically.

- (5) John **flechtet** den Buchstaben **ein**
 John braided the letter in
 ‘John inserted the letter’

Here we come up against the idea of Lexical Integrity (Di Sciullo & Williams 1987), which bans excorporation. If the particle and verb are a lexical item, or X^0 , then they should not be able to separate in this fashion, and must therefore be a head (the verb) and a complement XP (the particle and any object present).

The above considerations lead us to a similar paradox involving particle verbs to the one seen above with *unhappier*. Examples such as (4) lead us to an X^0 structural representation of the particle verb, while examples such as (5) lead us to an XP analysis. As these two structural representations appear to be necessary, we are again dealt a structural paradox. Both the X^0 and the XP analyses of particle verbs seem necessary, but are inherently contradictory.

What I propose here is that both of the above paradoxes (the typical bracketing paradoxes, as well as the structural paradox involved with particle verbs) are a function of the syntactic derivational system. Once the method of constructing these words has been examined closely, the paradoxes disappear. The conclusions to be reached are

- ▶ that all Structural Paradoxes contain a late adjunct,
- ▶ and that no Structural Paradox can exist without a late adjunct.

Crucial to the analysis put forth here are the following assumptions. First, words are constructed in the syntax, not in a pre-syntactic morphological component (DM). Second, Late Adjunction is a robust syntactic operation (Lebeaux 1988; Stepanov 2001). Third, words, like phrases, are constructed in phases (Marantz 2001; Marvin 2002). Fourth, morphemes may only be late adjoined at an edge. This last assumption is Nissenbaum’s (2000) Linear Edge Condition, applied at the word level, and gives us the impossibility of constructions like *happyuner*, as the late adjunct may not intervene between the morphemes in the previously spelt-out *happier*. The above allow us to postulate that morphemes can adjoin late to an edge at the X^0 level, in the same way that phrases can adjoin late at the XP level.

2. *Distributed Morphology*

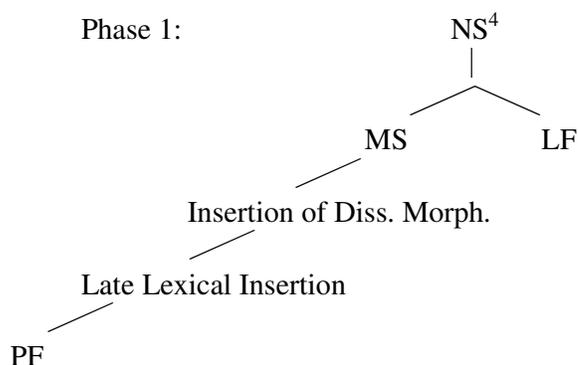
Here I adopt the theory of morphology put forth initially in Halle & Marantz (1994) and Marantz (1997), namely Distributed Morphology (DM). DM holds that the terminal elements that enter into the syntax are the same elements that combine to form words. These elements may combine through operations in the syntax proper, or through lowering or merger in the syntax-phonology interface (Morphological Structure). Crucially for the proposals to follow in this work, vocabulary items within DM are not ordered linearly, nor specified with phonological features until MS/PF. This theory allows for both the intuition that morphemes are syntactic elements (6), and also for the fact that certain morphophonological phenomena (i.e. suppletion) may mask the one to one relationship between a morpheme and a syntactic terminal node (7).

(6) The king of England's hat.

(7) He went to the store.

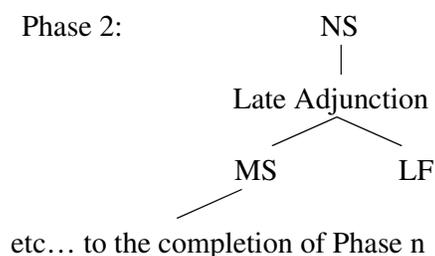
Let me refine here my assumptions about the DM model, and differentiate the notions of late lexical insertion, late merger, and the phenomenon of late adjunction proposed in this work. As mentioned above, lexical items within DM have no phonological form before they are realized at the PF interface. This late lexical insertion of phonological material to syntactic nodes is crucial to the current proposal, but is distinct from the phenomenon of late adjunction. Also, the notion that terminal elements may be inserted in the morphological component itself (post-syntactically) is a different notion from that of late adjunction of morphemes within the syntax proper. These Dissociated Morphemes, elements like Case, Agreement, Number and Gender may not be present in the narrow syntax, but are rather inserted at MS to '...meet universal and/or language-specific well-formedness conditions.' (H&M 1993:115). These elements may be thought of as being inserted 'late' into the syntactic structure, but are not the elements to be discussed in this paper. What will be examined in this paper is the phenomenon of adjoining elements counter-cyclically in the narrow syntactic component of the derivational system. These late adjuncts differ also in that they are not required by the system, they are not grammatical reflexes of a particular structural configuration, and the derivation does not crash should they fail to be inserted. Assuming that the syntax is computed in phases (to be discussed below in section 3.3), the timing of these three distinct 'late' operations can be schematized as follows.

- (8) A timeline for insertion of Dissociated Morphemes, Late Lexical Insertion, and Late Adjunction



In contrast to the two ‘late’ operations seen in (8), the late adjunction of morphological objects within the current proposal occurs in the NS, on a following phase. These late adjoined morphemes are then subject themselves to late lexical insertion at MS/PF.

- (9) Phase 2:



Here late adjunction, either XP or X^0 , is an operation whereby a syntactic object is merged into the phrase marker constructed at a previous phase. This adjunction is final in the ordering of events in the narrow syntax, and must be to a non-root node, following the argumentation in Stepanov (2001).

2.1. Late adjunction

Syntactic, as opposed to the above morphological, Late Adjunction was first proposed in Lebeaux (1988) to account for the adjunct/argument asymmetries in Condition C effects, seen in (10) and (11).

- (10) a. *She_i wants the picture of Seonaid_i.
b. *Which picture of Seonaid_i does she_i want?
- (11) a. *She_i wants the picture that Seonaid_i likes.
b. √Which picture that Seonaid_i likes does she_i want?

The (a) examples above show typical Condition C violations, where the R-expression *Seonaid* is governed by the pronoun *she*, leading to ungrammaticality. In (10b) the movement of

⁴ NS=narrow syntax, MS=morphological structure.

Seonaid to a position not c-commanded by the pronoun does not save the construction, however in (11b) this movement leads to grammaticality. This is argued to be due to the fact that the argument of *Seonaid*, but not the adjunct *that Seonaid likes*, must be merged with *picture* before movement. The adjunct is merged after movement, and therefore *Seonaid* in (11b, see the derivation in 12) is never c-commanded by *she*. In (11a) the adjunct is also merged late, but to a position c-commanded by the pronoun, causing ungrammaticality.

- (12) Initial Merge: She does want which picture. →
 a. [_{CP}[which picture]_j [_{does}_i [_{IP}she t_i want t_j]]]
 b. [_{CP}[which picture [_{CP}that Seonaid likes]]_j [_{does}_i [_{IP}she t_i want t_j]]]

2.2. Lexical phases and linear edges

Another proposal in the DM literature is that morphemes are divided into root (lacking syntactic features) and functional (defined by semantico-syntactic features) morphemes. Roots are those morphemes traditionally thought of as exemplifying major lexical categories such as noun, verb and adjective – e.g. *cat*, *dog*, *run*, *jump*, *pretty*, *nice*. These morphemes within the DM theory have no category features, but rather their category is defined distributionally, by functional morphemes. A nominalizing head ‘n’ will be deterministically spelled out (a property inherent to functional morphemes) based on the content of its complement, where it may, for example, surface as *tion* in the environment of *destroy*, giving *destruction*, but as *cy* in the environment of *constant*, giving us *constancy*. Category defining heads such as these have been proposed in Marvin (2002) to be phase heads, in the same manner that the v(oice) and Complementizer heads are in Chomsky (1999).

What this proposal gives an explanation for is the fact that phonological and semantic opacity at the sub-word level are contained in the same domains. Consider (13).

- (13) a. [twInkəllɪŋ] ‘act of twinkling’
 b. [twInklɪŋ] ‘a short moment’

Marvin contends that the difference in sound/meaning between the above pair is caused by the difference in the number of phase heads/category defining morphemes present in each. At each phase, the complement of the phase head is sent to PF and LF, triggering interpretation and phonology in the following manner.

- (14) a. [_{vP}[_v∅ [_vtwinkl]]] → PF schwa insertion **twInkəl**
 LF act of twinkling
 b. [_{nP}[_Ning] [_{vP}[_v∅ [_vtwinkl]]]] → schwa insertion/semantics of vP cannot
 be influenced at this phase
twInkəllɪŋ
- (15) [_{nP} [_Ning] [_vtwinkl]] → PF syllabification of *twinkl* includes *ing*.
 No schwa insertion.
twInklɪŋ (cf. Marvin 2002:38)

In (14a) the root *twinkl* is merged with the little v head, here a phase head. This causes *twinkl* to be sent to PF and LF, undergoing phonological operations (schwa insertion) and semantic

evaluation. In the following phase (14b), the little *n* head is merged and again the complement is sent to PF and LF. Further operations at the interface are not able to alter the previous output, and therefore the final result is a phonological form with schwa insertion intact, and a semantics based on the interpretation computed at the first phase, *an act of twinkling*. In (15) Marvin proposes that there is only one phase head, little *n*, and therefore only one cycle at the PF/LF interfaces. Here *ing* and *twinkl* are spelled out and interpreted together.⁵ The environment for schwa insertion is bled, and the idiomatic reading, *a short moment*, is obtained.

This proposal is important here in conjunction with the aforementioned Linear Edge Condition put forth in Nissenbaum (2000). Nissenbaum proposes that anti-cyclic merger is only possible at an edge.

- (16) Linear Edge Condition (LEC)
For any syntactic object *SO* accessed in an array, merge of new material is possible inside *SO* only at the linear edge. (Nissenbaum 2000: 201)

The status of this edge will be discussed further in section 6.3, but we can see here how the theory that words are created in phases forces the postulation of syntactically motivated intermediate phonological edges within words. It is these edges that will be important for the proper functioning of Late Adjunction at the X^0 level.

2.3. Summing the assumptions

Now, putting the above proposals together, I argue that we are led to expect late adjunction at the X^0 level. Assuming, following DM, that the atoms of syntax are also the atoms of morphology, any operation of phrasal syntax is in principle going to interact with word-formation, as the narrow syntax creates the input to MS.

Second, Late Adjunction is an operation active in the narrow syntactic component of the derivational system, and is therefore not expected to differentiate between XP and X^0 adjunction. Third, words are derived in a manner that creates X^0 internal PF edges. Assuming late or anti-cyclic adjunction to be constrained by the LEC, positions therefore exist within words to which Late Adjunction is possible. In the following section I will outline the diagnostics for a morphological adjunct, and in section 4 will argue that morphological late adjunction is indeed operative at the X^0 level, and can explain the apparent paradoxes discussed in the introduction.

3. What is a morphological (X^0) adjunct?

Before appealing to late adjunction to account for the paradoxes above, I must first define what it means to be a morphological adjunct. Here a morphological adjunct is any X^0 that is (1) not selected for and (2) whose contribution to the word it adjoins to involves no projection

⁵ Note that Marvin's assumptions allow the head and complement to spell out together, unlike the proposals in Chomsky (1999) and Nissenbaum (2000). The exact mechanisms involved here will not be discussed in detail, but it will be assumed here that heads in lexical phases have a closer phonological relationship to their complements than in strong phases (*v(oice)P*, *CP*). The exact nature of this closeness will be the subject of further research.

of category features. Taking the case of the morpheme *un-* in *unhappy*, it can be argued that its contribution to the word as a whole is purely semantic and phonological, but not syntactic. It does not percolate any features to the root node upon affixation (17), but as with XP adjunction (18), the root node is an extension of the element adjoined to.

(17) [_Aun [_Ahappy]]

(18) [_{VP}eat cake [_{VP}in the hallway]]

Examples of morphological adjuncts in English can be seen in (19). Examples of morphemes that cannot be adjuncts are given in (20).

(19) **un**happy, **re**apply, **mis**align, **up** chuck, **nuclear** physicist.....

(20) **en**rage, **destruction**, **refusal**, **happier**, **man** eater

Each of the bolded X^0 s in (19) causes an iteration of the root node adjoined to, while in (20) each bolded morpheme either changes the category of the word -projecting its own label- or is selected for by the head it adjoins to, as is the case for *man* in *man eater*.

This distinction is proposed here to give us a cyclic vs. acyclic merger divide. Following Lebeaux (1988), I propose that these adjuncts have the ability to be merged late. Stepanov (2001) argues further that adjuncts must be merged late, although he also restricts discussion to phrasal adjuncts, and this extension will be adopted here and applied to X^0 adjuncts, giving us the following.

- ▶ Morphemes that project are merged cyclically
- ▶ Morphemes that do not project are merged acyclically

3.1. What is not a morphological adjunct?

The morpheme *in-* is one that, as it is being argued here that *un-* is an adjunct, one might also expect to be in the class of morphological adjuncts. *in-* appears to perform the same semantic function as *un-*, where the adjective *X* merged with acquires the interpretation *not X* (possible vs. impossible). It also appears to not project category features, merging with adjectives to produce adjectives.

The comparison of *-in* with *un-* however appears to break down in the realm of comparatives, the environment which is important here for demonstrating the late adjunct status of *un-*. *in-* merges only with Latinate roots, which generally do not take the synthetic comparative morpheme, even when they meet the phonological requirements (more inept vs. *inepter). In the analytic comparative, *more* always transparently scopes over the negative morpheme, and there is therefore no bracketing paradox. For some speakers however, there is one example that can illustrate here the difference in adjunct status between *in-* and *un-*.⁶

The Latinate adjective *polite* may take the synthetic comparative, giving us *politer*. As this is a two syllable adjective, it should behave on par with the *happier~unhappier* example, should *in-* be a morphological adjunct. Contrary to expectations, if we are assuming *in-* to behave on par with *un-*, **impoliter* is not grammatical. I contend here that this is due to the

⁶ Thank you to an anonymous reviewer for bringing the importance of the following example to my attention.

fact that *in-* does project category features, and therefore must be merged cyclically, necessarily bleeding the environment for insertion of the *-er* allomorph of the comparative.⁷ Additional evidence for this conclusion comes from the phonological and distributional nature of *in-*. First, it is phonologically ‘closer’ to the root than is *un-*. The nasal in (21a) assimilates to the following consonant, while in (21b) it does not.

- (21) a. intolerable vs. impolite
b. untrue vs. unpopular

Following Marvin’s above analysis, this difference is argued here to be due to the fact that *in-* but not *un-* is spelled out in the same phase as its sister, and is therefore in the same phonological domain.

Also, *in-*, but not *un-*, is restricted to adjectival environments. The Latinate bound adjective *ept* may be prefixed with *in-*, giving *inept*, but the Latinate verb/noun *aid* cannot, **inaid*. *un-*, conversely, may affix to adjectives — *unhappy*, *unattractive* — or verbs — *untie*, *undo*. This difference follows naturally if we assume that *in-* projects an adjectival label, while *un-* does not.

- (22) a. [_A in[_√polite]]
b. [_A un [_A ∅ [_√happy]]]

The above discussion illustrates the distinction between a true morphological adjunct and a morpheme that only appears to not project, because the category it projects happens to be the same as the category of its base. It is only a member of the class of true morphological adjuncts that may cause the appearance of a structural paradox in the discussion to follow.

4. All bracketing paradoxes contain a morphological adjunct

This section demonstrates how a proposal that incorporates late morphological adjunction causes bracketing paradoxes to dissolve. Three canonical bracketing paradoxes in the literature are shown to be caused by the presence of an X^0 adjunct.

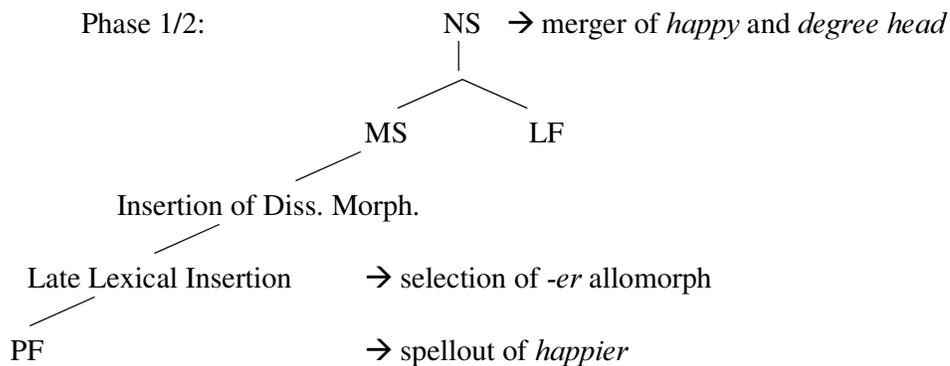
- (23) a. UNHAPPIER contains UN
b. UNGRAMMATICALITY contains UN
c. NUCLEAR PHYSICIST contains NUCLEAR

4.1. How an unhappier derivation can be happy

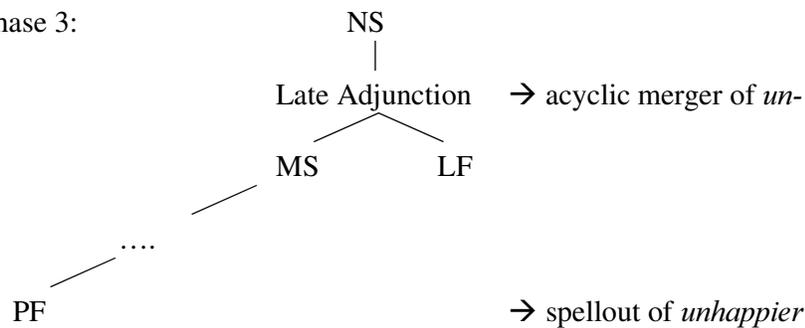
As claimed above, the morpheme *un-* is a morphological adjunct. It is therefore adjoined acyclically. This acyclic adjunction allows for (A) the phonological restrictions of the synthetic comparative to be met at the point of vocabulary insertion, and (B) the correct relative semantic scope of the negative and comparative morphemes.

⁷ For arguments leading to the conclusion that *-er* and *more* are indeed allomorphs, see Embick and Noyer (2001).

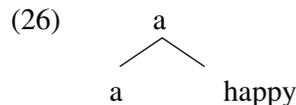
- (24) A timeline for insertion of
- un*
-
- ⁸



- (25) Phase 3:



In the first phase involved in the derivation of *unhappier* we have the root *happy* and the category defining phase head *a*.



Here the complement of *a* is sent to MS and PF, giving us the linear output [happy].

In the second phase, we have the degree head, and a phase head *Z*, the exact characterization of which is not important to the discussion here.⁹ A possible phase head here is the *v*(oice) head, introducing the subject under comparison.

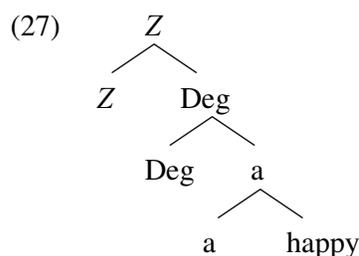
⁸ The LF component of this derivation is not discussed herein, due to space limitations.

⁹ The phase head here may in fact be the degree head. The only crucial point here is that the complement of the degree head be spelt out in a previous phase. If the mechanics of lexical insertion allow for the phonological shape of the complement to be 'seen' by the degree head before its lexical insertion occurs, then the first two steps here may be conflated, making the first stage in the derivation as in (i). This structure assumes that the degree head is a category defining head.

(i)

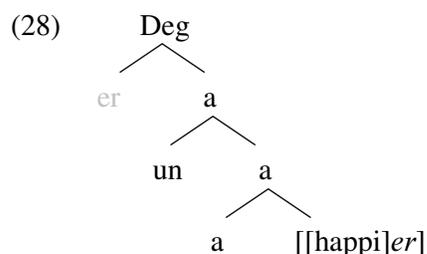
a/Deg

happy er



Here, at phase Z, the degree head undergoes morphological merger (following Embick and Noyer 2001), as its complement is of the correct phonological shape for vocabulary insertion of the synthetic comparative. The PF output is [[happi]er], where the inner bracketing is the output of the phase in (26). Note that this merger is purely morpho-phonological and involves no syntactic lowering (see 28). This is crucial for the correct LF interpretation of the construction. At LF, *-er* remains in a position that scopes over *un-*.

In the final relevant phase we have the acyclic morpheme *un-*. As *un-* does not project, it is not restricted to merger at the root node of the tree.¹⁰



(28) shows that *un-* has merged to the syntactic node dominating *happy*. The base position of the degree head remains in a position that scopes over the negative morpheme, while it is simultaneously phonologically interior to *un-*. The PF output at this phase is [un[[happi]er]], while the syntactic bracketing is the LF appropriate [[un[happi]]er]. The apparent bracketing paradox is therefore the result of the derivational nature of the PF system in conjunction with the late adjunction of *un-*.

4.2. How ungrammaticality is grammatical

Ungrammaticality is another widely cited bracketing paradox. The argument for its paradoxical nature is theory internal to Lexical Phonology. The theory of Lexical Phonology contends that the cyclic nature of individual affixes is dependent on their membership in a certain level of an affix hierarchy. Therefore, according to LP, cyclicity is not inherent in the computational system, but rather is a reflex of the (sequential) level of word formation in which the affix is merged.

The *ungrammaticality* paradox stems from the proposal that the affix *-ity*, as it affects the phonology if its complement (grammátical → grammaticáity), is a level 1 affix, and that *un-*, as it does not (grammátical → ungrammátical), is a level 2 affix. Lexical Phonology holds

¹⁰ The question of whether *un-* must merge on the immediately following phase, or may merge at any subsequent phase is not addressed here. This is an issue that requires further research.

that level 2 affixes can never be attached to a base before level 1 affixes. This theory gives the following structure as necessary for *ungrammaticality*.

(29) [_N un [_N [_A grammatical] ity]]

This structure, however, cannot be the correct one. *Un-* is generally assumed to not attach to common nouns, and the semantics, like with *unhappier*, is one where the suffix scopes over the prefix.

In Halle and Vergnaud (1987), and again in Light (1993), it is noted that *ungrammaticality* can have a derivation where both the semantic and phonological requirements are satisfied by the same structure:

(30) [[[un]grammatical] ity]

H&V introduce the proposal that it is not an affix's membership in a level of lexical derivation that determines whether cyclic phonological rules will apply on its merger. It is proposed that this cyclicity (or triggering of phonological rules) is inherent to the individual affixes themselves. Assuming that *un-* is not cyclic, and *-ity* is, H&V only have to assume that it is linear and not structural proximity that allows *-ity* to affect the stress of the root. Therefore *un-* may merge prior to *-ity*, not triggering stress shift on the root. Subsequent merger of *-ity* will then give us the correct scope configuration and obey all of the selectional restrictions of the affixes involved, while the affix is still in a configuration (linearly adjacent) where it may affect the phonology of the base it attaches to. Therefore under H&V's proposal, *ungrammaticality* does not give positive evidence of late adjunction, or of a bracketing paradox, for that matter.

Though this is a possible derivation, this appealing to linear order would not solve the paradox of *unhappier*. *-er* affixation is dependant on the phonological shape of the base it attaches to, and therefore if *un-* were to merge before the degree head the base would be three syllables long, and the *more* allomorph would be lexically inserted, giving us *more unhappy*. If H&V's analysis were to be extended we would expect *unhappier* to be ungrammatical.

I propose, in order to unify these two derivations, that it is instead the late adjunct status of *un-* that allows both the phonological proximity of *grammatical* and *-ity*, the correct semantic scope.

(31) a. [_N [_A grammatical] ity]
 b. [_N [_Aun [_A grammatical] ity]]

In (31a) we see the input to the first phase, where *-ity* can influence the spellout of *grammatical*. In (31b), *un-* tucks in under the nominalizer, giving a structure that does not violate the selectional restrictions of *un-*, or the attested meaning. A unified analysis of both the *ungrammaticality* and *unhappier* paradoxes is therefore possible.

4.3. How to get a nuclear physicist out of a nutshell

The third and final well-known bracketing paradox in the literature to be discussed here is *nuclear physicist*. This paradox, like *ungrammaticality*, stems from the theoretical premise that morphemes need to be in a local relation to affect the phonology/allomorphy of their complement (Kiparsky 1982; Selkirk 1982; Bobaljik 2000, among others). Assuming

allomorphy is conditioned locally, the affix *-ist* must merge with the root *physics* before compounding occurs, allowing the [fɪzɪs] allomorph to surface. That this variant is not derived by a purely (post lexical) phonological rule, but is rather phonologically conditioned allomorphy, can be shown with the minimal pair in (32).

(32) a. kissed [kɪst] b. cyst [sɪst]

The morphophonologically motivated structure of *nuclear physicist* is therefore the following.

(33) [nuclear [[physic]ist]]

This structure, however, clashes with the semantically motivated bracketing in (34).

(34) [[nuclear [physic]]ist]

The bracketing in (34) gives us the appropriate reading of the compound, ‘the physics is nuclear, and the individual referred to studies/practices it’. The bracketing in (33) on the other hand, gives us the unattested reading ‘there is an individual who studies/practices physics, and this individual is nuclear’.

This paradox is solved on par with the above two, where nuclear-being an adjunct, as it does not project nor is it selected for-is adjoined late to a non-root node.

(35) a. [N [√ physic [N ist]]]
 b. [N [√ [nuclear] physic [N ist]]]

In the first phase (35a), including the root and the category-defining phase head *-ist*, the allomorphy of the root is determined locally at MS and is spelled out at PF. In the second phase the modifier adjoins anti-cyclically to *physics*, giving the correct input to the LF interface. Again, the phonological bracketing is at odds with the semantic bracketing, but this is due to the derivational nature of the word, and is not because the compound had two simultaneous and mutually exclusive structures.

This analysis predicts that bracketing paradoxes will never surface in the derivation of synthetic compounds. If the non-head of a compound is an argument of the head, it will not be able to be merged acyclically, making a suffix-prefix bracketing paradox in compounds like *truck driver* impossible.

5. Some previous analyses

It would be impractical to discuss all of the previous analyses of bracketing paradoxes in the literature here (Kiparsky 1982; Pesetsky 1985; Falk 1991; Spencer 1988; Stump 1991; Sproat 1992; Light 1991; to name a few). I will therefore discuss two representative proposals Pesetsky’s (1985) Quantifier Raising solution, and Falk’s (1991) autosegmental approach.

Pesetsky (1985), proposes that bracketing paradoxes of the type discussed above be solved by appealing to QR of the suffixes in question. Therefore a derivation of *unhappier* would be the following.

(36) a. [A un[A happi [A er]]]
 b. [A[A un[A happi [t_iA]]] er_i]

representations, this does not entail that there be no hierarchical morpho-syntactic structure. If there are no hierarchical structures, it is unclear how scope relations are defined. Falk does not discuss *unhappier*, yet it is not touched upon how the autosegmental structure espoused by Falk could restrict the semantics of this word to ‘more unhappy’, without allowing the unattested ‘not more happy’.

Furthermore, the proposal that words are constructed autosegmentally, while phrases are constructed hierarchically leaves open the question of how the possessive morpheme ‘s is concatenated with a phrase in (6). Falk’s analysis predicts the unattested *the king’s of England hat*.

Thirdly, he claims that an autosegmental morphology can account for the fact that ‘...sometimes the meaning of an affix is added to a part of the meaning of the word rather than the entire word.’(30). His structures, unlike the proposal put forth in the preceding sections, makes no prediction as to when these semantic anomalies will occur.

The proposal I espouse here is of the Pesetsky-class, syntax-saves type of account. It however, does not have to appeal to QR, or to a separate morphological computational domain. Although Morphological Late adjunction has not been discussed in the Late Adjunction literature, it is a cleaner extension than that of QR to non-quantificational elements, given that all bracketing paradoxes involve elements with adjunct-like properties, but not necessarily elements with quantificational properties. Given the generally assumed architecture of the faculty of language (Y or T model), along with the theory of Late Adjunction, it is unsurprising that there should be two conflicting structures for a word/phrase that contains an adjunct.

6. Extending the analysis: The particle verb

In this section I will endeavor to do two things. First, I will offer a solution to the particle verb bracketing paradox discussed in Müller (2003). I will show that late morphological adjunction, along with certain assumptions about the structure of nominalized verbs in German, dissolves the paradox seen below. In (40a) we see the surface phonological order of the morphemes involved, and in (40b) the necessary (under Müller’s assumptions) LF bracketing.

- (40) a. herum-ge-renn-e
b. [ge[herum-renn]e]

After showing how late adjunction solves the particle verb, as well as the *unhappier*-type paradoxes, I offer a novel solution to the long standing debate over whether particle verbs have the structure of a complex predicate, or of a small clause (section 6.3). Although these constructions are not bracketing paradoxes in the sense of *unhappier*, the analysis of particle verbs offered here falls out of the analysis of *herumgerenne* – an *unhappier*-type bracketing paradox involving a particle verb. Both the structural ambiguity of particle verbs, and the *herumgerenne* paradox are due to the late adjunction of particles.

It has been argued that some particle verbs must be phrasal, a term that I will use for all non- X^0 accounts (e.g. Wurmbrand 2000; Kratzer 1993; den Dikken 1992, 1993 among others). Kratzer, for example, notes that in German *un-* cannot affix to XP constituents, therefore all PVs that may be affixed with *un-* are considered to be X^0 s (41a), while those that do not accept *un-* affixation are XPs (41b).

- (41) a. das un-ab-geschickte Manuskript
 the un off sent manuscript
 ‘the manuscript that wasn't sent off’
 b.*das un-weg-geschickte Manuskript
 the un off sent manuscript
 ‘the manuscript that wasn't sent off’ (Haiden: syncom¹¹ case 117)

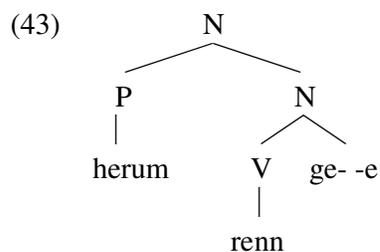
The delimitation problem (Ludeling 2001) surrounding particle verbs makes a cohesive analysis difficult, and I will therefore focus here on countering the argument that all particle verbs are phrasal, projecting a small clause. The most solid argument in the literature that this must be the case is due to the fact that the particle and verb may be separated in the syntax. Even those particles as in (41a), that accept *un*-affixation, will be separated from the verb under V2.

- (42) Ich sendete das Manuskript ab
 I sent the manuscript off
 ‘I mailed the manuscript’

This, it is argued, is a slam-dunk argument against the proposal that particle verbs are complex heads. To allow for this data, proponents of the complex X⁰ theory of particle verbs must in some way allow for excorporation of the verbal head. Here I will assume that excorporation is not possible (c.f. Baker 1988), yet will argue that morphological late adjunction gives us a possible X⁰ account of particle verbs which avoids the issue of excorporation entirely.

6.1. A run around the herumgerenne paradox

Müller (2003) notes that the nominalizing circumfix *ge-*–*e* gives rise to a bracketing paradox in combination with a particle verb. The nominalization morphophonologically excludes the particle (where the particle precedes *ge-*), while the semantics of the nominalization includes (scopes over) the particle. The meaning of this construction is ‘acts of aimless running’, not the phonologically implied ‘aimless acts of running’.



(Müller 2003: 3)

Müller contends that the structure above is predetermined (projected) by a verb that takes a particle, and that this semantic/structural encoding is what allows the interpretation given.

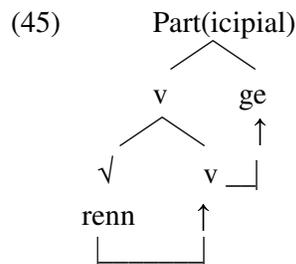
Here I contend that this construction only leads to a structural paradox if one assumes that *ge-*–*e* is a circumfix. It is only the assumption that *ge-*–*e* is a circumfix, projecting a single head, that forces the particle to be morphologically outside the nominalization. There is

¹¹ http://www.univ-lille3.fr/silex/equipe/haiden/particle/case_117_vepa.htm

reason to believe that this is not the case. The prefix *ge-* is not restricted to nominalized forms, but is rather a participial prefix, found also in the participial *ge-* *-t* and *ge-* *-n* constructions.

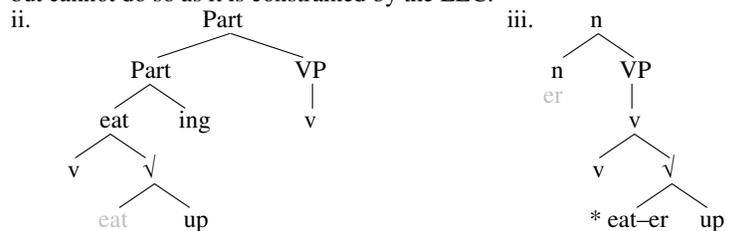
- (44) a. ich habe gebetet
 I have prayed
 'I have prayed'
- b. ich habe gesungen
 I have sung
 'I have sung'

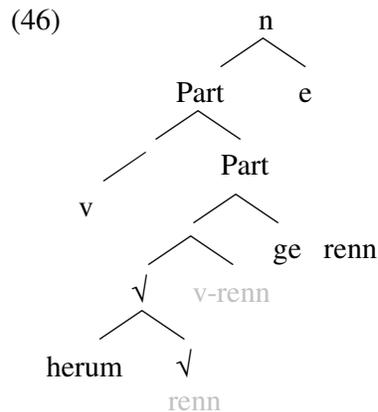
Suppose that the prefix *ge-* were to merge with the verb, independently of the *-e* nominalizer.



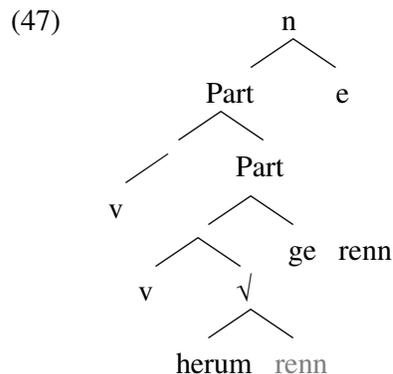
In (45) the verb and the participial head are merged. Now suppose that the participle has features that trigger raising of the verb.¹² Subsequently, the nominalizing head *-e* is merged. At this point, the particle may be merged to the initial merger position of the verb, allowing a structure where the nominalizing *-e* scopes over the entire participle verb.

¹² Assuming this to be correct allows an analysis of the difference in grammaticality between (ii) and (iii) below. If participial morphology triggers raising then the particle in (ii) can merge to the phonological edge, while allowing its selectional restrictions (attaches to verbs) to be met. In (iii) the syntactic edge and the phonological edge no longer match up. If we assume morphological lowering of the comparative (c.f. Embick & Noyer 2001) then the syntactic edge of 'eat' is the phonological edge of 'eater'. Further merger of 'up' confounds PF instantiation, as 'up' is in a syntactic configuration that requires spell-out at the right edge of 'eat', but cannot do so as it is constrained by the LEC.





I contend that the particle is not adjoined to the position the verb has raised to, but rather to the initial merger site of the verb. The reasoning for this is as follows. An adjunct, being the type of object that does not project, has no formal features. If we assume that formal features are targeted for movement then we must assume that adjuncts cannot be moved (Stepanov 2001). An adjunct must therefore be merged to the point in a structure where it will be interpreted. If we assume that head movement reconstructs, then for the verb and particle to be interpreted as a head-adjunct structure, the particle must be merged to the trace of verbal head movement, as depicted in (47).



In (47) we can see the PF position of the verb in black. The LF position of the verb is in grey rather than black. The paradox is therefore resolved. The nominalizing morpheme does scope over the entire particle verb, while late adjunction explains the phonological ‘outsideness’ of the particle.

6.2. *The structure of (some) particle verbs*

As mentioned in the introduction to this section, I have the modest goal here of proposing that syntactic separation of the particle and the verb in particle verb constructions does not preclude a complex predicate analysis of such structures. The above analysis in 6.1, in addition to dissolving the nominalization paradox, allows for a derivation where the particle verb is a complex head, while explaining how inflection can intervene between the particle and the verb. Verb movement, followed by low late adjunction of the particle permits intervening morphology (and phrases), while maintaining an X^0 analysis. This observation

will be expanded upon here, offering a solution to the debate over whether some particle verbs are complex predicates.

To recap, some particle verbs, by virtue of their idiomaticity and ability to undergo further morphological processes, have been argued to be X^0 s, or complex predicates. The problem that this type of analysis brings forth is that subparts of X^0 elements are generally assumed to not be permitted to move independently in the syntax (see Matushansky (to appear) for a current proposal on the exact mechanism that bans such excorporation). Particle verbs, however, separate predictably and consistently, in environments like German V2.

(48) John **flechtet** den Buchstaben **ein**
 John braided the letter in
 'John inserted the letter'

(49) die **Einflechtung** des Buchstaben
 the in.braid.ing of.the letter
 'the insertion of the letter'

In (48) the verb has undergone typical German V2 movement, and the particle has been stranded in the VP domain. This separation is unexpected if the particle verb comprises a complex X^0 . In (49) the fact that the particle and the verb together are (1) the base for a further morphological process (nominalization) and (2) are interpreted idiomatically (as they are in (48)) has, as stated above, been argued to be due to the X^0 nature of the particle-verb combination. (Booij 1990; Johnson 1991; Zeller 1997a, b, 1998; among others).

I argue here, based on the solution to the paradox in section 6.1, that particles are late adjuncts. This will allow for an account that maintains that particle verbs are complex X^0 s, while easily explaining their ability to be syntactically separated.

6.2.1. Arguments supporting the XP (Small Clause) analysis of particle verbs

Let us now examine in detail the pro-phrase/Small Clause arguments with regard to particle verbs. In Section 6.3, to follow, I will show how the late adjunction analysis here can also account for the behaviour of particle verbs discussed here. The proponents of the small clause structure attack the pro-head camp (complex predicate, whether morphological or syntactic (including adjoined and incorporated)) with the following data. First, it is typical of particles that they are separable.

(50) Peter **lächelt** *(das Mädchen) **an**.
 P. smiles the girl at
 'Peter smiles at the girl.' (Zeller 1999:29)

As this is the case, the pro-head proponents need to answer the question of how the verb raises without the particle. In answer, proponents of particle verbs as complex predicates/heads in the morphology / lexicon loosen the restrictions on Lexical Integrity that disallow the separation and movement of any morphemes within a complex word. Another argument for the phrasal nature of particle verbs arises when we examine the positioning of inflectional morphology. Particle verbs are always inflected on the verbal head, even when this inflection will separate the particle and the verb.

- (51) throw out → threw out *throw outed
 play on → played on *play oned
 anrufen → anzurufen ‘call up’ zu=infinitive *zuanrufen

If the particle and the verb are a complex head, it is argued that we would expect inflection to surface as an affix on the entire particle verb complex, contrary to fact.

Thirdly, particles never influence the conjugation class of the verb. As can be seen above, the irregular verb *throw* remains irregular when the particle is present, and the regular verb *play* remains regular.

Finally, the Case of the object in particle verb constructions is always the same Case that is assigned by the simplex verb.

- (52) Peter trinkt das Bier aus dem Glas (full PP)
 P. drinks the beer from the glass
 ‘Peter drinks the beer from the glass.’
- (53) Peter trinkt das Bier aus (particle)
 P. drinks the beer from
 ‘Peter drinks up the beer.’ (Haiden: syncom case 117)

All of the above are offered as evidence that the particle (phrase) is a complement of the verb, and not part of a complex head with the verb.

- (54) [_{VP} trinkt [_{PartP} [_{DP} das bier] aus]]

This structure allows for the separation of the verb and particle, and for the conjugation class facts, as they are separate heads. This separation explains why inflection separates the verb and the particle. The assumption that the particle does not assign case, and therefore its object must move to receive case marking from the verb explains why the particle never affects Case.

6.2.2 Problems with the XP analysis

This section will concern itself with the problems raised by an XP account of particle verbs, such as the one above in 6.2.1. It will not concern itself with arguing for an X^0 account of particle verbs, but will rather lead to an X^0 account that captures all of the facts in the preceding section, while encountering neither of the problems that follow here.¹³

First, as is noted in Ramchand & Svenonius (2002) the above structure falls afoul of the fact that the object of a preposition is uniformly interpreted as a ground, rather than a figure.

- (55) I took the hat off my head
 figure ground

In particle verb constructions, it is argued that the object must not be the object of the particle, as it may be interpreted as a figure.

¹³ These are by no means the only problems with the XP account discussed in the literature. I restrict the discussion here to these two, as they are sufficient to show that PVs do not behave as a uniform morpho-syntactic class.

- (56) I threw out my hat.
figure

Secondly, a uniform XP analysis of particle verbs cannot account for the distinct morpho-syntactic behaviour of those particles that have X^0 properties. As noted above, Kratzer (1993) points out that some particles may accept *un-* prefixation, while others, even though they are semantically similar, may not. Similarly, Wurmbrand (2000) notes that some particles may be topicalized, while others cannot.

- (57) a. [AUF]_{PART} hat er die Tür t_{PART} gemacht
[open]_{PART} has he the door t_{PART} made
'He opened the door'
b. *[AUF]_{PART} haben sie das Stück t_{PART} geführt
[PART]_{PART} have they the piece t_{PART} performed
'They performed the piece' (Wurmbrand 2000:8)

Those that cannot are those that have an idiomatic interpretation in combination with the verb, leading to the conclusion that idiomatic particle verbs are more 'word like' (X' as opposed to XP, according to Wurmbrand), than non-idiomatic particle verbs. This distinction is not easily captured within a framework in which all particles are phrasal.

Data like the above leads one to question whether all particles can be considered to be heading phrasal constituents. The question therefore becomes whether non-XP particles can be analysed as X^0 elements that merge directly with the verb. Wurmbrand concludes that they cannot, following the generally assumed proposal that such complex X^0 s cannot undergo separation in the syntax. In the following section I offer a solution to this problem, following the proposal in sections 1-3 that particles may be late adjoined, that allows an X^0 account of these particle verbs while avoiding the issue of excorporation.

6.3 Particle verbs are more complex heads than you might think

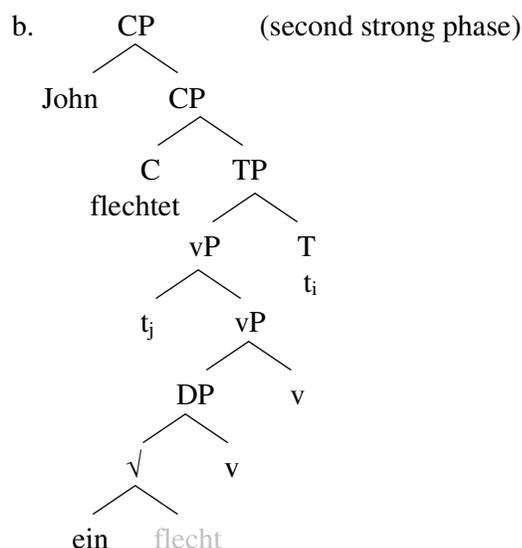
What I argue here is that the Complex Head Analysis overcomes all of the above problems when the particle is seen as a late adjunct. The non-nominal derivations where the verb is separated from its particle (V2) can be accounted for by assuming raising of the verb and late, low merger of the adjunct, just as in the *herumgerenne* derivation above.

- (58) [_{CP}John [_Cflechtet] [_{TP} den Buchstaben [_{VP} [_vein t_i]]]]
John braid the letter in
'John inserted the letter'

- (59) a. v(oice)P (first strong phase)
-
- ```

graph TD
 v(oice)P --> flecht1[flecht]
 v(oice)P --> vP
 vP --> DP
 vP --> v
 DP --> flecht2[flecht]
 v --> check[√]
 v --> v2[v]
 check --> flecht3[flecht]

```



Here the verb merges with  $v^0$ , and the object DP, and then raises, eventually coming to be situated in  $C^0$ . Remember that I assume here that the verb later reconstructs to be interpreted. After the verb has undergone at least one operation of raising, the particle is merged. As this is the position where the verb is interpreted at LF, we then expect an idiomatic reading to be possible here. No special structure is needed to explain the apparent ability of the verb to incorporate, as the verb and particle are never in a structural position where they must be separated. This surface (as opposed to LF) separation allows for the fact that inflection and phrasal elements may intervene between the verb and the particle, and for the fact that the conjugation class of the verb does not alter with the addition of the particle. As the object of the particle verb is always the object of the verb, case assignment follows transparently, and the figure~ground distinction becomes no longer relevant. Finally, the  $X^0$  status of the particle verb offers an easy solution to the *un*-affixation and topicalization facts.

Note that the particle must merge on the left so as to not violate the LEC. Merger to the right of the verb's copy would position the particle between the copy and the null  $v^0$  head.<sup>14</sup> This structure would also derive the left-adjoined position of the particle in the nominalized forms. Interestingly, in English particles are (almost) uniformly found on the right. As the English vP is left-headed, this also falls out from the LEC. Whether this LEC-determined particle position is cross-linguistically valid will be left to further research.

## 7. Conclusion

Under the analysis laid out above, structural paradoxes are no longer paradoxical. There is no need at any one point in the derivation to posit two structural representations for these phenomena, but rather the phonological and semantic structures are defined separately, at the interfaces. The appearance of two necessary structures has been argued to be due to the cyclic nature of the syntactic derivational system, crucially joined with the theory that syntactic adjuncts may be late merged inside an already derived syntactic representation. This analysis

<sup>14</sup> This is of course assuming that German is right-headed below CP.

holds that all bracketing paradoxes contain a morphological adjunct, and therefore that no bracketing paradoxes will occur in constructions that do not involve adjunction.

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