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Displaced Morphology in German verb clusters

An argument for post-syntactic morphology

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Abstract In this paper I will provide a new argument for post-syntactic morphology. The empirical evidence comes from so-called displaced morphology in German verb clusters, where the non-finite verb form selected by a given governor does not appear on the immediately dependent verb but rather on the linearly last verb of the selector's complement. The placement of the morphology thus partly depends on linear notions and not exclusively on hierarchical relations. I will provide an analysis within Distributed Morphology (Halle and Marantz 1993), where exponents for non-finite morphology are inserted into separate functional heads which are linearized after their VP-complements. At a late stage of the PF-derivation, the exponents are associated with their verbal hosts by means of Local Dislocation, an operation that applies under adjacency (Embick and Noyer 2001). As a consequence, the non-finite morphology always comes last in the selector's complement. Displacement arises once the immediately dependent verb is not the last verbal element in the complement of its selector; this is generally the case in strictly ascending orders, while in the strictly descending 321 order the morphology is faithfully realized. The placement operation is thus always the same, displacement only emerges as a side-effect of certain cluster orders. Further evidence for a post-syntactic approach to the placement of non-finite morphology and against a pre-syntactic perspective comes from the absence of semantic effects under displacement, the emergence of non-finite verb forms specified for more than one non-finite category under multiple displacement and the distribution of default forms.

Keywords Verb clusters · Post-syntactic Morphology · Distributed Morphology · Morphological selection · Displaced morphology · IPP-effect · Participles · Infinitives · Local Dislocation · Adjacency · Haplology · Lowering · Cyclicity · West-Germanic · German dialects · Swiss German

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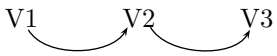
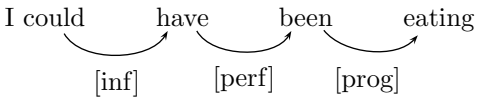
1 Introduction: morphological selection

It is a general property of syntax that heads determine the formal properties of their complements. In this paper I focus on selection of non-finite morphology where several selection relations are involved. Canonically, the morphology selected by a verb V_n is realized on the directly subordinate verb V_{n+1} (if the non-finite morphology is selected by a noun/adjective/complementizer, it is realized on the highest verb below it). This is schematically represented in (1), which depicts a sequence of verbs that are in a government relation:[1]

(1) 

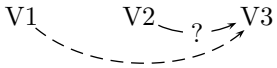
The non-finite morphology selected by V1 is thus realized on V2, the morphology selected by V2 on V3 and so forth. The following example from English illustrates the workings of selection:

(2) 

The modal verb *could* selects an infinitive, which is realized on the perfective auxiliary *have* that immediately depends on the modal. *Have* in turn selects a past participle, which is realized on the progressive auxiliary *been*. *Been*, finally, selects the progressive form, which is realized on the lexical verb *eating*.

Ensuring that the selectional properties of a governor are satisfied can be done either by means of a checking operation or by Agree between the selector and the dependent element. In the former, both elements are pre-specified for a certain value. If the values coincide, checking and thus selection is successful. In the latter, first adapted to morphological selection in Adger (2003) and later developed in Wurmbrand (2012), the dependent element starts out with an unvalued feature that is valued in the course of the derivation by the selector.

In this paper, I discuss a case of morphological selection which does not conform to the picture sketched above: In German (varieties), the non-finite morphology selected by V_n is not always realized on V_{n+1} but rather generally on the linearly last verb of the selector's complement. We thus instead find a pattern as in (3), where the non-finite morphology selected by V1 is not realized on the directly dependent V2 but rather on V3, the lowest element in the verbal hierarchy, so that it appears to be displaced (the fate of the selectional restrictions of the intermediate verb V2 will be addressed in Sect. 5 below; in what follows, the arrows in the diagrams indicate morphological selection; dashed arrows indicate selection that involves displacement):

(3) 

displacement

[1] In the traditional German literature, cf. Bech (1983), the selection of non-finite verb forms is called 'status-government'; verbs thus govern the 'status' of dependent verbs.

A concrete example is presented in (4), where V1 selects a past participle, while V2 selects an infinitive. Crucially, the participle morphology occurs on V3 rather than on V2 (cf. Behaghel 1923-1932, Volume 2, 369, §750):[2]

(4) ob in diu edele vrouwen het(e)$_1$ lazen$_2$ daz getan$_3$
*if him the noble lady have.*SBJV.*3*SG *let.*INF *that do.*PTCP
'if the noble lady had let him do that' *Middle High German*

I will argue that despite appearances this phenomenon does not involve any displacement operation as such but emerges as a side-effect of certain cluster ordering possibilities. I will provide an analysis couched within the framework of Distributed Morphology (Halle and Marantz 1993), where morphological exponents are inserted after syntax and may be subject to various post-syntactic operations. Under this perspective, displacement follows from the assumption that the morphological exponents are inserted into separate syntactic heads and are placed at PF by means of Local Dislocation. Since the placement of the morphology thus applies very late in the PF-branch and is sensitive to linear order, it can be affected by earlier operations including those that are responsible for the different orders in the verb cluster. Foreshadowing the analysis to be presented in Sect. 3, in examples like (4), V1 selects an FP into whose head the participle morphology will be inserted. Since VP2 and VP3 are ordered after V1 in this variety but before F (a fact related to the head-finality of German), both verbs are linearized before the participial affix. By means of Local Dislocation, it is attached to the adjacent V3:

(5) a. structure: [$_{\text{VP1}}$ V1 [$_{\text{FP}}$ [$_{\text{VP2}}$ V2 [$_{\text{VP3}}$ V3]] F]]
b. linearization + vocabulary insertion: V1 V2 V3 ptcp
c. placement: V1 V2 V3 ptcp → V1 V2 **ptcp**+V3
LD

Next to the fact that the placement of non-finite morphology is not solely governed by hierarchical relations but crucially affected by linear notions such as adjacency, two further aspects of the phenomenon provide arguments for post-syntactic morphology: First, displacement has no semantic effects. Second, the restrictions on displacement follow from the selectional properties of the vocabulary items, which are checked under linear adjacency. I will show that the placement facts follow straightforwardly under a derivational approach to morphological computation and thus the ordering of post-syntactic operations (cf. Embick and Noyer 2001; Arregi and Nevins 2012).

This paper is organized as follows: In Sect. 2, I will introduce the phenomenon of displacement. Section 3 provides a derivational account of the placement of non-finite morphology. In Sect. 4, I will show that displacement

[2] The glosses follow the Leipzig glossing rules, available at https://www.eva.mpg.de/lingua/pdf/Glossing-Rules.pdf. The numerical indices on the verbs indicate the hierarchical relations, i.e., 1 stands for the hierarchically highest verb of the relevant domain, 2 for the immediately dependent verb, etc.
Examples without reference have been constructed by the author. This includes the Swiss German examples, which are drawn from Zurich German, the author's native language.

does not have any semantic effects. Section 5 is devoted to restrictions on displacement. In Sect. 6, I discuss the implications for morphological theory. In Sect. 7 I address instances of non-displacement, and Sect. 8 concludes. The appendix in Sect. 9 briefly compares displaced morphology in German with parasitic participles in Frisian and Scandinavian; furthermore, it explores the prospects of a unified theory of morphological selection within Germanic involving a combination of hierarchy-based Agree with post-syntactic movement operations.

2 The phenomenon of displacement

One prominent feature of Continental West-Germanic OV-languages like Dutch and German is the clustering of verbal elements at the end of the clause in V-final structures, as in the following example (under verb second, where the finite verb moves to C, only the non-finite verbs occur together):

(6) dass er das Buch lesen$_3$ können$_2$ muss$_1$
*that he the book read.*INF *can.*INF *must.3*SG
'that he must be able to read the book' *Standard German*

Such sequences are referred to as verb clusters (for an overview, cf. Wurmbrand 2017). They are restructuring constructions and involve the combination of a lexical verb with one or several functional verbs (modals, auxiliaries) and/or with lexical verbs selecting a non-finite complement. Furthermore, they are characterized by massive cross-linguistic/dialectal/inter-speaker variation with respect to the various orders of the verbal elements. Of the six logically possible orders in three-verb clusters, the existence of five orders is uncontroversial, viz., 321, 123, 132, 312 and 231, while the existence of the 213 order has been subject to much controversy; see Salzmann (2019b, this issue) for a recent overview of the debate and new arguments that the 213 order does exist.

In this section, I will describe the workings of morphological selection in German verb clusters; I will first discuss the placement of the infinitival particle *zu* in the standard language and in the dialects before addressing placement of other non-finite forms.

2.1 Standard German descending verb clusters: well-behaved

Verb clusters in the standard language are mostly descending, viz., the governing verb follows the governed verb. Descending orders are unsurprising from the point of view of morphological selection since the non-finite morphology selected by a given verb is faithfully realized on the immediately dependent verb, as illustrated in (7):

(7) a. dass er das Buch **ge**les**en**$_3$ haben$_2$ muss$_1$
*that he the book read.*PTCP *have.*INF *must.3*SG
'that he must have read the book' 321 *Standard German*

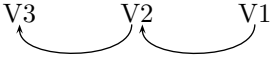
b. dass er das Buch **zu** lesen$_3$ versucht$_2$ hat$_1$
*that he the book to read.*INF *try.*PTCP *have.3*SG
'that he tried to read the book' 321 *Standard German*

c. dass er das Buch nicht lesen$_3$ **zu** können$_2$ scheint$_1$
*that he the book not read.*INF *to can.*INF *need.3*SG
'that he does not seem to be able to read the book' 321 *Std. G.*

d. dass er das Buch **zu** lesen$_3$ **zu** versuchen$_2$ versprach$_1$
*that he the book to read.*INF *to try.*INF *promise.*PST.*3*SG
'that he promised to try to read the book' 321 *Standard German*

In (7a), V1 selects a bare infinitive, which is realized on V2; V2 in turn selects a past participle, which is realized on V3. In (7b), V1 selects a past participle, which is realized on V2; V2 selects a so-called *zu*-infinitive (an infinitival verb preceded by the particle *zu* 'to'), which is realized on V3. In (7c), V1 selects a *zu*-infinitive, which is realized on V2. V2 selects a bare infinitive, which occurs on V3. In (7d), V1 selects a *zu*-infinitive, which is realized on V2. V2 also selects a *zu*-infinitive, which is realized on V3. The placement of the selected forms in descending order is schematically represented in (8):

(8) V3 V2 V1 *no displacement*



It is uncontested that participial and bare infinitival exponents belong to morphology (they are affixes); the same holds for two further non-finite forms to be discussed below, the gerund and infinitives with a *ge*-prefix. The status of *zu*, however, is somewhat equivocal, in that it has both properties of affixes and clitics, as will become clear in the next sections. For the moment it suffices to know that *zu* is a dependent element that needs to attach to the left of a verb in the bare infinitive. I will in what follows subsume it under non-finite morphology, not the least because it patterns like the other categories with respect to displacement. I will return to the status of *zu* in Sect. 5.1.

2.2 Standard German (partially) ascending clusters: displaced *zu*

Interestingly, once the cluster order deviates from the strictly descending 321-order, i.e., involves a (partially) ascending order, the transparent pattern of the previous subsection changes. While nothing special happens with bare infinitives and participles, *zu*-placement is no longer in accordance with the hierarchical relations. Consider the triple in (9) where the complementizer *ohne* 'without' selects a *zu*-infinitive (*zu*-selectors will henceforth be underlined):[3]

[3] Note that while V2 occurs as a participle in (9a), it appears as a bare infinitive in (9b/c). This instantiates the so-called IPP-effect, cf. Sect. 5.2 below for discussion. Some speakers prefer the participle morphology to appear on V3 in (9c), instantiating the so-called scandal construction (cf. Vogel 2009, who coined the term, for details as well as the discussion in Sect. 2.6 below).

(9) a. ohne das Buch lesen$_3$ gekonnt$_2$ **zu** haben$_1$
*without the book read.*INF *can.*PTCP *to have.*INF
'without having been able to read the book' 321
b. ohne das Buch haben$_1$ lesen$_3$ **zu** können$_2$
*without the book have.*INF *read.*INF *to can.*INF
'without having been able to read the book' 132
c. ohne das Buch lesen$_3$ haben$_1$ **zu** können$_2$
*without the book read.*INF *have.*INF *to can.*INF
'without having been able to read the book' 312

In (9a), which involves a 321-order, the *zu*-infinitive appears on the hierarchically highest verb of the cluster, viz., V1, as one expects. In (9b/c), however, which involve a 132 and 312 order, respectively, *zu* does not occur on V1 but rather on V2. It thus seems to be displaced. As an initial generalization: When selected by an element outside the verb cluster, *zu* attaches to the last verb of the cluster, irrespective of the hierarchical relationships. In a configuration as in (9) displacement thus occurs once V1 is not cluster-final, i.e., in all orders except 321 and 231. Crucially, if *zu* occurs on V1 or on V3 in (9b/c), the result is sharply ungrammatical, as (10) shows for (9b):[4]

(10) ohne das Buch {***zu**} haben$_1$ {***zu**} lesen$_3$ {zu} können$_2$
*without the book to have.*INF *to read.*INF *to can.*INF
'without having been able to read the book' 132

Importantly, displacement is a property of verb clusters/Verb Projection Raising (for the latter, see Salzmann 2019b, this issue); in the 3rd Construction, a restructuring construction where the dependent *zu*-infinitive follows the governing verb, there is no displacement. Rather, the *z(u)* selected by the matrix verb (*raten* 'advise' in (11)) appears on V1 (since V1 also selects a *zu*-infinitive, there is another *zu* on V2; pronoun fronting indicates restructuring):

(11) ... würd ich dir raten ihn$_1$ ***(zu)** versuchen$_1$ t$_{ihn}$ zu
*would.1*SG *I you.*DAT *advise.*INF *him to try.*INF *to*
überzeugen$_2$
*convince.*INF
'I would advise you to try to convince him.' *Std./Coll. G.*
https://www.gutefrage.net/frage/pole-dance-ohne-einverstaendnis-vom-freund, accessed September 5, 2018

[4] Displacement is also found in ascending attributive present participle clusters:

(i) der das Buch haben$_1$ lesen$_3$ woll$_2$-ende Schüler
*the the book have.*INF *read.*INF *want-*PTCP *pupil*
'the pupil who wanted to read the book' *Standard German*

The distribution is exactly the same as with *zu*: The participial ending attaches to the last verb of the participial cluster, which entails displacement if a verb other than V1 comes last. The analysis to be presented in Sect. 3 below can also be applied to examples like (i); like *zu*, the participial ending will be inserted into a separate functional head that is linearized after the verb cluster and is attached to the adjacent verb by Local Dislocation.

Displaced *zu* has been frowned upon by grammarians ever since Grimm (1837, 949). There seem to be two reasons: First, displacement is considered illogical as it blatantly violates the canonical rule of morphological selection; second, native speakers show a significant degree of uncertainty and variability in empirical tests according to Reis (1979); Haider (2011) (one should add, though, that their claims are not based on data obtained by modern experimental techniques). As for the first point, German is often compared with the well-behaved Dutch verb clusters, where the equivalent particle *te* always occurs on the hierarchically highest verb (for *te*-placement in Dutch, see Sect. 7.1):

(12) zonder het boek **te** moeten$_1$ kunnen$_2$ lezen$_3$.
*without the book to must.*INF *can.*INF *read.*INF
'without having to be able to read the book.' 123 *Standard Dutch*

Since displacement violates a rule of grammar, it is considered ungrammatical by Merkes (1895) and Haider (2011). Both argue that the existence of displacement may be motivated by the fact that *zu* generally occurs at the end of the verb cluster. Displacement may then be an over-generalization. Haider (2011) argues that it is a grammatical illusion: Although the construction is acceptable to many speakers, it is nevertheless ungrammatical. Bech (1963) considers the construction grammatical, but argues that it is a hybrid repair phenomenon that results from the fact that two equal rules are in conflict with each other, viz., that (i) *zu* must occur on the immediately depending verb and (ii) at the end of the verb cluster. Given that this conflict cannot be resolved in 132 and 312 orders, the degradedness of the result may thus be unsurprising. Reis (1979), finally, argues that the grammatical status of the construction is undefined: She proposes that grammatical rules are only defined for the standard cases and may consequently not apply in very specific environments such as the one where displacement is found.

Following Meurers (2000) and Vogel (2009), I assume instead that displacement is a grammatical phenomenon. I will show that the picture changes drastically once the rule for the placement of non-finite morphology in German is reconsidered. There will be just one placement rule in my analysis so that no conflicts arise; both lack of displacement in descending orders and displacement in orders that deviate from 321 will result from the very same rule and both thus arise as the only logical possibility in their respective grammatical environments. The theory-internal arguments against the grammatical status of displacement adduced in the works cited above thus disappear. Nor will there be any reason to consider displacement as either a repair phenomenon or as a construction outside the purview of grammatical rules.

Quite apart from the conceptual argument, there are also strong empirical arguments against treating displacement as ungrammatical/para-grammatical/hybrid: First, this fails to account for the significant contrast between the displaced variant in (9b) and the versions without displacement in (10). Second, displacement is attested in careful sources, including poetic and scientific texts as well as in prestigious newspapers as in (13) (for more examples see Merkes

1895, 69f.; Behaghel 1923-1932, volume 2, 308f.; Meurers 2000, 72, ex. 114; for examples from Early New High German, cf. Ebert et al. 1993, 397, §179):

(13) die Ohnmacht, nicht haben$_1$ helfen$_3$ **zu** können$_2$ ...
the powerlessness not have.INF *help*.INF *to can*.INF
'the powerlessness not having been able to help' FAZ, 03. 01. 2005

Displaced *zu* can also be found in large corpora such as the DWDS- and the COSMASII-corpus; a search returned 11 hits for the COSMASII- (winter 2018) and 38 hits for the DWDS-corpus (spring 2017).[5] Third, displaced *zu* is unmarked in German dialects (see Sect. 2.3), and fourth, displaced *zu* is part of a more general displacement phenomenon (see Sect. 2.4).

2.3 Displaced *zu* in German dialects

Displaced *zu* is necessarily infrequent in the standard language because (partially) ascending orders only occur in three-verb clusters, and among those only in one cluster type (Aux/Fut-Mod-Inf). This may help explain why some speakers perceive the construction as marked.

The situation in dialects is very different because ascending orders are much more prominent and often constitute the default (at least in Central and Upper German dialects); this crucially includes the much more frequent two-verb clusters. Consequently, displacement is expected to occur more often than in the standard language. Indeed, the phenomenon is well-attested in the literature and crucially there is no indication that it is a marked or ungrammatical phenomenon. Rather, displaced *zu* is described as the canonical realization of non-finite morphology in (partially) ascending orders, i.e., it is obligatory. Its grammaticality is thus undisputed.

The dialectal data in this and later sections will mainly be drawn from Alemannic and Thuringian dialects (the latter being East Central German or East Franconian varieties). This is simply due to the fact that displacement has been explicitly described for these varieties and, in the case of Alemannic (especially Swiss) varieties, is well-attested in the modern dialect. But in principle I expect *zu*-placement to work analogously in other German dialects. Two further recently discovered patterns of *zu*-placement will be briefly addressed in Sect. 2.6.

Importantly, the consensus about the grammaticality of displacement holds for both traditional grammars (Hodler 1969, 560; Weber 1987, 244; and especially the works cited in Höhle 2006), more descriptive treatments (Comrie and Frauenfelder 1992) as well as formal approaches (Bader 1995, 22; and Cooper 1995, 188f.). Furthermore, displaced *zu* can be heard on the (Swiss) radio (Cooper 1995) and be found on the internet.

The following examples are but a small selection. The first set involves cases where *zu* (*z* in Swiss German) is selected by a non-verbal element (noun,

[5] For more information about the corpora, see `https://www.dwds.de/` and `http://www1.ids-mannheim.de/kl/projekte/korpora.html`.

adjective, complementizer) that governs the verb cluster. (14c) is from Comrie and Frauenfelder (1992, 1059); (14d/e) illustrate *z*-placement in the orders 231 and 213:[6]

(14) a. Ich liebe d freiheit, selber de tag chöne$_1$ **z**
*I love.1*SG *the freedom self the day can.*INF *to*
bestimme$_2$.
*determine.*INF
'I love the freedom to determine my schedule.' 12 *Swiss G.*
cf. http://badoo.com/de-ch/0279246484/, accessed March 11, 2013

b. bin [...] trurig [...] die liebe Lüüt hinder mir müese$_1$ **z'** loh$_2$
*am sad the nice people behind me must.*INF *to let.*INF
'I am sad having to leave these lovely people behind' 12 *Swiss G.*
http://melanie-underwegs.blogspot.com, accessed September 5, 2018

c. Ech ha ts Büach kchöifft, fer dam Marco cheni$_1$
*I have.1*SG *the book buy.*PTCP *for the.*DAT *Marco can.*INF
z sägan$_2$, ...
*to say.*GER
'I bought the book to be able to tell Marco ...' 12 *Bosco Gurin*

d. D Froid, di ghööre$_2$/ghöört$_2$ singe$_3$ **z** haa$_1$
*the joy you hear.*INF*/hear.*PTCP *sing.*INF *to have.*INF
'the joy to have heard you sing' 231 *Swiss G.*

e. Wieder en grund meh zum glücklich drüber sii, niä
*again a reason more to happy about.it be.*INF *never*
agfange$_2$ ha$_1$ **z** rauche$_3$!
*begin.*PTCP *have.*INF *to smoke.*INF
'Another reason to be happy to have never started smoking!' 213
https://www.facebook.com/Radio24/posts/10151574652070814, accessed March 28, 2016

As in the Standard German cases discussed above, when selected by an element outside the cluster, *z(u)* attaches to the last verb of the verb cluster, which entails displacement in the orders 12(3), 132, 312 and 213.

I now turn to examples where the non-finite morphology originates within the cluster, i.e., where the *zu*-selector is V1. There is no displacement in 321, 132 and 312 orders; in these orders, *zu* is faithfully realized on V2. The 321 order displays the same pattern as in Standard German, cf. ex. (7c). The following pair provides 132- and 312 examples from Swiss German (since *zu*-

[6] As in the standard language, there is displacement in 132 and 312 orders and faithful realization in the 321 order (to the extent that this order is available). In all the examples, the verb selecting the lexical verb (V1 in a–c, V2 in d–e) governs the bare infinitive.
Note that since 231 orders are marked in Swiss German (they only occur with motion verbs, cf. Salzmann 2013a, and benefactives, inchoatives and perception verbs, cf. Lötscher 1978, 3, fn. 2; Schmid 2005; and Salzmann 2019b, this issue), embedding them under a *zu*-selector will further increase the markedness of such examples. Since some speakers allow for a *zu*-infinitive with 'begin', (14e) might also be an instance of the missing-*z* construction discussed in Sect. 5.3.1 below.

selecting verbs do not frequently occur in these orders in Swiss German, such examples will invariably be somewhat marked; but there can be no doubt about the proper placement of *zu*; pronoun fronting indicates restructuring).[7]

(15) a. dass er si schiint$_1$ hürate$_3$ z wele$_2$
*that he her seem.3*SG *marry.*INF *to want.*INF
'that he seems to want to marry her' 132
b. dass er si hürate$_3$ schiint$_1$ z wele$_2$
*that he her marry.*INF *seem.3*SG *to want.*INF
'that he seems to want to marry her' 312

In the other orders, we find displacement. The following pair illustrates displacement under a strictly ascending order; (16a) is from Weber (1987, 244, fn.1) and (16b) is from Weise (1900, 154):

(16) a. Er schiint$_1$ nüüt wele$_2$ **z** wüsse$_3$ dervoo.
*He seem.3*SG *nothing want.*INF *to know.*INF *about.it*
'He does not seem to be interested in it.' 1 ... 23 *Zurich G.*
b. weil er sich nicht von ihm braucht$_1$ lassen$_2$ an**zu**schnauzen$_3$
*because he self not by him need.3*SG *let.*INF *rant.at.*INF
'because he does not need to be ranted at by him' 123*Altenburg*

[7] Swiss German constructions with *zu*-infinitives behave like proper verb clusters and not like the 3rd Construction, even in 123 and 132 orders, cf. Sect. 5.3.1 below and Salzmann (2019b, this issue). Comparable Standard German examples are given in (i):

(i) a. dass er [...] sein eigenes mattes Image aufpolieren$_3$ glaubt$_1$ zu müssen$_2$
*that he his own dim image polish.*INF *believe.3*SG *zu must.*INF
'that he believes he has to polish his dim image'
http://www.suedwatch.de/blog/?p=2139, accessed November 1, 2017
b. Dass der Schwachkopf [...] glaubt$_1$, antworten$_3$ zu müssen$_2$!
*that the idiot believe.3*SG *answer.*INF *to must.*INF
'that the idiot believes he should react to [such an insult].'
http://www.rationalgalerie.de/kritik/wer-sind-springers-erben.html, accessed November 1, 2017

However, at least in the 132 order it is not a priori clear whether this represents a proper verb cluster or rather an instance of the 3rd Construction (as claimed by Meurers 2000, 221f.). Given that such 132 clusters can also occur in 1243 order when embedded by an infinitive-selecting auxiliary with V2 thus in the upper-field, nothing speaks against treating them as proper verb clusters (in the 3rd Construction, which is a possibility as well, V2 would be located in the right sentence bracket preceding V1, with VP3 extraposed, resulting in 2143):

(ii) in der wie jedes Jahr eine Reihe von Mandataren wird$_1$ glauben$_2$
*in which like every year a number of representatives will.3*SG *believe.*INF
beweisen$_4$ zu müssen$_3$, dass ...
*prove.*INF *to must.*INF *that*
'in which a number of representatives will believe they have to prove that ...'
Tiroler Tageszeitung, 04.12.1997, Ressort: Regional Innsbruck und Umgebung; Eine beschlossene Sache; I97/DEZ.47824 (COSMASII, accessed November 9, 2017)

The displacement test that generally distinguishes between verb clusters and the 3rd Construction (recall example (11) above) is somewhat difficult to apply here as the cluster becomes relatively complex and a *zu* would go missing; see fn. 22 below for some discussion.

Examples with 231 and 213 order are difficult to construct since *zu*-selecting verbs usually do not occur in these orders in Swiss German and German dialects more generally. While the following examples are thus degraded because of the cluster order, there is no doubt that *z* has to be displaced to V3 (cf. ex. (21) below for an attested example in 213 order with displacement):

(17) a. %dass er si {*z} ghööre$_2$ {✓z} lache$_3$ <u>schiint</u>$_1$
that he her to hear.INF *to laugh seem.3*SG
'that he seems to hear her laugh' 231

b. %dass er si {*z} ghööre$_2$ <u>schiint</u>$_1$ {✓z} lache$_3$
that he her to hear.INF *seem.3*SG *to laugh*.INF
'that he seems to hear her laugh' 213

As mentioned above, displacement is unmarked in the dialects. There are two factors that lead to its unmarked status and thus higher acceptability than in the standard language: First, since ascending clusters are much more prominent in dialects, including two-verb clusters, displacement is much more frequent than in the standard language where they only occur in one type of three-verb cluster. Second, because of the higher frequency of strictly ascending orders in dialects (12, 123), the relative dependencies between the verbs can be determined more easily than in the mixed clusters (132, 312) that prevail in the standard language: In the relevant 13*zu*2- and 31*zu*2-clusters, all verbs appear as infinitives so that it is not immediately obvious which verb depends on which (cf. Wurmbrand 2013). The dialect speaker, however, takes an ascending order for granted and will thus be able to determine the hierarchical relationships quickly despite the lack of morphological clues.

To summarize the empirical situation so far, a *z(u)* selected by an element outside the verb cluster always attaches to the last verb of the verb cluster. As a consequence, *z(u)* will appear displaced once V1 is not cluster-final. If *zu* is selected by V1, we find displacement in the orders 123, 231 and 213.

2.4 Further types of displaced morphology in German (dialects)

Importantly, displaced *zu* is not an isolated case. Rather, displacement is a more general phenomenon in that it occurs with various non-finite forms in German varieties. In principle, displacement will always take place if the context is given. However, as will be discussed in Sect. 5, since displacement can lead to morphological conflicts, it is sometimes blocked or becomes invisible.

Displacement of participle morphology is found in the so-called Participium Pro Infinitivo (PPI)-construction that was found in earlier stages of the language. In the Middle High German example in (18) (from Behaghel 1923-1932, Volume 2, 369, §750, repeated from (4)), V1 selects a past participle, but V2 appears as an infinitive, while V3 (which should be an infinitive given the selectional requirements of V2) appears as a participle:[8]

[8] The PPI-construction is also residually found in some contemporary dialects, see, e.g., Steil (1989, 41) and Heilmann (1999, 63, ex. 3h) and references cited there on Swabian

(18) ob in diu edele vrouwen het(e)$_1$ lazen$_2$ daz getan$_3$
*if him the noble lady have.*SBJV.*3*SG *let.*INF *that do.*PTCP
'if the noble lady had let him do that' *MHG, Nibelungenlied 634,2*

Displacement is particularly prominent in Thuringian dialects, which have a richer inventory of non-finite forms (cf. Höhle 2006). While some functional verbs select the bare infinitive (which is usually identical to the stem), certain modals/auxiliaries select infinitives with a *ge*-prefix (a form that also occurs in earlier stages of the language, see Jäger 2018) or gerunds (a long infinitive that partly goes back to the inflected form of the infinitive and partly to a present participle), all of which can be displaced. In (19a), V1 selects a *ge*-infinitive. However, V2 (which selects a bare infinitive) occurs as a bare infinitive, while V3 appears in the *ge*-infinitive; in (19b), V1 selects a gerund; crucially, V2, which selects a bare infinitive itself, occurs in the bare infinitive, while the gerund ending appears on V3 (Höhle 2006, 68, ex. 38, 39):

(19) a. kåsd$_1$ mə heləf$_2$ gə-schri:$_3$
*can.2*SG *me.*DAT *help.*INF GE-*write.*INF
'Can you help me write?' 123 *Kleinschmalkalden*
b. ə wyəd$_1$=s ʃund lås$_2$ max-ə$_3$
*he will.3*SG=*it indeed let.*INF *do*-GER
'He will have it done.' 123 *Kleinschmalkalden*

The distributional pattern of these other non-finite forms is exactly the same as with *zu*: There is displacement in strictly ascending clusters from V1 to the final verb of the cluster as in (18), (19). There is no displacement from V1 in the orders 132 and 312 as the following examples show ((20a), where V1 selects a gerund and V2 a *ge*-infinitive, is from Höhle 2006, 72, ex. 54ii; (20b), where V1 selects a *ge*-infinitive, is from Steube 1995, 432; for another example with a 132 order with V1 selecting a *ge*-infinitive, see Sperschneider 1959, 43; the same can also be seen in the more complex examples from Barchfeld with 1243/1423 order discussed in Höhle 2006, 73, ex. 56iii, where the *ge*-infinitive selected by V2 is realized on V3 and the participle selected by V3 on V4):

(20) a. a weʌd$_1$=s ne: gə-måx$_3$ khün-ʌ$_2$
*he will.3*SG=*it not* GE-*do.*INF *can*-GER
'He won't be able to do it' 132 *Steinach*
b. öb hä: då:s wœrglich gəsœ:d$_3$ kon$_1$ gə-hå:$_2$
*if he that really say.*PTCP *can.3*SG GE-*have.*INF
'if he really can have said that' 312 *Steinbach-Hallenberg*

I do not have any information about the placement facts in the 321 order; I suspect, though, that the dialects that feature these special infinitives do not allow this order so that this cannot be tested. Clusters with 231 order are also rare in German varieties. The only example with displacement in this

clusters with V2 = 'help'. See also Höhle (2006, 66, fn. 19) for a PPI-example from Wasungen. For PPI in Afrikaans, cf. De Vos (2003, 522).

order that I am aware of is a PPI-case in Swabian (the participle morphology selected by V1 occurs on V3), cf. Heilmann (1999, 63, ex. 3f); there are also instances of PPI in Afrikaans in the 231 order, cf. De Vos (2003, 522). Clusters in 213 order with displacement from V1 to V3 are somewhat easier to find. A PPI-example is attested in Swabian, cf. Heilmann (1999, 62, ex. 3d). In the following example where the 213 cluster is part of a four-verb cluster (thus instantiating a 1...324 cluster), V2 selects a *ge*-infinitive which is realized on V4 (while V3 appears in the bare infinitive), cf. Höhle (2006, 74, ex. 59ii):

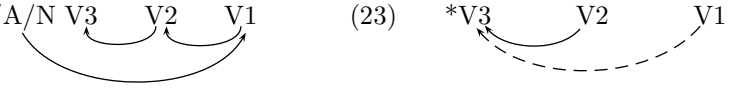
(21) iç hdåu$_1$=s=nʌ los$_3$ khun$_2$ gə-max$_4$
*I have.1*SG*=it=him let.*INF *can.*INF GE-*do.*INF
'I have been able to make him do it.' 1...324 *Steinach*

If the non-finite morphology is selected by V1, displacement thus obtains in the orders 123, 213 (and possibly 231).

2.5 Summary

We have seen that the order in the German verb cluster has an effect on the placement of non-finite morphology. In strictly descending (321) orders, the selectional requirements of a given verb/adjective/noun/complementizer are always satisfied on the immediately dependent verb, cf. (22). Importantly, there is never any displacement in such orders, cf. (23):

(22) C/A/N V3 V2 V1 (23) *V3 V2 V1



Things are different in those orders that deviate from the strict 321 order. If the selector of non-finite morphology is outside of the verb cluster, the generalization is very simple: The non-finite morphology attaches to the last verb of the cluster. This implies displacement whenever V1 is not cluster-final:

(24) *selector outside the cluster:* displacement in 123, 132, 312, 213

Displacement in 12(3) and 312 orders is illustrated in (25) and (26):

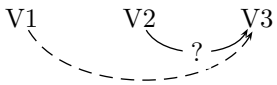
(25) C/A/N V1 V2 (26) C/A/N V3 V1 V2

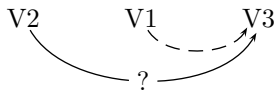
Note that displacement affects the selectional restrictions of the verbs that are in the middle of the government sequence (i.e., V1 in (25) and (26)). I will discuss the consequences in Sect. 5 below.

When the non-finite morphology is selected by a verb within the cluster, viz., V1, the pattern seems to be different at first sight: Unsurprisingly, non-finite morphology is faithfully realized in 321 orders. Interestingly, it is also well-behaved in 312 and 132 orders (where there is displacement if the selector is outside the cluster). Displacement, however, is found in the remaining orders:

(27) *non-finite morphology selected by V1*: displacement in 123, 231, 213

Displacement in 123 and 213 orders is illustrated in (28) and (29):

(28) 

(29) 

So far there does not seem to be a clear generalization for the placement if the morphology is selected by V1: in 123, 132, 312 and 213 orders, the morphology occurs on the last verb of the cluster, but in the 321 and 231 orders a different pattern obtains. I will show below that all placement facts involving non-finite morphology can be unified with the following very simple generalization:[9]

(30) *Placement of non-finite morphology*
The non-finite morphology selected by a head X occurs on the last verb of the complement of X.

The placement of non-finite morphology in German thus follows a very simple and general rule. What is remarkable is that it is not exclusively governed by hierarchical notions but is crucially affected by linear order. I will show in the next sections how the placement can be captured and what it implies for theories of verb clusters and for morphological theory. Before that I will briefly discuss two cases of displacement in German that follow a different pattern.[10]

2.6 Other displacement patterns

The so-called *Skandalkonstruktion* 'scandal construction' was first mentioned in Merkes (1895, 72), rediscovered in Reis (1979) and discussed in detail in Vogel (2009). In this construction, which obtains in 312 (and 1423) orders, the selectional requirements of the perfective auxiliary V1 are displaced to V3 (or from V2 to V4). Crucially, displacement thus does not target the last verb of the complement of the selector but rather the verb left-adjacent to V1. In (31), the past participle selected by V1 occurs on V3, see Vogel (2009, 308) (note that the *zu* selected by the matrix verb *bedauern* 'regret' undergoes regular displacement to the last verb of the cluster, viz., V2):

(31) Er bedauert, es nicht verhindert$_3$ haben$_1$ **zu** können$_2$.
*He regret.3*SG *it not prevent.*PTCP *have.*INF *to can.*INF
'He regrets not having been able to prevent it.'

Obviously, displacement of participial morphology in the scandal construction deviates from the general placement rule established above that the morphology selected by X (the auxiliary in (31)) attaches to the last verb of the com-

[9] The generalization in (30) also holds if the non-finite morphology is selected by V2. For obvious reasons, displacement can only be observed in four-verb clusters. Thus, there is displacement in 1234 orders but not in 1243 orders. Ex. (21) shows displacement from V2 to V4 in a 1324 order.

[10] Another phenomenon that seems related to displaced morphology are parasitic participles in Norwegian/Swedish/Faroese and Frisian; see the appendix in Sect. 9.

plement of X, which would be V2 rather than V3 in (31). I will therefore set the scandal construction aside in the rest of the paper. It is not my intention to brush it under the carpet, not the least because Vogel (2009) provides evidence that the scandal construction is not just a marginal phenomenon (it can, e.g., be found in corpora, cf. also Wurmbrand 2013, but see Haider 2011 for a critical assessment). Rather, given the systematic placement differences, I believe it is misguided to attempt to unify the scandal construction with the instances of displacement that target the last verb of the complement of the selector. Consequently, the necessary mechanisms to derive the scandal construction will be rather different, see, e.g., Vogel (2009) and Wurmbrand (2012) for relevant proposals. An alternative view is proposed in Meurers (2000, 96ff.), taking up an observation by Merkes (1895, 33f.): He argues that the scandal construction should be considered a residue of a construction that was more prominent in Middle High German (cf. Jäger 2018); this construction shows a systematic syntax-semantics mismatch: In three-verb clusters with the perfective auxiliary semantically as V1 and the modal as V2, the modal appears syntactically as V1 and the perfective auxiliary as V2 (basically as in English *should have left*). The scandal construction can then be reanalyzed as a 321 cluster where morphological selection is regular. I will not choose between these options and leave the issue for future research.

Schallert (2018a) has recently drawn attention to hitherto neglected patterns of *zu*-placement: He provides three examples from Alemannic, Southern Bavarian and Low German as well as two examples from the internet where *zu* occurs displaced to the left in a descending verb cluster, thus, on V2 instead of V1, leading to *zu*21. In addition, he reports two instances of *zu*-doubling, from the dialect of Frankfurt and the urban dialect of Berlin, where in descending clusters *zu* is correctly placed on V1 but additionally occurs on V2 as well, leading to *zu*2*zu*1 (a few such examples can also be found on the internet). Because of their rarity one may be inclined to treat these examples as production errors, but as Schallert points out, next to the dialectal attestations, at least the first pattern without doubling can also be found in earlier stages of the language, cf. Behaghel (1923-1932, 308) and Ebert et al. (1993, 397, §179). Additional evidence for the viability of these patterns may come from the fact that similar patterns can be found in Flemish and Afrikaans (*te* before the verb cluster) and Dutch dialects (*te*-doubling and -lowering), cf. Sect. 7.1 below. Eric Hoekstra (p.c.) pointed out to me that in Frisian (descending clusters) *te*-doubling occurs as well. Given the scarcity of information about these placements, I will refrain from speculating about possible analyses, although a treatment similar to that for Afrikaans and Dutch dialects may be an option (cf. 7.1). For a concrete proposal, see Schallert (2018a).

3 The derivation of displaced morphology

The basic idea underlying the placement of non-finite morphology is very simple: Adopting a Distributed Morphology architecture (Halle and Marantz

1993), the non-finite morphology is inserted into independent syntactic heads and is associated with its host post-syntactically by means of Local Dislocation, an operation that applies to linear structure and is constrained by adjacency (Embick and Noyer 2001; cf. also Hinterhölzl 2009, 2018). Concretely, there are separate functional heads F that host the features corresponding to *zu* (cf. Den Dikken and Hoekstra 1997, 1062) and the other non-finite categories (past participle, gerund, (*ge*-)infinitive). These functional heads occur above VP. Morphological selection is thus checked in syntax: A complementizer/V1 that takes a *zu*-infinitive is syntactically combined with an FP hosting the relevant syntactic features (given a post-syntactic approach to morphology, the exponents are inserted late). For my purposes the correct result obtains irrespective of whether this involves checking between C/V and F or if F starts out with unvalued features and is valued by the governing verb/complementizer (as in Adger 2003; Wurmbrand 2012). The functional heads hosting inflectional information take their VP-complement to the left, in accordance with the head-final nature of the German VP.[11] As a consequence, the non-finite morphology always comes last in the complement of the selector. This captures the generalization that the non-finite exponents always attach onto the last verb in the complement of their selector. The mechanism that associates the morphology with its host is thus always the same, but since Local Dislocation applies to linear structure, it can have very different effects, depending on the order in the verb cluster: If the order is strictly descending (viz., (3)21), the morphology appears to be well-behaved. If, however, the immediately dependent verb does not occur last in the selector's complement, the non-finite morphology will appear to be displaced. Crucially, however, there is thus no displacement operation as such; rather, displacement is only a side effect.

I make the following assumptions about verb clusters: First, the coherence/restructuring effects are due to the fact that the relevant verbal projections contain less structure, viz., lack a CP- (and possibly a TP-) layer, cf., e.g., Wurmbrand (2007). In what follows, I will label all verbal projections as VPs for ease of readability even though they may slightly differ in size (i.e., corresponding to VP/*v*P/TP) and some may better be classified as functional (cf. Wurmbrand 2004b). Second, I assume that the various orders that can be observed in verb clusters are largely a matter of PF, i.e, are determined by linearization parameters, cf. Bader and Schmid (2009); Abels (2016) (and, probably, Schmid and Vogel 2004) or explicit PF-operations such as VP-inversion/flip (Haegeman and van Riemsdijk 1986; Williams 2004; Wurmbrand 2004a,c) or Local Dislocation (cf. Salzmann 2013a). For reasons of simplicity, I will in what follows treat the orders 123, 132, 231 and 321 as arising through flexible linearization between head and complement, but a derivational perspective where one order is basic and the others are derived from it by means

[11] F thus differs from other functional heads in the language, viz., C and D, which precede their complement. However, since F is essentially an inflectional/agreement head and thus belongs to a different section of the clausal spine than C and D, I take this to be unproblematic. Evidence for further functional heads in the clausal domain like *v* and T is scarce given that they do not seem to be targeted by verbs in a final movement step (Haider 2010).

of additional PF-operations would also work for my purposes. The 312 and the 213 order require additional operations, as discussed below. For a comparison of left-branching and right-branching accounts, see Salzmann (2013b), for a discussion of alternative ways of deriving the different cluster orders, cf. Salzmann (2019b, this issue); for XP-/remnant movement-based approaches, see also Sect. 4 below.

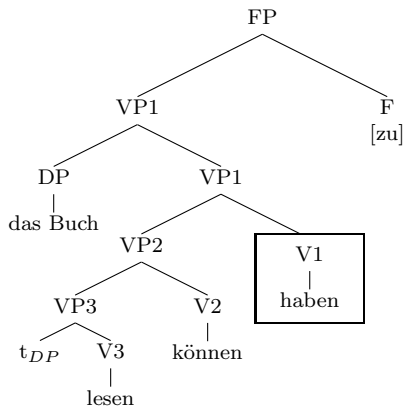
I will now go through the derivations for the placement of non-finite morphology. I will first discuss non-finite morphology that originates outside the cluster (i.e., is selected by N/A/C) before addressing the placement of non-finite morphology selected within the cluster.

I will start with Standard German Aux-Mod-Inf clusters involving both 'well-behaved' 321 cases like (9a) as well as examples with displacement such as (9b) and (9c). I repeat them for convenience:

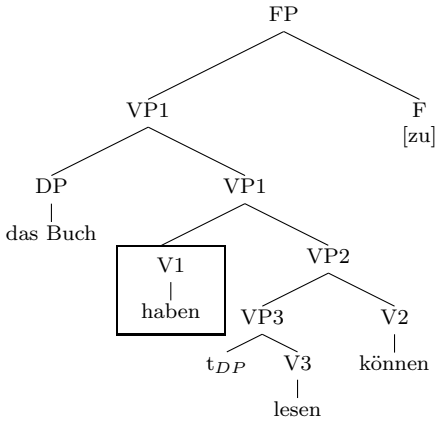
(32) ohne das Buch {lesen$_3$ gekonnt$_2$ **zu** haben$_1$ | haben$_1$
without the book *read.*INF *can.*PTCP *to* *have.*INF *have.*INF
lesen$_3$ **zu** können$_2$}
*read.*INF *to* *can.*INF
'without having been able to read the book' 321/132 *Standard G.*

In Standard German, Aux-Mod-Inf clusters occur in either a strictly left-branching (321) order where the VP-complements are ordered before the governing Vs, cf. (33), or in a mixed (132) order, cf. (34), where VP2 is ordered after V1, while VP3 is ordered before V2 (the boxed verb is the one whose position is crucial; for simplicity's sake, I represent the features corresponding to *zu* as [zu]):[12]

(33) Aux-Mod-Inf 321:



(34) Aux-Mod-Inf 132:



[12] If non-verbal material is not scrambled out of the lexical VP, Verb Projection Raising arises, see Salzmann (2019b, this issue). For a base-generation alternative to scrambling in such configurations, see Salzmann (2011). In the tree diagrams in the text, scrambled material is located in a specifier of V1; a specifier of F would be a possible landing site as well; since the two options are difficult to tease apart, I will not dwell on this.

At vocabulary insertion, the hierarchical structures are converted into a linear string. *Zu* is thus inserted into F. Importantly, *zu* is a dependent element that needs to attach to the left of its host, a verb in the infinitive. This triggers Local Dislocation, by which it is affixed onto and inverted with the closest, i.e., linearly adjacent verbal element. The operation is thus Vocabulary-sensitive (cf. Embick and Noyer 2001, 566; Kramer 2010).[13]

Depending on the linearization, this will target different verbs: In (33), *zu* will attach to V1 and thus derives the 'well-behaved' case in (9a) above, as illustrated in (35a). In (34), however, *zu* attaches to V2, which is the adjacent verb in this derivation, leading to displacement, as illustrated in (35b):

(35) a. left-branching: V3 V2 V1 zu ⇒ V3 V2 **zu**+V1
LD
b. mixed: V1 V3 V2 zu ⇒ V1 V3 **zu**+V2
LD

In strictly ascending 12(3) clusters like (14a), (14b), (14c), VP2 is ordered after V1. Since F is always ordered after its complement VP1, *zu* will be inserted at the end of the entire verb cluster and thus attaches to the last verb of the cluster. (36) illustrates *z(u)*-placement in the derivation of (14c):

(36) a. linearization: C V1 V2 z
b. *z*-placement: C V1 V2 z → C V1 **z**+V2
LD

Displacement with 312 orders as in (9c) proceeds similarly. Assuming that this order involves movement of VP3 to a position above V1 and linearization of VP2 after V1 (Wurmbrand 2004c; Abels 2016), the derivation of (9c) will be as in (37) (for concreteness' sake, I assume that VP3 moves to SpecFP):

(37) a. VP3-movement: $[_{FP}\ [_{VP1}\ [_{VP2}\ [_{VP3}$ V3] V2] V1] F] ⇒
$[_{FP}\ [_{VP3}$ V3] $[_{F'}\ [_{VP1}\ [_{VP2}$ t$_{VP3}$ V2] V1] F]]
b. linearization: $[_{FP}\ [_{VP3}$ V3] $[_{F'}\ [_{VP1}$ **V1** $[_{VP2}$ t$_{VP3}$ V2]] F]]
c. *zu*-placement: V3 V1 V2 zu → V3 V1 **zu**+V2
LD

Turning to clusters with 231 order as in (14d), the correct result obtains if VP3 is ordered after V2, while VP2 is ordered before V1:

(38) a. linearization: N V2 V3 V1 z
b. *z*-placement: N V2 V3 V1 z → N V2 V3 **z**+V1
LD

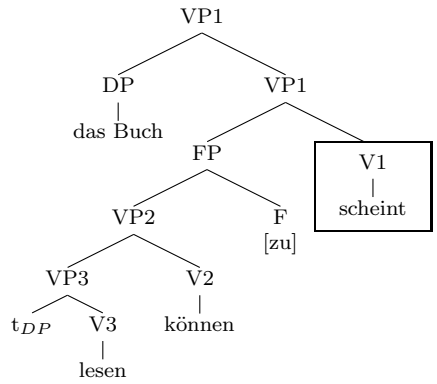
[13] Note that for ease of representation I have omitted the functional projection hosting the features of the participle selected by V1 in (33) and (34). In (33) this head would also be linearized after its VP-complement, viz., VP2, so that the participle attaches to V2, resulting in (9a). In the 132 order in (34), V2 regularly appears in the infinitive rather than as a participle, instantiating the IPP-effect. Projections for infinitive morphology have also been omitted. See Sections 5.1, 5.2 below for discussion of the infinitive and the IPP-effect.

For displacement in 213-clusters like (14e), I adopt the approach by Salzmann (2013a), where 213 orders involve a strictly ascending 123 linearization, cf. (39a), followed by Local Dislocation that inverts V2 with V1, cf. (39c) (given cyclicity, *z*-placement will occur before cluster formation, cf. (39b)):

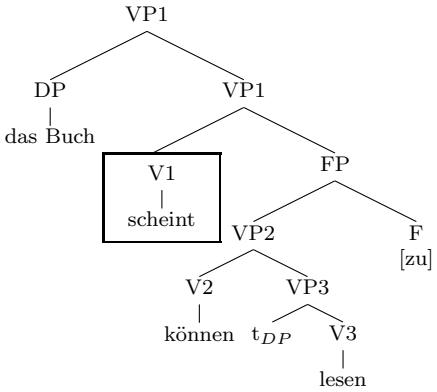
(39) a. linearization: V1 V2 V3 z
b. *z*-placement: V1 V2 V3 z → V1 V2 **z**+V3
LD
c. cluster formation: V1 V2 z+V3 → [V2+V1] z+V3

I now turn to placement of non-finite morphology that is selected by V1. The following trees represent two options of ordering a cluster where V1 selects a *zu*-infinitive and V2 a bare infinitive as either strictly descending or strictly ascending (for the finite morphology on V1, cf. Sect. 7.2; projections for infinitival morphology have been omitted for ease of presentation, cf. Sect. 5.1; Standard German lexicalizations are used to facilitate understanding, but the structures are meant to apply to all German varieties):

(40) *Zu*-Selector-Mod-Inf 321:



(41) *Zu*-Selector-Mod-Inf 123:



Recall that there is no displacement in 321, 132, and 312 orders. This is trivially linked to the fact that in these orders, the verb immediately dependent on V1 is the last verb in V1's complement. In the 321 order as in (7c) above, V1 and V2 take their complements to the left. The morphology selected by V1 will be linearized after VP2 and thus affixed onto V2:

(42) a. linearization: V3 V2 zu V1
b. placement: V3 V2 zu V1 → V3 **zu**+V2 V1
LD

In the derivation of 132 orders as in (15a) and (20a), V1 takes its FP-complement to the right, while VP2 is ordered before F; the complement of V2 is also ordered to the left. At PF *zu* (or some other non-finite exponent, in the case of (20a) the gerund) is affixed onto V2:

(43) a. linearization: V1 V3 V2 z
b. placement: V1 V3 V2 z → V1 V3 **z**+V2
LD

In the derivation of 312 orders as in (15b) and (20b), VP3 undergoes movement above V1 (to SpecVP1 in (44) for concreteness' sake), while V1 takes its FP-complement to the right. Since F follows its VP-complement (= VP2), F is linearized at the end of the cluster and attaches to V2:

(44) a. VP3-movement: $[_{VP1}\ [_{FP}\ [_{VP2}\ [_{VP3}$ V3] V2] F] V1] ⇒
$[_{VP1}\ [_{VP3}$ V3] $[_{V1'}\ [_{FP}\ [_{VP2}\ t_{VP3}$ V2] F] V1]]
b. linearization: $[_{VP1}\ [_{VP3}$ V3] $[_{V1'}$ V1 $[_{FP}\ [_{VP2}\ t_{VP3}$ V2] F]]]
c. placement: V3 V1 V2 z → V3 V1 **z**+V2
↰LD┘

In the orders 123, 231 and 213, the morphology selected by V1 is displaced to V3. In the 123 order as in (16a), (16b), (18), (19a) and (19b), V1 and V2 take their complement to the right. Since F follows its VP-complement (VP2), cf. (41), it is linearized at the end of the cluster and the exponent inserted into it is consequently attached to V3 (illustrated in (45) for *z*):

(45) a. linearization: V1 V2 V3 z
b. placement: V1 V2 V3 z → V1 V2 **z**+V3
↰LD┘

In 231 clusters as in (17a), V1 takes an FP-complement (containing VP2) to its left, while the complement of V2 is ordered to its right. After linearization, F is thus adjacent to V3 so that there is displacement to the left:

(46) a. structure: $[_{VP1}\ [_{FP}\ [_{VP2}$ V2 $[_{VP3}$ V3]] F] V1]
b. linearization: V2 V3 z V1
c. placement: V2 V3 z V1 → V2 **z**+V3 V1
↰LD┘

For clusters with 213 order as in (17b) and (21) above, I again adopt the proposal by Salzmann (2013a) where 213 involves ordering of the complements of V1 and V2 to the right, cf. (47a), followed by Local Dislocation that inverts V1 with V2, (47c) (because of cyclicity, *z*-placement precedes cluster formation):

(47) a. linearization: V1 V2 V3 z
b. *zu*-placement: V1 V2 V3 z → V1 V2 **z**+V3
↰LD┘
c. cluster formation: V1 V2 z+V3 → [V2+V1] z+V3

It should have become clear that displacement is just a side-effect of cluster-reordering; there is crucially no displacement rule as such. Rather, there is just a single mechanism that associates the non-finite morphology with its host. This implies that there are no longer two rules in conflict (as claimed in Bech 1963) so that displacement cannot be viewed as a repair or compromise construction. Rather, displacement arises from a conflict between the head-finality of the German VP (as expressed by the head-final linearization of the functional heads with respect to their VP-complements) and the possibility of (partially) ascending verb clusters.

The facts thus all fall out from independently motivated principles: The head-finality of the German VP motivates the head-final ordering of the functional head F, and the selectional properties of the vocabulary items, e.g., that they have to precede their host like *zu*, determine their exact position (i.e., trigger Local Dislocation). An explicit rule for the placement of non-finite morphology is thus unnecessary. Finally, the various cluster order possibilities are independent properties of a given variety.

This section has already provided a first argument in favor of a post-syntactic treatment: Since the placement of non-finite morphology is partly governed by linear notions, handling morphological selection entirely in syntax (by means of checking/Agree) will not be sufficient (but see the appendix for how an Agree-approach can be reconciled with the post-syntactic perspective pursued here). The following two sections provide further evidence for the post-syntactic perspective (for discussion of earlier derivational approaches to *zu*-placement, see Salzmann 2016, 420 and the next section; for representational approaches to displaced morphology, see Sect. 6.2 below).

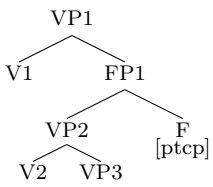
4 Absence of semantic effects

Displaced morphology is crucially not interpreted in its surface position. This can be shown with the PPI-construction, repeated from (18):

(48) ob in diu edele vrouwen het(e)$_1$ lazen$_2$ daz getan$_3$
if him the noble lady have.SBJV.*3*SG *let*.INF *that do*.PTCP
'if the noble lady had let him do that' *MHG, Nibelungenlied 634,2*

Although the participle morphology occurs on V3, it semantically applies to VP2. This follows straightforwardly under the post-syntactic approach pursued here: At spell-out, which forms the input to LF, the features realized by the participle are located in an FP above VP2 and thus will be interpreted in the correct position, cf. (49) (I henceforth represent the features realized by the past participle simply as [ptcp], thereby remaining agnostic as to the precise semantic contribution). Crucially, Local Dislocation at PF does not have any effect on the interpretation (this argument presupposes that the participle contributes to the meaning of the present perfect, cf. Wurmbrand 2004a):

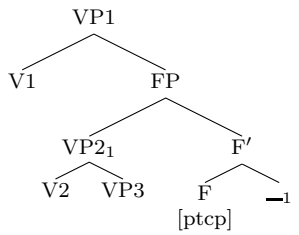
(49)



In approaches where displacement is derived by means of syntactic operations as in antisymmetric XP-movement approaches, serious problems arise for semantic interpretation: For an F-head hosting features like [ptcp] to occur at the end of (part of) the cluster, the relevant part of the cluster has to be moved

into its specifier. For instance, in the approach by Barbiers (2005), which is based on Agree + VP-movement, VP2 has to move to derive (48):

(50)

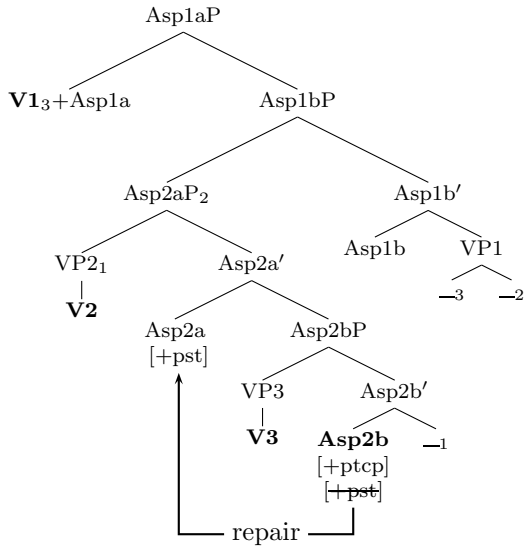


To obtain the correct interpretation, one either has to assume that F applies to its specifier rather than simply its c-command domain as is standardly assumed or that VP has to undergo obligatory reconstruction; this complication does not arise under the post-syntactic approach.

Even more serious issues arise with the remnant movement approach by Hinterhölzl (2009, 2018). Simplifying somewhat, massive (remnant) XP-movement takes place in the derivation of verb clusters for temporal licensing and subcategorization checking and targets aspect phrases. The displaced morphology is a phrasal affix in Asp2 of the extended projection of V2. The basic idea is that displacement obtains if an XP (containing a verb) moves into the specifier of a phrasal affix that is associated with a higher VP.

The derivation of an example like (48) then proceeds as follows: VP3 moves to SpecAsp2bP, and VP2 moves to SpecAsp2aP. Finally, the entire Asp2aP is moved into SpecAsp1bP. At Morphological Form, the affix in Asp2b is affixed onto the verb in its specifier, viz. V3 (cf. Hinterhölzl 2009, 208–211; I have modified the labels to make the structure more transparent):

(51)



The problem with this derivation is quite obvious: In (51) the participle would apply to V(P)3 (Hinterhölzl assumes that the heads always semantically ap-

ply to their specifiers), deriving the wrong interpretation. To avoid that, Hinterhölzl proposes a repair operation which copies the *semantic* feature [+pst] from Asp2b to Asp2a (which then applies to the VP2 in its specifier). Note that this is a semantic repair in syntax; there is nothing wrong with the syntax as such, which casts doubts on the viability of this repair operation. A slightly different repair can be found in Hinterhölzl (2018, Sect. 5.1): Here, the semantic feature is copied onto a head above VP2, which then enters Agree with V2. This strikes me as equally problematic as the previous repair solution.[14]

It should have become clear that approaches to verb clusters that rely on syntactic operations to derive displacement run into serious difficulties once the semantic interpretation of the displaced morphology is taken into account. The post-syntactic approach is at a clear advantage here.

5 Restrictions on displacement

Importantly, displacement is not unrestricted. This has to do with the fact that once there is more than one selector of non-finite morphology in the same local domain, more than one exponent will have to be attached to the same verb if the ordering of VPs leads to displacement. Generally, displacement is possible as long as there are no conflicts between the selectional properties of the vocabulary items. I will discuss four different scenarios in this section: First, a conflict of the selectional properties leads to a crash of the derivation at PF; displacement is thus blocked. Second, displacement is possible despite a clash in selectional requirements because the features for one of the exponents are deleted by impoverishment. Third, displacement is possible because identical exponents can be deleted under identity. Fourth, displacement is possible because the vocabulary items are compatible with each other. Since the restrictions on displacement thus follow from independently established properties of vocabulary items, they provide yet another argument for a post-syntactic treatment. In the last subsection, I discuss *zu*-placement with prefix and particle verbs and in coordination.

5.1 Selectiveness

Initially, the free positioning of *zu* is reminiscent of that of special clitics (clitics subject to special ordering principles): It occurs at the edge of the verb cluster, viz., in second to last position when selected by an element outside the cluster. Therefore, the implications of *zu*-displacement for morphological theory may not be obvious (note that *zu* goes back to a preposition and thus a free-standing element, cf. Demske-Neumann 1994, 120–127 for diachronic data). However,

[14] At first sight, one might argue that under remnant movement, the remnant VP has to be reconstructed anyway so that no problems arise for interpretation. However, if Barss' generalization (Barss 1986) is taken seriously, this would imply that while the remnant XP can be reconstructed, the XP extracted from the remnant cannot. Thus, in the PPI-example, if VP3 moves out of VP2 and VP2 undergoes remnant movement, VP3 cannot reconstruct into VP2 anymore, but this is crucially necessary to obtain the correct interpretation.

the free positioning cannot be considered a diagnostic for clitic-status given that bona fide affixes like participles, *ge*-infinitives and gerunds are subject to the same (dis-)placement rules. Additionally, *zu* patterns with affixes in having selectional properties: it only attaches to verbs in the bare infinitive. Unlike the cognate English *to*, it cannot be separated from the verb by non-verbal material (*zu* also occurs inside particle verbs, cf. Sect. 5.5):

(52) a. to quickly eat the bread
b. um das Brot {schnell} zu {*schnell} essen
*to the bread quickly to quickly eat.*INF

The selectiveness of *zu* will be the crucial property for the analysis to follow. Other properties of *zu* that are usually taken to be relevant for the clitic-affix distinction are inconclusive in my view (see also Schallert 2018b for discussion): It differs from the past participle in that it neither shows any lexical exceptions (i.e. paradigmatic gaps) nor morphological idiosyncrasies, but the uncontroversially affixal bare infinitive is also completely morphologically regular and free of lexical gaps. The non-deletetability in coordination discussed in Sect. 5.5 is also not restricted to affixes but occurs with clitics as well.

Because it shows selectiveness and flexible positioning, *zu* has been referred to as a phrasal affix, see Vogel (2009); Hinterhölzl (2009). I will refrain from deciding on a strict classification of *zu* because the clitic-affix dichotomy has generally been called into question from a cross-linguistic/typological point of view (Embick and Noyer 2001; Bickel et al. 2007) since the properties thought to distinguish clitics and affixes do not always line up. For this reason the distinction has been abandoned within Distributed Morphology (both morphological objects are inserted into terminal nodes). The fact that all non-finite categories behave the same with respect to displacement supports this view.

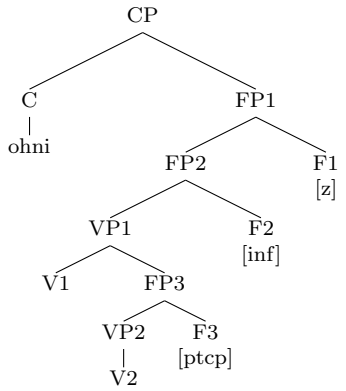
That selectiveness is a crucial factor in understanding the restrictions on displacement can be shown for *zu* as follows: In some Western Swiss German dialects (e.g., Bernese or Fribourg German), two-verb clusters with V1 = perfective auxiliary and V2 = participle allow both the 12 and the 21 order when V1 is finite, (53a). However, if V1 is non-finite, e.g. when selected by the complementizer *ohni* 'without', only the descending order is possible, (53d). The ascending order is ungrammatical, irrespective of whether *zu* is placed on V1 (i.e., not displaced), (53b), or whether it undergoes displacement to V2, (53c) (I am grateful to Raffaela Baechler for confirmation of the facts):

(53) a. das er s Buech hät$_1$ kchaufft$_2$/ kchaufft$_2$ hät$_1$
*that he the book have.3*SG *buy.*PTCP *buy.*PTCP *have.3*SG
'that he bought the book' 12/21; *Swiss G., Western dialects*
b. *ohni s Buech **z** ha$_1$ kchaufft$_2$
*without the book to have.*INF *buy.*PTCP
'without having bought the book' 12; *Swiss G., Western dialects*
c. *ohni s Buech ha$_1$ **z** kchaufft$_2$
*without the book have.*INF *to buy.*PTCP
'without having bought the book' 12; *Swiss G., Western dialects*

d. ohni s Buech kchaufft$_2$ **z** ha$_1$
*without the book buy.*PTCP *to have.*INF
'without having bought the book' 21; *Swiss G., Western dialects*

The reason why displacement is blocked here is the following: In the syntax, there will be a functional projection above the verb cluster for *z*, selected by *ohni* 'without'. Importantly, *zu* itself selects an infinitive and thus an FP hosting the relevant feature, a fact I omitted in the diagrams and derivations in Sect. 3 above (more explicit derivations below will show that this does not affect the results). In addition, there will be another functional projection hosting the features for the participle selected by V1 between V1 and VP2:

(54)



At linearization, the exponents for [ptcp] and [inf] are attached cyclically, viz., bottom-up/inside-out (Embick and Noyer 2001). Consequently, the participle exponent is attached to V2 first. Since the participle selects a stem, this will be felicitous. Thereafter, however, the infinitive exponent has to be affixed.

Affixation fails in this case because the infinitive suffix has to attach to the stem as well; but since the participial suffix has already been attached, this is no longer possible. In other words, the derivation crashes at the linearization of FP2 because the selectional properties of the inf-suffix are not respected. The failed displacement is schematically represented in (55):

(55) C $\overset{z+\text{inf}}{\frown}$ V1 $\underset{\text{ptcp}}{\smile}$ V2 $\rightarrow$ **ohni* V1 [*z*+[ptcp(*ge*)+V2+ptcp(*t/en*)]+inf(-*en*)]

I have treated the participle morphology as a circumfix for ease of illustration, but nothing really hinges on this as long as the participial suffix is attached before F2 is considered. The same result obtains if the prefix is treated as a separate element, e.g., introduced by a readjustment rule or as a secondary exponent. Of course, participle formation may additionally involve ablaut; I will abstract away from this in what follows as it has no effect on displacement.

Importantly, displacement remains blocked even if V2 is a participle that does not take a *ge*-prefix (*ge*- fails to surface with stems that do not have initial

main stress, a general property of prefix verbs) and happens to be identical to the infinitive (it belongs to the strong inflection and features no vowel change):

(56) *ohni s ha z ver-gäss-e
without it have.INF *to* PREF-*forget*-PTCP
'without having forgotten it' *Swiss German (Western dialects)*

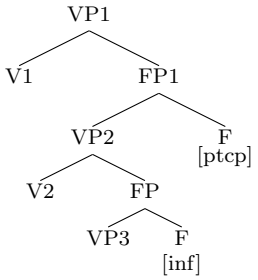
The derivation of (56) fails because the infinitive suffix cannot attach to the participle. It also shows that *zu* clearly has morphological selection requirements, i.e., it needs to attach to a verb in the bare infinitive; the fact that the past participle *vergässe* is phonologically identical to the bare infinitive is not sufficient (there is thus no phonological haplology, see also fn. 21).

The problems I have just discussed in principle always obtain under multiple displacement because more than one exponent needs to be attached to the same verb. Since the selectional properties of the vocabulary items often conflict with each other, this will frequently lead to a clash in the morphology and thus to a crash of the (PF-) derivation. Accordingly, displacement is by necessity rather restricted.[15]

5.2 Conflict resolution by impoverishment

In the previous subsection, there was a conflict between the infinitive and the participle morphology. This conflict also obtains systematically in Aux-Mod-Inf clusters in the 123 order: Both the infinitive selected by V2 as well as the participle selected by V1 target V3 (for additional functional projections in infinitives like wollP, cf. Wurmbrand 2014):

(57)



In this configuration, we predominantly find two solutions: the PPI-construction as in (48) or the IPP-construction, where both V2 and V3 appear as bare in-

[15] The derivation also crashes if there is no adjacent verb for the affix to attach to, e.g., when a PP is extraposed/right-adjoined to VP and thus linearized between V and F:

(i) $[_{FP}\ [_{VP}\ [_{VP}\ V\ ]\ PP\ ]\ F\ ] \rightarrow$ V PP F

Extraposition thus has to target FP, which is unproblematic under the assumption that the choice of extraposition site is free.

finitives. In East-Central-German and East Franconian dialects, we instead often find a so-called supine form on V2 as in (58) (from Höhle 2006, 58):[16]

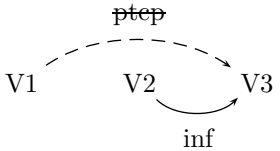
(58) de håsd$_1$ darfd$_2$ dringke$_3$
*you have.2*SG *may.*SUP *drink.*INF
'You were allowed to drink.' *Oberschwöditz*

I propose that the PPI- and the IPP-construction are two sides of the same coin: They result from deleting the features of one of the functional morphemes to be attached to V3 by means of impoverishment. Deletion of the participle features leads to the IPP-construction, deletion of the infinitive features results in the PPI-construction. Furthermore, since in both constructions, V2 fails to be associated with functional morphemes, default morphology is inserted, either an infinitive or a supine (depending on the variety).[17]

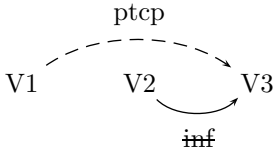
(59) IPP-construction
a. linearization: V1 V2 V3 inf ptcp
b. affixation: V1 V2 V3+inf ptcp
c. impoverishment: V1 V2 V3+inf ~~ptcp~~
d. default: V1 V2+inf/Sup V3+inf

(60) PPI-construction
a. linearization: V1 V2 V3 inf ptcp
b. impoverishment: V1 V2 V3 ~~inf~~ ptcp
c. affixation: V1 V2 V3+ptcp
d. default: V1 V2+inf V3+ptcp

The derivations are schematically illustrated in (61) and (62):

(61)


⇒ V1 V2 [V3+inf]

(62)


⇒ V1 V2 [V3+ptcp]

The infinitive has a double function: It can be regularly selected or it can act as a default if a verb does not receive any functional morphemes. The fact

[16] Supines are non-finite verb forms that are characterized by a weak participial suffix affixed to the bare stem and the lack of the *ge*-prefix. They cannot be analyzed as past participles without prefixes because the suffix is always weak even if the verbs form the participle according to the strong inflection; furthermore, the stem-vowel usually differs from the vowel of the past participle and that of the infinitive. The varieties differ with respect to the verbs that show supine forms. This usually includes modal verbs, while other infinitive-selecting verbs (like 'see', 'learn') can occur in the IPP-form (i.e., the infinitive); but in some varieties (e.g., in Oberschwöditz), even these appear as supines in complex clusters, cf. Höhle (2006, 57–63). Supines are attested in earlier stages of the language (cf. Jäger 2018) and also occur outside of the East-Central-German and the East Franconian area, e.g., in Low German (cf. Bölsing 2011), in Bavarian and in the Alsace (cf. Höhle 2006, 60f. for references). For examples in (the history of) Dutch, cf. Zwart (2007, 85f.).

[17] Hinterhölzl (2018) argues that displacement in the PPI-configuration is unproblematic because the participle featurally subsumes the infinitive. Since there is no transparent morphological relationship between infinitives and participles, this strikes me as unconvincing.

that only V2 appears as a supine, while V3 appears in the form selected by V2 in (58) provides clear support for that. Further evidence that the selectional requirements of V2 can be realized on V3 if those of V1 are deleted by impoverishment can be found in Steube (1995, 432), where in an Aux-Mod-Inf cluster V2 appears as a supine and V3 as a *ge*-infinitive as selected by V2 'can' (cf. also fn. 30). The supine, however, only occurs as a default form; it therefore only occurs in 123 but not 132 orders (Höhle 2006, 62, ex. 20. vs. 21; 72, ex. 54ii vs. 55). The following minimal pair provided by Anita Steube (p.c.) illustrates the same point (V1 selects a bare infinitive, V2 a *ge*-infinitive):

(63) doas=e will$_1$ mit än fliecher kön**d**$_2$ ge-foar$_3$/ge-foar$_3$ kön$_2$
that=he wants with a plane can.SUP GE-*go*.INF/GE-*go*.INF *can*.INF
'that he wants to be able to travel by plane.' *Steinbach-Hallenberg*

Crucially, the supine arises not only with V1 = perfect auxiliary, cf. (58), but also with V1 selecting a gerund, cf. (76), (79); a bare infinitive, cf. (63); or a *ge*-infinitive, cf. (75), showing that it is not selected by V1 (agreement in mood with the governing verb in some varieties suggests some interaction after all, cf. Höhle 2006, 58–59; for a cluster with two supines, cf. Jäger 2018, fn. 20).

Treating the absence of participial morphology in Aux-Mod-Inf clusters by means of impoverishment goes back to Wurmbrand (2004a). The main argument for this view comes from the fact that the IPP-construction has the same meaning as the version with the participle. Since syntactically the participial features are located in a functional head above VP2, the perfect semantics will apply to VP2. Impoverishment of the participle features at PF will not affect the interpretation (as in Sect. 4 above, this argument presupposes that the participle contributes to the meaning of the present perfect). Importantly, deletion of the participial features can be considered a means of conflict resolution only in the orders 123 and 231 (and perhaps 213), where both the infinitive and the participle would have to be affixed onto V3. In these orders, the impoverishment rule deletes the [ptcp]-features in the context of an infinitive. However, within German varieties, the IPP-effect is also found in the 132, the 312 and, more rarely, in the 321 order (cf. Zwart 2007; Wurmbrand 2017, Sect. 2.2; for an interesting exception, see Meurers 2000, 223). This suggests that in these varieties, the impoverishment rule deleting the features of the participle is more general in that it applies when a participle head has as its complement a V that selects an infinitival VP. Thus, conflict-resolution-induced impoverishment may historically be the first step, but in modern varieties that have the IPP-effect in several orders (and not just in the 123 order), synchronically there will arguably be just one general impoverishment rule.

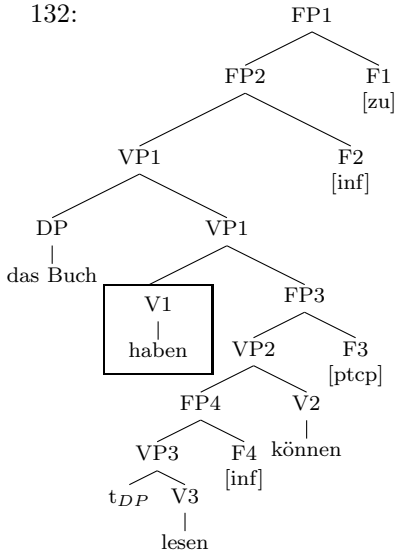
Wurmbrand proposes that linearization follows impoverishment (she assumes that the infinitival form of V2 triggers the 132 order). For a variety that displays the IPP-effect only in the 123 order, the reverse order is needed to treat the deletion of participial features as a means of conflict resolution since the conflict only arises after linearization. However, once deletion of participial features has become a general rule of the language as is the case in many modern German varieties, nothing precludes ordering impoverishment

before linearization. In fact, the impoverishment rule is easier to state when hierarchical structure is still present than under linear order, where the context restriction of the impoverishment rule would have to refer to the order in the cluster more generally and not just to adjacent verbs; in the subsequent derivations, I will thus order impoverishment before linearization.
The IPP-effect in a Standard German Aux-Mod-Inf cluster is thus derived as follows: There will be a functional head hosting the participial features above VP2. After impoverishment, cf. (64a), a mixed linearization (132) results, cf. (64b). Then, the inf-suffix after V3 will be attached, (64c). Finally, V2 receives infinitival morphology by default, (64d):[18]

(64) a. impoverishment: $[_{VP1}\ [_{FP1}\ [_{VP2}\ [_{FP2}\ [_{VP}$ V3] F2] V2] $F1_{[ptcp]}$] V1]
→ $[_{VP1}\ [_{FP1}\ [_{VP2}\ [_{FP2}\ [_{VP}$ V3] F2] V2] $F1_{[\sout{ptcp}]}$] V1]
b. linearization: V1 V3 inf V2
c. affixation: V1 V3+inf V2
d. default: V1 V3+inf V2+**inf**

Impoverishment also makes *zu*-displacement in 132 clusters as in (9b) possible: The syntactic structure would be as in (65) with several FPs:

(65) 132:



[18] The fact that the IPP-effect also occurs in 132 clusters shows that synchronically it is unrelated to displacement (another argument is that Dutch, which does not have displacement, also displays the IPP-effect). Things are different from a historical perspective given that the earliest clusters have strictly ascending 123 order. If there is displacement in such an order, V2 will not receive any functional morphemes so that a default form on V2 arises; at a later point this may be reinterpreted as a general rule so that impoverishment applies to participial features even in orders where no feature conflict arises, a plausible diachronic scenario in my view. For a recent historical overview of the IPP-effect, see Jäger (2018).
An even more general impoverishment rule seems to be at work in some Thuringian dialects where displacement from V1 (selecting a *ge*-infinitive, a *zu*-infinitive or a gerund) to V3 fails even though V2 selects a bare infinitive, so that both V2 and V3 appear in the bare infinitive, cf. Höhle (2006, 68, fn. 23; 69, ex.42/43; 71, ex. 49–53; 72, ex. 55). Apparently, the impoverishment rule in these varieties systematically deletes the selectional properties of V1 even if there is no conflict with those of V2.

After impoverishment of the participial features of F3, (66a), a mixed linearization obtains where F4 is linearized after VP3 and F2 and F1 after VP2, cf. (66b). Given cyclicity, the inf-suffix after V3 will be attached first, (66c). Since no participial affix is inserted in this order, no conflict arises with the infinitive suffix inserted into F2 so that it can be affixed, followed by Local Dislocation of *zu*, which attaches to the left of the newly built V2+Inf-complex, cf. (66d). Because of displacement, V1 is not associated with any functional morphemes and thus receives infinitival morphology by default, cf. (66e):

(66) a. impoverishment: [[[[[[V3 $F4_{[inf]}$] V2] $F3_{[ptcp]}$] V1] $F2_{[inf]}$] $F1_{[zu]}$]
→ [[[[[[V3 $F4_{[inf]}$] V2] $F3_{[\sout{ptcp}]}$] V1] $F2_{[inf]}$] $F1_{[zu]}$]
b. linearization: V1 V3 inf V2 inf zu
c. affixation: V1 V3+inf V2 inf zu
d. *zu*-placement: V1 V3+inf V2 inf zu→V1 V3+inf **zu**+V2+inf
e. default: V1+**inf** V3+inf zu+V2+inf
LD

Impoverishment in 132 orders can thus also have a conflict-resolving function as a side effect in that it removes the features for an exponent that might conflict with other exponents that are to be attached to the same verb.

If no impoverishment takes place, a strictly descending 321 order obtains; the F-head hosting [ptcp] would be linearized after VP2, while the F-heads hosting the features for *zu* and the infinitive would be ordered after V1, (67a). There is no feature conflict so the participle attaches to V2 and *zu*+inf attach to V1, while V3 receives infinitival morphology from V2, as in (9a) above:

(67) a. linearization: V3 inf V2 ptcp V1 inf zu
b. affixation: V3+inf V2+ptcp **zu**+V1+inf
LD

Given the possibility of impoverishment, one may wonder why impoverishment was not an option to resolve the feature conflict in the previous subsection, where in ex. (53c) *z*+inf had to attach to a participle in 12 order. Deleting the features of the participle can be ruled out given that the IPP-effect is restricted to larger verb clusters. Thus, synchronically, there seems to be no general conflict-resolving impoverishment rule (anymore?) in this variety. Consequently, deleting the participle features in two-verb clusters is not an option. Deleting the infinitive instead would violate *z*'s selectional properties. Deleting *z*, finally, would arguably violate recoverability.[19]

[19] Impoverishment also has a conflict-resolving function in the ascending attributive participle clusters mentioned in fn. 4: Deletion of the past participle features of the F-head following V2 makes attachment of the present participle possible, essentially as in the derivation in (66). Interestingly, ascending participle clusters where V1 selects a *zu*-infinitive are ungrammatical (cf. **der das Buch versuchen*$_1$ *zu les-ende*$_2$ *Schüler* 'the student trying to read the book'). Here, *zu*+inf are attached to V2 first. The present participle, which needs to attach to the stem, then cannot be affixed anymore to V2, leading to a crash of the derivation at PF. Interestingly, the surface-identical modal passive is grammatical as an attributive participle (*das zu les-ende Buch* 'the book that is to be read'). This suggests, in line with claims in the literature, that *zu* is not an infinitival marker in this construction but a modal element (that does not select an infinitive so that the participle can be attached).

5.3 Haplology/deletion under identity

In this subsection I discuss two configurations where a conflict is avoided because exponents can be deleted under identity; in one case, both selectors select the same non-finite category, in the other, the selected categories are in an inclusion relationship.

5.3.1 V1 and V2 select the same form

In the so-called missing-*z* construction in Swiss German (cf. Bader 1995, 22, 26), there are two *z*-selectors in ascending order ('seem' and 'try' in (68)), but we find only one *z*, on V3, the last verbal element of the cluster (while V2 appears in the bare infinitive):[20]

(68) wüu dr Hans sine Fründe schiint$_1$ probiere$_2$ **z** häuffe$_3$
because the John his.DAT *friends seem.3*SG *try*.INF *to help*.INF
'because John seems to try to help his friends' *Bernese German*

Displacement and the unavailability of impoverishment may also account for the rarity of three-verb clusters in German varieties where V3 is a participle and occurs in cluster-final position (cluster-final participles in 2-verb Aux-Ptcp clusters are well-attested, though). In Mod/Fut-Aux-Ptcp-clusters only the orders 132, 312 and 321 are well-attested (for rare examples with 123 in Bernese, cf. Hodler 1969, 684, 3). In the 123 order, both the participle morphology selected by V2 and the infinitive selected by V1 would be displaced to V3. Attachment of the infinitive will be blocked for the same reason that *zu*+inf cannot attach to Bernese Aux-Ptcp-clusters in 12 order. With impoverishment of participle features restricted to Aux-Mod-Inf clusters, the conflict cannot be resolved and the derivation crashes at PF.

[20] Missing *z* seems to be optional, which can be accounted for if FP3 can undergo extraposition so that it patterns like the 3rd Construction in Standard German, see Salzmann (2019b, this issue). According to Cooper (1995, 188f.), missing *z* is limited to Verb Raising cases (i.e., uninterrupted clusters) and is blocked in Verb Projection Raising. However, this claim could not be verified in an informal survey. Furthermore, a google search delivers two counter-examples, see (ia) and (ib):

(i) a. ... ohni öpe jeh mau säuber probiere$_1$, Dütsch z rede$_2$
without PRT *ever once self* *try*.INF *German to speak*.INF
'without ever trying to speak German oneself'
http://www.chefkoch.de/forum/2,22,296109/An-alle-CHer-Wir-zelebrieren-den-Kantoenligeist.html, accessed March 28, 2013.

b. S Ziel isch nid blibe z' stah sondern versueche$_1$ glich z bliebe$_2$
the goal is not stay.INF *to stand*.INF *but try*.INF *same to stay*.INF
'The goal is not to make no progress but to try to remain the same'
http://www.mosiweb.ch/maennerriege/maennerriege.htm

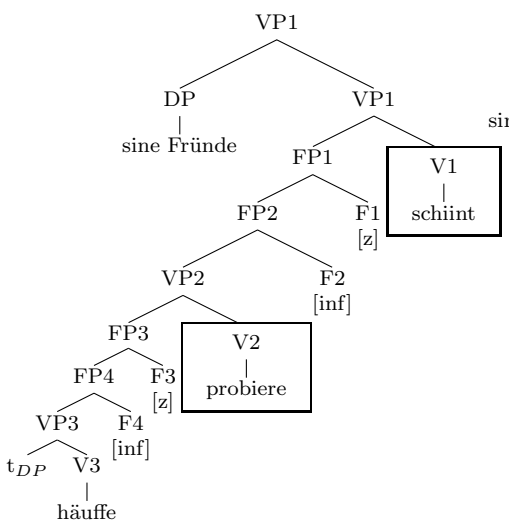
Another counter-example can be found in the description of the dialect of Bosco Gurin, see Comrie and Frauenfelder (1992, 1058) (the complementizer *fer* selects a *z* as does *tüa/tian*; the infinitive of causative 'do' always appears as a gerund);

(ii) Ech ha ts Büach kchöifft, fer ts Chenn tian$_1$ waldsch z leeran$_2$.
*I have.1*SG *the book bought for the child make*.GER *Italian to learn*.GER
'I bought the book in order to make the child learn Italian.' *dialect of Bosco Gurin*

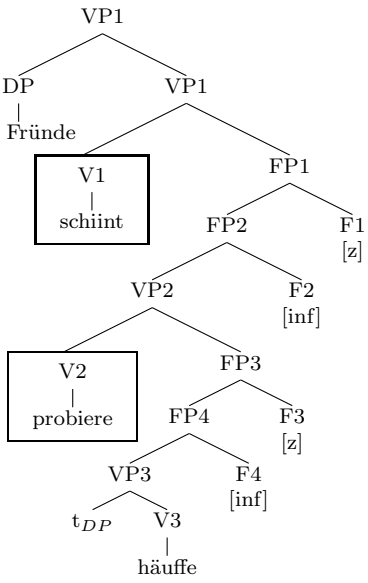
Missing-*z* also seems to be (marginally) available for some speakers of (spoken) Standard German, see footnote 22 below and Salzmann (2019b, this issue) for discussion.

In (69), the FP-complements of *zu*-selecting verbs are linearized in either strictly left-branching or strictly right-branching order (the latter option is the predominant one in Swiss German; mixed linearizations like 132 and 312 are possible as well, depending on the variety):

(69) left-branching:



(70) right-branching

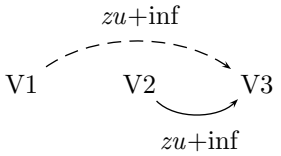


After linearization of (69), there will be a *z* and an infinitive suffix adjacent to each verb, thus deriving the unspectacular 'well-behaved' Standard German case in (7d) above. After linearization of (70), however, both *z*s and both infinitive suffixes follow the verb cluster, cf. (71a). I propose that the two *z*s and the two infinitive suffixes are reduced to one by haplology. More precisely, given cyclicity, the infinitive and the *z* adjacent to V3 are considered first; the infinitive is suffixed to V3, cf. (71b), and *z* undergoes Local Dislocation and thus prefixes to the V+Inf complex, cf. (71c). Then, the second Inf and *z* are considered. The infinitive is suffixed to V3, while *z* undergoes Local Dislocation, whereby it is prefixed to the entire complex, cf. (71d). Then, the outer *z* and the outer inf-morpheme are deleted under identity with the adjacent morphemes, cf. (71e). Deletion is unproblematic here without crashing the derivation because it is recoverable. Since V2 does not receive any functional morphemes, it receives infinitive morphology by default, (71f):[21]

[21] Note that this is an instance of morphological haplology. Deletion is only possible because the terminal hosting the second *z* bears the same features. Phonological haplology would wrongly predict haplology with verbs taking the *zu*-prefix like *zugeben* 'admit', which appears as *zuzugeben* 'to admit'. Consequently, the morpho-syntactic features must not be deleted after Vocabulary Insertion, cf. Embick (2015, 91, 107ff.) (recall also ex. (56) above). Haplology could, in principle, also be handled by means of impoverishment before vocabulary insertion (but after linearization). However, the data in Sect. 5.4 strongly suggest that the

(71) a. linearization: V1 V2 V3 inf z inf z
b. inf-affixation: V1 V2 V3+**inf** z inf z
c. Local Dislocation: V1 V2 **z**+V3+inf inf z
LD
d. inf-affixation + LD: V1 V2 **z**+z+V3+inf+**inf**
LD
e. deletion under identity: V1 V2 ~~z~~+z+V3+inf+~~inf~~
f. default: V1 V2+**inf** z+V3+inf

The haplology effect can be schematically illustrated as follows:

(72) 

→ V1 V2 *zu*+V3+inf

Haplology with *zu* may be more widespread than previously thought: In Frisian, where the cluster order is normally strictly descending, *te*('to')-infinitives allow the 312 order. In (73), a slightly modified version of the original example in Den Dikken and Hoekstra (1997, 1062) that was provided by Eric Hoekstra (p.c), both the complementizer *om* and V1 *hoeve* 'need' select *te*+gerund. Interestingly, we only find one *te*, crucially before the cluster-final verb V2:

(73) ... om net kontrolearre$_3$ hoeve$_1$ te wurden$_2$
*to not check.*PTCP *need.*INF *to become.*GER
'in order to not have to be checked' 312 *Frisian*

This pattern obtains if there is displacement and haplology, which can be derived by means of VP3-movement (contained in FP5), (74a), and ordering of FP3 after V1, (74b) (F1/F3 contain the features for *te*, F2/F4 the features for the gerund, F5 the features for the participle):

(74) a. [$_{FP1}$ [$_{FP2}$ [$_{VP1}$ [$_{FP3}$ [$_{FP4}$ [$_{VP2}$ [$_{FP5}$ [$_{VP3}$ V3] F5] V2] F4] F3] V1] F2] F1] →
[$_{FP1}$ [$_{FP5}$ V3 F5]$_1$ [$_{F1'}$ [$_{FP2}$ [$_{VP1}$ [$_{FP3}$ [$_{FP4}$ [$_{VP2}$ —$_1$ V2] F4] F3] V1] F2] F1]]
b. ordering:
[$_{FP1}$ [$_{FP5}$ V3 F5]$_1$ [$_{F1'}$ [$_{FP2}$ [$_{VP1}$ **V1** [$_{FP3}$ [$_{FP4}$ [$_{VP2}$ —$_1$ V2] F4] F3]] F2] F1]]

After linearization and attachment of the two *te*-prefixes and the two gerund-suffixes, the outer ones are deleted under identity, as in the Swiss German example above. The fact that V1 appears as a bare infinitive and not as a gerund (like V2), which is the form normally selected by *te*, suggests that there has been no *te*-deletion on V1 (Eric Hoekstra p.c.); rather, V1 has not

selectional requirements are checked under linear adjacency. In the case of *zu*-haplology, *zu* will therefore only see the adjacent infinitival suffix after linearization in (71) so that affixation and Local Dislocation will not be blocked. Therefore, haplology must follow Local Dislocation. The same holds for haplology involving *ge*-infinitives, cf. ex. (75). In the case of infinitive and gerund haplology (see Sect. 5.3.2), however, impoverishment could be ordered before insertion since the functional head would be adjacent to the suffix bearing the same features.

been associated with any functional morphemes and therefore appears in the bare infinitive by default.[22]
In (75), haplology occurs with *ge*-infinitives: V1 and V2 select a *ge*-infinitive, which occurs on V3, while V2 appears as a supine (Höhle 2006, 70):

(75) ə meçd$_1$ lɪwɚ kend$_2$ gə-aʁwəd$_3$
*I would like.1*SG *rather can.*SUP GE-*work.*INF
'I would rather like to be able to work.' *Barchfeld*

5.3.2 Selectional requirements of V1 and V2 in an inclusion relationship

Haplology also plays a crucial role when two non-finite forms are in an inclusion relationship. In the following example, V1 selects a gerund and V2 *zu*+gerund. While V2 appears as a supine, V3 occurs as *zu*+gerund, see Höhle (2006, 70):

(76) sɪ wiʁd$_1$ dɔs ned bʁyçd$_2$ tsə dʊ-n$_3$
*she will.3*SG *this not need.*SUP *to do-*GER
'She won't have to do this.' *Barchfeld*

Given a cyclic PF-derivation, the form selected by V2, viz., *zu*+gerund has to be attached first; the gerund-suffix is attached first, (77b), followed by Local Dislocation of *zu*, cf. (77c). Thereafter, the exponent selected by V1, viz., ger, is attached, cf. (77d). Then, the outer ger-suffix is deleted under identity, (77e). Finally, V2 receives supinal morphology by default, cf. (77f):

(77) a. linearization: V1 V2 V3 ger zu ger
b. gerund affixation: V1 V2 V3+**ger** zu ger

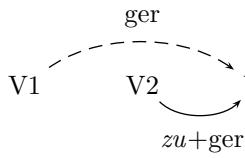
[22] In Standard German 3-element cluster-like constructions with V1 selecting a *zu*-infinitive (recall fn. 7), haplology effects seem to be possible to some extent, but the facts are subtle and require empirical verification (judgments vary), especially in the 312 order:

(i) a. weil er das Buch scheint$_1$ (??zu) glauben$_2$ verstehen$_4$ zu können$_3$
*because he the book seem.3*SG *to believe.*INF *understand.*INF *to can.*INF
'because he seems to believe he can understand the book' 1243 *Standard G.*
b. weil er das Buch scheint$_1$ verstehen$_4$ (??zu) glauben$_2$ zu können$_3$
*because he the book seem.3sg understand.*INF *to believe.*INF *to can.*INF
'because he seems to believe he can understand the book' 1423 *Standard G.*

In other orders like the 12 and 213 order (but not in the strict 321 order), though, *zu*-infinitives are usually constructed as a 3rd Construction with the *zu*-infinitive undergoing extraposition. Under the assumption that this includes the FP that hosts the features for *zu*, the infinitival clause will be outside the domain of the superordinate VP/FP so that there will be no displacement, see Salzmann (2019b, this issue).
If clusters with the highest verb being a *zu*-selector like *glauben* 'believe' are embedded under another *zu*-selector as in (i) but appear in descending order, the *zu* selected by the lower *zu*-selector is sometimes omitted, resulting in V4~~*zu*~~V3*zu*V2V1. This kind of haplology is not predicted by my account since this *zu* would not be inserted at the right edge of the cluster and therefore would not undergo deletion under identity. It is not fully clear to me whether this is a grammatical option or a performance error. Den Dikken and Hoekstra (1997, 1062) report this option for Frisian, but this may be due to a more general possibility of *te*-deletion in Dutch and Frisian varieties, cf. Sect. 7.1 below. For an attested example in a literary text, see Behaghel (1923-1932, volume 2, 308).

c. Local Dislocation: V1 V2 **zu**+V3+ger ger
LD
d. gerund affixation: V1 V2 zu+V3+ger+**ger**
e. deletion under identity: V1 V2 *zu*+V3+ger+~~ger~~
f. default: V1 V2+**sup** *zu*+V3+ger

Inclusion relationships are also found in some of the examples discussed in previous sections. In (14a), (14b), (14c), (16a), (16b), (17a) and (17b), the lower selector selects a bare infinitive, while the higher one selects *zu*+infinitive. The derivation is similar to (77) in that the inf-suffix selected by the higher selector is deleted under identity. In (19a) and (21), the lower selector selects a bare infinitive and the higher a *ge*-infinitive. In (19b), the lower selector selects a bare infinitive and the higher one a gerund. Since the infinitive is usually identical to the verb stem in Thuringian varieties, displacement will generally be unproblematic if one of the selectors governs the bare infinitive as it amounts to zero (haplology is thus unnecessary). Displacement under an inclusion relationship is schematically illustrated in (78):

(78) 

→ V1 V2 *zu*+V3+ger

5.4 Cumulativity: both exponents are attached

One of the strongest arguments for a post-syntactic perspective comes from examples like (79): Here, V1 selects a gerund, usually realized by the suffix *-e* in East Central and East Franconian varieties, while V2 selects a *ge*-infinitive, which amounts to a bare stem with a *ge*-prefix because the infinitive is identical to the stem in these varieties. Since these are marked forms that are not in a subset relationship, one expects a clash. However, the combination is felicitous: V3 bears both the *ge*-prefix and the gerund-suffix, see Steube (1995, 432f.):[23]

(79) öb-sd=e wörschd könd ge-kom-e
*if-2*SG-*you will.2*SG *can.*SUP GE-*come*-GER
'whether you will be able to come' *Steinbach-Hallenberg*

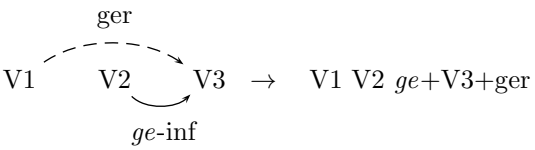
Thus, a non-finite form arises on V3 that is never selected by a single verb and thus would never occur in a two-verb cluster, viz. *ge*+V3+ger. (79) crucially suggests that the selectional restrictions of the vocabulary items are checked under linear adjacency rather than hierarchically: the gerund, which must attach to the stem, may be blocked when trying to attach to a complex head

[23] As pointed out in Höhle (2006, 68f., fn. 24), some speakers prefer a variant without the gerund, i.e., a form where the selectional requirements of V1 are suppressed, cf. fn. 30. According to Anita Steube (p.c.), the version with a gerund suffix is completely regular but mainly occurs in epistemic readings of 'will', while in purely futurate readings, the gerund suffix is missing.

consisting of verb stem and *ge*-infinitive. Under a linear perspective, however, after Local Dislocation of the *ge*-infinitive, the gerund suffix is adjacent to the verb stem and affixation is successful. Local Dislocation of the *ge*-prefix thus counterbleeds gerund-suffixation:[24]

(80) a. linearization: V1 V2 V3 ge ger
b. Local Dislocation: V1 V2 **ge**+V3 ger
LD
c. gerund affixation: V1 V2 ge+V3+**ger**

Checking selectional restrictions under adjacency will also work for *zu*-placement as discussed above even though it is not adjacent to the infinitival suffix on the surface: Given head-final linearization, *zu* will be adjacent to the infinitival suffix at insertion; subsequent Local Dislocation does not affect this anymore. In Embick (2007, 321, 331f.) it is assumed that elements that undergo Local Dislocation are adjoined to their host. If selectional requirements were checked hierarchically, *zu* might only see the verb stem but not the infinitival suffix; similarly, affixation of the infinitival suffix to a participle could not so easily be prevented if the selectional requirements are checked hierarchically as the inf-suffix would only see the verb stem.
The derivation of cumulative non-finite morphology is illustrated in (81):

(81)


5.5 Interaction with prefix and particle verbs and coordination

The placement of non-finite morphology is sensitive to the distinction between prefix and particle verbs. While the non-finite morphology attaches to the left of the prefix in the case of prefix verbs (this only holds for *zu*, the *ge*-prefix is deleted in most German varieties for prosodic reasons), it occurs between particle and stem in the case of particle verbs:

(82) a. ver-stellen → **zu** ver-stellen
PREF-*put*.INF *to* PREF-*put*.INF *'block'*
b. auf-stellen → auf-**zu**-stellen
on-put.INF *on-to-put*.INF *'to set up'*

I propose that the asymmetry follows from the fact that prefix verbs form an impenetrable unit, while particle words are not complex words. The impenetrability of prefix verbs follows from general principles of Local Dislocation (cf. Embick and Noyer 2001, 577): There is a structure preservation principle that holds for PF-operations in that so-called morphosyntactic words, viz., heads

[24] Should the infinitive involve a suffix after all in a variety, the gerund would have to be decomposed into gerund+infinitive. Attachment of the gerund would then involve haplology of its infinitival suffix.

that are not part of complex heads, and so-called subwords, viz., segments of complex heads, have to target objects of the same type when moved at PF. Prefix verbs are complex heads, it is thus the entire prefix verb that counts as a morphosyntactic word. Consequently, the non-finite exponent inserted into F, which also constitutes a morphosyntactic word, attaches to the entire prefix verb rather than infixing between prefix and stem (the same result obtains, of course, if prefix verbs are only morphologically but not syntactically complex); note that the same structure preservation principle is at work in several derivations in the previous sections where *zu* inverts with the V+Inf-complex.

Assuming that particle verbs are not complex heads is generally preferable: First, under a complex head analysis there has to be obligatory excorporation under verb second movement (the particle is always stranded), which is spurious. Second, particles can also be moved to the prefield, a position only occupied by phrases; third, particles can be separated from the verb in V-final sentences when modified by PPs, cf. Müller (2003, 290f.). See also Abels (2016) who treats particles as VPs that depend on the lexical verb. This accounts for the fact that particles (like bare VPs) cannot be scrambled and that the governing verb cannot be topicalized without the particle (they thus behave like bare VPs that cannot be topicalized without VPs dependent on them).[25]

An interesting complication arises with coordination. Since *zu/z* realizes a separate head, one might expect it to be able to have scope over a coordination. However, this is not the case: Both verbs have to bear *zu/z* (unlike English *to*), cf. also Cooper (1995, 191) and Haider (2011, 237):

(83) Er hät versproche, *(z) schriibe und regelmässig *(z) telefoniere
he has promise.PTCP *to write*.INF *and regularly to phone*.INF
'He promised to write and to phone regularly.' *Swiss German*

This may initially seem problematic. However, the restriction observed in (83) is part of a more general pattern: Obligatory repetition in coordination is a frequent feature of phonologically/morphologically dependent elements. Thus, typologically, occupying an independent syntactic head does not imply scope over the coordination, see, e.g., Romance function words (including the infinitive markers *de*, *à* 'to'), cf. Miller (1992); Abeillé et al. (2006, ex. 12–14, 22), prepositional dative marking in Swiss German, cf. Seiler (2002, 252), or the definite article in Amharic (Kramer 2010). Embick (2007, 332f.) argues that post-syntactic operations like Lowering or Local Dislocation have to apply across the board (ATB). This can be seen in the impossibility of VP-

[25] The only difficulty for this view is presented by those prefix verbs (they all happen to be backformations) that are immobile in syntax, i.e., that cannot undergo verb second, but can take affixes like *zu*, cf. *urauffführen* 'premiere' → *uraufzuführen* 'to premiere'. I am thus led to assume that they do not form complex elements in syntax and that their immobility cannot be reduced to conflicting morphological requirements of prefix and particle but is due to different factors, cf. Müller (2010); this seems to be unavoidable anyway given that other backformations like *sonnenbaden* 'sunbathe' also fail to undergo verb second and have an 'infixing' *zu* but are not characterized by conflicting morphological requirements. For more discussion of immobile verbs, see, e.g., Stiebels and Wunderlich (1994, 944–947). In Middle High German, *zu* could also occur before the particle, cf. Demske-Neumann (1994, 123f.).

coordination under T[past/pres] in English and asymmetric fusion between preposition and article in French (both phenomena involve Lowering, from T to V/P to D):

(84) *John T slice-d and cook/*slice-s and cook

(85) J'ai parlé ...

a. au père et *(à) la mère.
to.the father and to the mother

b. *au père et le garçon
to.the father and the boy

c. au père et au garçon
to.the father and to.the boy

Why PF-operations display this restriction in their interaction with coordination (and why they sometimes do not, cf. Harizanov and Gribanova 2014, ex. 30 on the definite article in Bulgarian) is a question I have to leave for future research. See also Kramer (2010, 215–218) for discussion of this issue.[26]

6 Implications for morphological theory

The previous sections have provided several arguments in favor of a realizational and crucially post-syntactic approach to morphology as pursued within Distributed Morphology: First, the placement of non-finite morphology is not exclusively governed by hierarchical notions but is crucially affected by linearity and adjacency. Second, displacement of non-finite morphology does not have any semantic effects. Third, restrictions on displacement can be related to selectional properties of the vocabulary items. Perhaps the most spectacular empirical fact involves non-finite verbs that are specified for more than

[26] There is an interesting wrinkle in that *zu* can be missing in X°-coordination as in (i):

(i) weil er das Geld [zu gewinnen und verschenken] versucht
*because he the money to win.*INF *and give.away.*INF *try.3*SG
'because he tries to win and give away the money' Sabel (2000, ex. 22a)

At first sight, the phenomenon seems to violate the ATB-requirement stated above. However, the pattern falls out nicely once it is recognized that it involves an X°-coordination so that the entire coordination counts as a morphosyntactic word. Consequently, *zu* will attach to the left of the entire coordination. This may not yet be sufficient because a *zu* in the second conjunct is required if the governing verb undergoes V2-movement or if the infinitiveP is extraposed, cf. Sabel (2000). This may suggest that the phenomenon rather involves *zu*-deletion under adjacency with the governing verb. A further argument for a deletion account comes from the fact that other non-finite forms do not show the same flexibility; the past participle and the infinitive always have to be repeated, even under X°-coordination. For a deletion account in Dutch, which shows a similar pattern, cf. Zwart (1993, 104f.).
In earlier stages of German, *zu* could be omitted in non-initial conjuncts more generally (not just under V+V-coordination), see Behaghel (1923-1932, Volume 2, 308); Sabel (2000); there are even cases where only the *zu* of middle conjuncts is missing, cf. Behaghel (1923-1932, Volume 2, 308); Ebert et al. (1993, 397, §179). For data from older stages of Dutch, see Hoeksema (1995).

one non-finite category. In this section, I will discuss the implications for morphological theory by comparing the post-syntactic approach with both pre-syntactic approaches and representational/parallel realizational approaches. I will show that the facts discussed in this paper constitute serious problems for a pre-syntactic approach to morphology; alternative realizational approaches fare somewhat better but cannot account for the whole range of data and are confronted with conceptual drawbacks.

6.1 Arguments against pre-syntactic morphology

The first argument against pre-syntactic morphology comes from morphological selection quite generally. Since the non-finite morphology is expressed on the 'wrong' verb, one would expect violations of the verbs' selectional properties during structure building; in such approaches, inflected words are formed before they enter the syntax. Thus, to derive the PPI-construction, for example, the participle morphology would have to be on V3 from the start, while V2 starts out as an infinitive. However, once V2 is combined with VP3, the derivation crashes because V2's selectional requirements are not met as it selects an infinitive rather than a participle. This problem arises not only for [+lexical, +incremental] approaches (cf. the terminology in Stump 2001), where the syntactic features are contributed by the morphemes (i.e., do not exist independently) but also for pre-syntactic realizational approaches like Bruening (2017). In his approach complex heads (e.g., inflected verbs) are constructed in separate workspaces and morpheme insertion takes place before the complex head merges with other syntactic objects. Since all the inflectional information is part of the verb from the beginning (in the PPI-case, the verb root would have to be merged with a functional head contributing the present perfect information), mismatches as with displaced morphology are unexpected. As a consequence of the fact that the participle morphology would be located on the 'wrong' verb from the start in the PPI-construction (on V3), pre-syntactic approaches also crucially make the wrong prediction w.r.t. semantic interpretation: The participle should be interpreted on V3, contrary to fact (under Bruening's approach, problems with semantic interpretation can perhaps be avoided if the participle is just the reflex of an Agree relationship with a higher silent participle head that is interpreted instead).

Perhaps the most spectacular problem for a pre-syntactic approach comes from the cumulative non-finite forms discussed in Sect. 5.4: Such forms would simply never be generated. In such models, verbs would be inflected for certain categories according to general rules, and as far as I can tell, there is no room for a verb to be inflected for two non-finite categories simultaneously.

Another serious issue for morphological selection under a pre-syntactic approach comes from default forms, i.e., the infinitives and supines in three-verb clusters with displacement from V1 to V3. In the case of IPP, one could argue that the infinitive on V2 is a perfect allomorph. The supines are much more difficult to accommodate because they can occur if V1 selects a perfect participle, cf. ex. (58); a bare infinitive; cf. (63); a *ge*-infinitive, cf. ex. (75); or a

gerund, cf. ex. (76). The supines are thus obviously default forms independent of the selectional restrictions of V1. Under a pre-syntactic approach, there is absolutely no motivation for these forms, while the supines and the IPP-forms follow naturally under the post-syntactic perspective since they are a default that only kicks in if a verb fails to be associated with functional morphemes.

Equally problematic for a pre-syntactic approach is the order-dependency of morphological selection, i.e., the fact that we find faithful realization in some orders and displacement and default forms in others. One could perhaps add directionality statements to the selectional features (as in Bader and Schmid 2009) such that faithful forms are only selected to the left but not to the right. This may provide a handle on the default forms, but is insufficient for displacement (V1 does select its regular form in these contexts). However, it even fails for the default forms once topicalization is taken into account: At least in the dialect of Steinbach-Hallenberg, V3 often appears as a default bare infinitive if it undergoes topicalization rather than bearing the (displaced) form selected by V1 or the form governed by V2; and instead of the supine on V2 we find the form selected by V1, cf. (86b) (Anita Steube, p.c.). The pattern is thus somewhat different from 132 orders where we find faithful realization not only on V2 but also on V3, recall (63). Consider the following minimal pair where the base-line example in (86a) shows cumulative realization of non-finite morphology on V3 (recall Sect. 5.4) and a supine form on V2:

(86) a. doas e ned wörd$_1$ könd$_2$ ge-kom-e$_3$
*that he not will.3*SG *can.*SUP GE-*come*-GER
b. Komm$_3$ wörd$_1$ e ned kön-e$_2$
*come.*INF *will.3*SG *he not can*-GER
'He will not be able to come.' *Steinbach-Hallenberg*

Adding directionality statements to selectional features will be insufficient here; to obtain the correct form on V2 and V3, the selectional properties of V1 and V2 would have to be sensitive to whether V2's complement undergoes topicalization. Under the post-syntactic approach, the default bare infinitive (which is reminiscent of the English Perfect Participle Paradox as in *We had to stand firm and stand firm we have*) would result if the functional morpheme above the topicalized V3 undergoes impoverishment (for whatever reason).[27]

[27] Note that the examples in the text may at first sight point towards a covert left-dislocation analysis with phonetic deletion of the dislocated D-pronoun (as proposed in Zwart 1993, 262f.). Indeed, the form of V2 and V3 remains unaltered if there is an overt left-dislocated pronoun following V3. However, one does not always find a default form on V3: The selected form appears if V2 (e.g., *brauchen* 'need') selects a *zu*-infinitive or a gerund (in the case of *bleiben* 'stay'). Even more puzzlingly, in two-verb clusters, we find the selected *ge*-infinitive on topicalized V2 (with V1 = *können* 'can'), but if V1 is *werden* 'will' we find the bare infinitive rather than the expected gerund on V2 (while with *bleiben* 'stay' we do find the gerund). In all cases, an overt pronoun does not affect the topicalized forms. While I have to leave detailed exploration of the topicalization patterns for further research, they strongly suggest that the left-dislocation + deletion reanalysis cannot be generally correct. See Salzmann (2013a, 102f.) for further evidence against Zwart's reanalysis.

In summary, then, displaced morphology constitutes an extremely severe if not insurmountable problem for pre-syntactic approaches to morphology.[28]

6.2 Representational alternatives

I now turn to what I will call representational approaches. In these approaches both the syntax as well as the placement of non-finite morphology are handled by constraints that apply to representations.

Meurers (2000, 189-194, 214f.) argues that verbs in the upper-field, i.e., verbs in (partially) ascending order, are not regular verbs but functional elements. Not being proper verbs, they cannot be governed nor can they act as governors. As a consequence, they cannot determine the status of verbs that depend on them, e.g., a perfective auxiliary as V1 cannot govern V2 in the 132 order. This not only accounts for the IPP-effect but also for *zu*-displacement in 132 orders: the complementizer *ohne* 'without' selects a complement specified for the *zu*-infinitive. Since V1 is not a verb, it is consequently not the head of the verbal projection that *ohne* combines with. Instead, the cluster-final V2 is the head of VP and thus correctly occurs as a *zu*-infinitive; verbs in ascending order are thus ignored in the government chain. The approach seems attractive in that it unifies the IPP-effect and *zu*-displacement. However, the approach fails in one fundamental respect: It is simply not correct that verbs in the upper-field, viz., in ascending order, do not govern: Next to the potential counter-examples Meurers discusses himself on p. 221 (see also footnote 7), there is ample evidence for government by verbs in ascending order, recall the examples with displaced morphology selected by V1: the *z*-infinitive in (16a) and (16b), the participle in (18), the *ge*-infinitive in (19a) and the displaced gerund in (19b). Therefore, the treatment of verbs in ascending order as functional elements (in Meurer's sense) cannot be correct.

The proposals by Bader (1995) and Vogel (2009) are similar to the DM-approach in that they are also realizational (Bader's HPSG-approach is inferential-realizational in Stump's terminology, Vogel's is arguably lexical-realizational, but he is not explicit about it). They differ from the derivational/post-syntactic perspective pursued here in that there is no separate syntactic head bearing features for the non-finite morphology; instead, the features are borne by the entire infinitival complement but crucially not by the head of this verb phrase (in Bader's HPSG-approach it is a so-called EDGE-feature otherwise used for clitic placement). Crucially, the morphological realization of the feature is the result of special realizational rules (Bader) or an alignment con-

[28] *Zu*-displacement can be accommodated in such approaches if *zu* is treated as an independent syntactic element (a clitic), which is plausible in lexicalist models. However, the fact that bona fide inflectional morphology shows identical behavior with respect to displacement rather suggests that a separation of the exponents of non-finite categories into lexical and syntactic is on the wrong track.

straint (Vogel). (87) captures the intuition of Vogel's analysis and is arguably equivalent to Bader's EDGE-feature realization rule:[29]

(87) *zu* is realized on the right-most verb *within* the XP bearing [zu]

This works for both well-behaved *zu* in 321 orders as well as for displacement in orders that deviate from it: The feature is realized on the right-most terminal of the relevant phrase. It thus captures the intuition that the placement of *zu* depends on the surface order within the verbal complex and not the hierarchical relations. I will first discuss possible conceptual objections before addressing problems that arise for representational accounts when several non-finite forms interact; for discussion of further issues (related to the treatment of CP-complements and the 3rd Construction), see Salzmann (2013b, 102-106). Starting with conceptual objections, such special features that are only present on the maximal projection of a head but not on the head itself certainly avoid the postulation of several functional heads (as my derivational approach is forced to); however, they also come at a cost: First, they increase the number of feature types (for instance, one will need different features for finite morphology, see Sect. 7.2 below). Second, such features are incompatible with endocentric phrase structures, especially under current Minimalist assumptions such as Bare Phrase Structure (Chomsky 1995): It is simply not possible for a feature to be present only on the maximal projection but not on the head as they share all relevant features. Furthermore, the rule essentially incorporates the descriptive generalization; it would thus be just as plausible as the reverse rule and therefore misses a crucial property of displacement: It is related to the head-finality of the language, an intuition that is captured more directly in the approach proposed above.

Turning to the interactions, the only type discussed in those works are the haplology cases with *zu* in Bader (1995). In this approach, the fact that there is just one *z* on V3 indeed follows automatically. However, serious problems arise for the HPSG-approach with the other interactions (inclusion relationships as well as cumulative realization), because they involve conflicting requirements on the realization of V3 that cannot be resolved (Olivier Bonami, p.c.). Furthermore, it remains unclear how conflict resolution as in the IPP- and the PPI-construction can be integrated. Under Vogel's approach, there will also often be conflicting features for the realization on V3. Perhaps, they can be handled by different relative rankings of faithfulness constraints, but since none of this is explicitly addressed, I will refrain from speculating.[30]

[29] Vogel's original formulation on p. 329, which defines *zu*-placement w.r.t. the extended projection of the phrase bearing the *zu*-feature, derives the wrong result in a number of cases, see Haider (2011, 250) and Salzmann (2013b, 103ff.) for discussion.

[30] Additional motivation for a derivational account (cf. Arregi and Nevins 2012) comes from impoverishment patterns. It is much more frequent that the features selected by V1 are deleted than those selected by V2; this makes sense if the exponent selected by V2 is attached first and then, the exponent selected by V1 is deleted in case of a clash. This is the pattern of the IPP-construction (in the 123 order, where impoverishment can be considered a local repair), as well as of the interactions discussed in Höhle (2006, 68, ex. 40; 70, ex. 48) where the gerund selected by V1 is deleted and V3 appears in the *ge*-infinitive

7 Absence of displacement

In this section, I will discuss verb clusters where there is no displacement although the structural condition, viz., an (partially) ascending order, is given. This implies that an alternative mechanism to associate (non-)finite morphology with the verb is necessary. Crucially, this will not only be necessary to account for cross-linguistic variation in placement patterns within Continental West-Germanic but also for variation within individual varieties.

7.1 *te*-placement in Standard Dutch

As mentioned at the beginning, Standard Dutch systematically differs from German with respect to the placement of non-finite morphology: Unlike *z(u)* in German, the infinitival particle *te* always occurs on the verb that is immediately dependent on the *zu*-selector even though the order in the verb cluster is usually strictly ascending. In (88), repeated from (12), *te*, selected by the complementizer *zonder* 'without', occurs on V1:

(88) zonder het boek **te** moeten$_1$ kunnen$_2$ lezen$_3$.
*without the book to must.*INF *can.*INF *read.*INF
'without having to be able to read the book.' 123 *Standard Dutch*

The Standard Dutch pattern can be derived if the placement of *te* is the result of either Agree between V and the functional head hosting the features for *te*/the selector of the non-finite morphology as in Adger (2003) and Wurmbrand (2012) or Lowering, viz. downward head-movement (an operation ultimately derived from the affix hopping transformation of early generative grammar, cf. Embick and Noyer 2001). The first solution seems simpler, especially if there is a direct Agree relationship between selector and verb, but for reasons of compatibility with what I have been assuming for German and

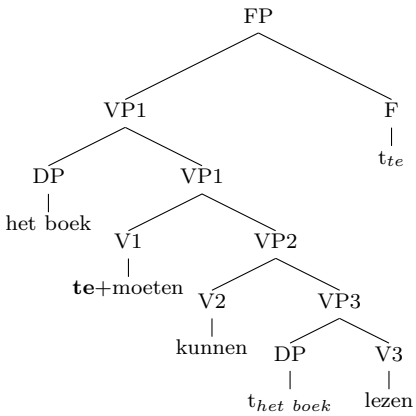
selected by V2. The most prominent counter-example is the PPI-construction, where the selectional requirements of V2 are deleted; another case is mentioned in Höhle (2006, 69, ex. 41) from Barchfeld where V1 selects *zu*+gerund, V2 a *ge*-infinitive, and V3 appears as *zu*+gerund. Interestingly, Anita Steube (p.c.) reports the opposite judgment for Steinbach-Hallenberg in this configuration: V3 appears as a *ge*-infinitive, while *zu*+gerund undergo deletion (alternatively, faithful realization is possible under the 132 order):

(i) doas de ned bruchsd$_1$ könd$_2$ ge-säng$_3$/ge-säng$_3$ zu kön-e$_2$ ...
*that you not need.2*SG *can.*SUP GE-*sing.*INF/GE-*sing.*INF *to can-*GER
'that you need not be able to sing ...' *Steinbach-Hallenberg*

The fact that selectional restrictions seem to be checked under linear adjacency (recall Sect. 5.4) also argues for a derivational account. It furthermore predicts that cumulativity of gerund and *ge*-infinitive should only be possible if the *ge*-infinitive is affixed first, i.e., is selected by V2; in the reverse order, the *ge*-infinitive would not be adjacent to the stem if the gerund has already been attached; unfortunately, I have not been able to find a relevant example, which is arguably related to the fact that the most prominent gerund-selecting verb 'will' cannot be embedded.

dialectal data to be introduced presently, I adopt a slightly more complex approach: I postulate a functional head F that hosts the features for *te*. For the case at hand it does not matter whether these features originate there and are checked against selectional features of the selector or whether F receives its features via Upward Agree from the selector. I further assume that F undergoes Lowering. Since this operation is sensitive to hierarchical relations, F will invariably end up on the highest verb of the verb cluster, irrespective of the order in the verb cluster, cf. (89) (I assume for expository purposes that the object has been scrambled out of the lexical VP, but alternative characterizations of the Dutch verb cluster would also work for present purposes):

(89) *te*-placement in Standard Dutch



The difference between Standard Dutch and German w.r.t. displacement thus lies in the way the non-finite morphology is associated with the verb at PF.

In addition to the parallelism with German, another argument for a separate functional head for *te* comes from varieties where *te* evidently can remain an independent element: It can occur before a verbal complex with 231 order, cf. (90a/b) or before the object in (90c):

(90) a. <u>mee</u> Valere **te** willen$_2$ Marie dienen boek geven$_3$ een$_1$
with Valere to want.INF *Mary that book give*.INF *have*.INF
'with Valere having wanted to give Mary that book'
West Flemish, Haegeman (1998, 276)

b. Die banke moes oop gewees het, <u>om</u> dit gister **te** kan$_2$
the bank should open been have to it yesterday to can.INF
betaal$_3$ het$_1$.
pay.INF *have*.INF
'In order to have been able to pay for it yesterday, the bank would have had to be open.' *Afrikaans*, Donaldson (1993, 367)

c. hest volk genog **te** heu in schuur bringen?
*have.2*SG *people enough to hay in barn bring*.INF
'Do you have enough people to bring the hay into the barn?'
Gronings, Zwart (1993, 103)

To capture this variation, all that is needed is the assumption that no Lowering takes place in these varieties (to account for the placement of *te* in descending orders in these varieties, where *te* precedes V1, one can assume that parts of the VP are moved to a position above *te*, cf. Haegeman 1998, 289f.). An approach that relies on direct Agree between the selector and the governed verb has nothing to say about the data in (90).[31]

7.2 Finite morphology in German

The placement of non-finite morphology in German and its varieties can be systematically described with the assumptions introduced above: Non-finite morphology is inserted into separate designated functional heads and associated with its verbal host at PF by means of Local Dislocation.

Finite verbal morphology, on the other hand, is (almost) never displaced in German and its varieties. Given the logic of my proposal one might expect this to be possible in ascending orders so that the finite morphology would end up on V2 rather than on V1.

However, such displacement is never observed, except in one famous constructional exception: In Swabian verb clusters with V2 = 'help', which normally selects a bare infinitive, displacement *is* possible, and crucially only in ascending orders, see Steil (1989, 41, 94f.) and Heilmann (1999, 61–69); see Schallert (2018a) for further references:[32]

[31] Interestingly, there is also a significant amount of displacement in Dutch dialects, which, however, displays different patterns than in German. As shown in Pots (2017a,b) *te* can both occur too high as well as too low. The first case, referred to as *te*-raising, is analyzed as an instance of clitic climbing (*te* is selected by V1):

(i) niet {te} hoeven$_1$ {te} gaan$_2$ voetballen$_3$
not to have.to.INF *to go*.INF *play.football*
'... not having to go play football.'

The second case, so-called *te*-lowering, is analyzed as resulting from spreading + optional deletion (cf. the Upward Agree analysis of Parasitic Participles in Sect. 9 below; the so-called *te*-shift discussed in Zwart 1993, 103 is arguably also a case of *te*-lowering):

(ii) Anne zegt op haar stoel {te} willen$_1$ {te} blijven$_2$ {te} zitten$_3$.
*Anne says.3*SG *on her chair to want*.INF *to remain*.INF *to sit*.INF
'Anne says she wants to remain seated on her comfortable chair.'

I will have nothing to say about displacement in Dutch as the patterns seem substantially different so that the mechanisms required to capture them will also be quite different from what was proposed above for German.
For the geographical distribution of the various options when two *te*-infinitives are selected, see Barbiers et al. (2008, 33). Interestingly, displacement also seems to be marginally possible in Dutch ascending present participle clusters, see Hoeksema (1993), although at least in earlier stages of the language, non-displacement was possible as well in that construction.

[32] Another example of finite verb morphology displacement is described in Schmeller (1821, 379ff.) for Bavarian where V1 is 'go' and the finite morphology ends up on V2.
Such cases of finite displacement can be accounted for with the same Local Dislocation analysis as above (additionally, the infinitival features selected by V1 have to be deleted

(91) I hedd ned denkt, daß mr der hälfa$_1$ kochd$_2$.
*I had.*SBJV.*1*SG *not think.*PTCP *that me that one help.*INF *cook.3*SG
'I wouldn't have thought that he would help me cook.' *Swabian*

While it may be unsurprising from a functional perspective that finite morphology is usually not displaced, one still needs a formal implementation of this fact. Given my analysis of Dutch in terms of Lowering, the obvious solution is to assume that T, the locus of finiteness features (which it may receive from C via Agree/check against features of C) and subject-verb agreement, undergoes Lowering onto V in verb-final sentences (under verb second, the verb moves via T to C so that no Lowering is necessary).[33] Thus, all that needs to be assumed to account for the placement of verbal morphology in German is that functional heads hosting verbal morphology can differ in how the morphology is associated with the verbal stem; via Lowering in the case of T and via Local Dislocation in the case of the exponents of the various F-heads.[34]

by impoverishment prior to attachment of the finite morphology to V2, and V1 receives infinitive morphology by default). What remains unaccounted for under it, however, is the fact that displacement is also possible if the finite verb carrying the displaced morphology (i.e., V2) undergoes movement to C, cf. Steil (1989, 94). Given that Local Dislocation applies at a late stage of the PF-derivation, this should be too late to feed V-to-C-movement. I have to leave this for further research.

[33] I assume for concreteness' sake that there is no overt movement to T; if there were, no Lowering would be needed, obviously. In the absence of a TP (as argued for in Haider 2010), the relevant features would arguably be borne by C and would have to be lowered from there. This would not be innocuous since it would have to affect a subset of C's features given that complementizers are inserted into C in finite verb-final clauses.

[34] I am aware of a few rare instances where non-finite morphology is not displaced in (partially) ascending orders. Faithful realization seems to hold quite generally in the dialect of Sonneberg. In (i), V1 selects a gerund and V2 selects a *ge*-infinitive. The result is that V2 occurs as a gerund and V3 as a *ge*-infinitive, cf. Höhle (2006, 66):

(i) ich waar$_1$=sch runtər künn-a$_2$ gə-reiss$_3$
*I will.1*SG*=it down can.*GER GE-*tear.*INF
'I will be able to tear it down' *Sonneberg*

Apparently, F1 (hosting the gerund) and F2 (hosting the *ge*-infinitive) undergo Lowering in this dialect. According to Höhle (2006), faithful realization seems to be confined to this particular dialect; I have at this point nothing to offer to account for this kind of cross-linguistic variation.
Another case I am aware of involves certain three-verb clusters in Swiss German with 123 order where V1 is a perfective auxiliary, V2 is either 'hear', 'help', 'teach/learn', 'stop' or 'begin' (and V3 is a bare infinitive). While V2 canonically appears in the infinitive (thus the IPP-form), more recently, the use of the participle on V2 can be observed quite often (cf. also Lötscher 1978, 3). Here is an example with V2 = *ufhöre* 'stop' (for a Swabian example with V2 = 'help', see Heilmann 1999, 63, ex. 3h; for examples in Afrikaans with V2 = 'come' or 'make', cf. De Vos 2003, 521; for examples in earlier stages of German with V2 = 'hear' and 'let', see Jäger 2018):

(ii) dass dis Herz vo sälber hät$_1$ ufghört$_2$ schlah$_3$.
*that your heart by itself have.3*SG *stop.*PTCP *beat.*INF
'that your heart has stopped beating by itself'
http://gaestebuch.007box.de/index.php?gbname=gb10323&pos=110, accessed December 30, 2015

8 Conclusion

I have argued that displaced non-finite morphology in German results from a conflict between the head-finality of the German VP and the possibility of head-initial verb clusters. More concretely, I have proposed that non-finite morphology is inserted into designated functional heads that are linearized after their VP-complements. Importantly, the morphology is placed by means of Local Dislocation, a late PF-operation, which ensures that placement will apply to the surface order in the verb cluster. Since Local Dislocation is constrained by adjacency, the non-finite morphology always attaches to the last verb in the complement of the selector. If the verb immediately dependent on the selector is not last in the selector's complement, we find displacement.

The phenomenon provides a straightforward argument for post-syntactic morphology and crucially against pre-syntactic morphology: First, the placement of non-finite morphology is not solely governed by hierarchical relations but crucially affected by linear notions such as adjacency. Second, displacement has no semantic effects, which also proves problematic for approaches that derive displacement by means of syntactic XP-movement. Third, the restrictions on displacement follow from the interaction of the selectional properties of the vocabulary items, which are checked under linear adjacency. Furthermore, I have shown that the phenomenon favors a derivational approach to the morphology-syntax interface as within Distributed Morphology, while alternative realizational models are confronted with both conceptual and empirical shortcomings.

Finally, variation in the placement of verbal morphology both across and within languages can be captured straightforwardly by differences in the way the functional heads and their content are associated with the verbal stem: either by means of Lowering, which ensures faithful realization of selectional properties, or by means of Local Dislocation, which can lead to displacement.

9 Appendix: Reconciling German displacement with Parasitic Participles

There is one displacement-like phenomenon within Germanic that at first sight seems incompatible with the assumptions I have made for the placement of non-finite morphology, viz., Parasitic Participles in Norwegian/Swedish/Faroese and Frisian (for parasitic morphology in Dutch varieties, see Barbiers et al. 2008, 38). In this construction the participle morphology selected by V1

Thus, F1 hosting the participial features seems to undergo Lowering. Lowering may also be necessary to account for the participle on V2 in the 213 order in example (14e) above. Without Lowering, the participle would be displaced to V3.

Another potential case of faithful realization involves clusters with V1 = perfective auxiliary and a *zu*-selecting verb as V2. One can find such examples in Bernese German in 123 order with the morphology faithfully realized. However, with *zu*-infinitives, the faithful realization could be due to extraposition, see footnote 22 above and Salzmann (2019b, this issue). Extraposition of VP3 as the source for faithful realization is unlikely for (i) and (ii) because extraposition of bare infinitives is generally taken to be impossible (but see Zwart 2007, 83f. for a proposal along these lines).

is not only realized on V2 but also (optionally) on V3, although V2 selects an infinitive, see Wurmbrand (2012, 132):

(92) a. Jeg hadde$_1$ villet$_2$ lest$_3$ boka.
*I had want.*PTCP *read.***ptcp** *books*
'I would have liked to read the book.' *Norwegian*

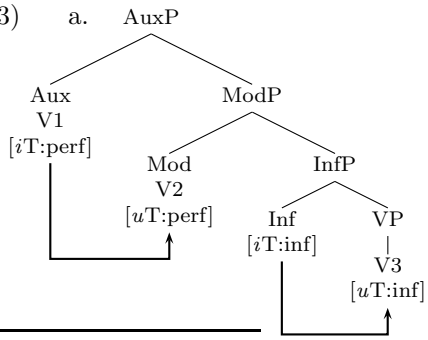
b. Ik ben tankber dat ik sa folle dien$_3$ kinnen$_2$ haw$_1$.
*I am thankful that I so much do.***ptcp** *can.*PTCP *have*
'I am grateful that I could do so much.' *Frisian*

Parasitic morphology in these languages differs in a number of ways from displacement in German and will thus require a partly different treatment.[35]

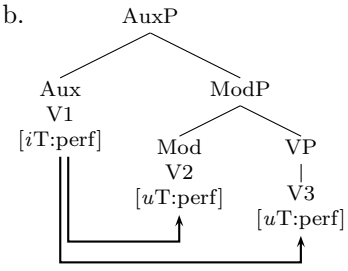
But since it is a prominent 'misplacement'-phenomenon within Germanic, a theory about the placement of non-finite morphology should ideally be able to account for both displacement in German and Parasitic Participles.

This seems difficult at first sight because the phenomenon has been taken as evidence for an Agree approach where the verbs start out with unvalued features that are valued via Upward Agree by the selecting heads, cf. Wurmbrand (2012, 136–139). She assumes that functional clausal heads (such as T, Mod, Asp etc.) have an interpretable T(ense)-feature, which is typically valued; the value corresponds to the semantic value of the head, viz., PAST, MODAL, PERFECT etc. Furthermore, all verbal heads have an uninterpretable T-feature, which is typically unvalued. Since it is unvalued, it has to undergo Agree with the closest valued feature. The values of the uT-feature then determine their morphological realization. In the case of participles, the verb's [uT]-feature is valued as [uT:perf] by the auxiliary. In three-verb clusters there is normally an intervening head Inf assigning the Inf-feature to V3 so that we obtain faithful realization, cf. (93a); in the parasitic construction, which is taken to be a restructuring construction with less structure (Wiklund 2001), Inf is absent and the [perf]-value of the Aux/V1 is thus copied onto V3 as well, cf. (93b):

(93) a.



b.



[35] First, displacement in German involves various types of non-finite forms, while in the other languages it is limited to participles. Second, only German features default forms (infinitives, supines) on V2 (there is no IPP-effect in the other languages). Third, displacement in German is limited to right-branching clusters, while parasitic morphology in Frisian occurs in left-branching/descending orders (right-branching/ascending structures only occur with *te*-infinitives in Frisian, recall Sect. 5.3.1). Fourth, Frisian also has upward displacement (the requirements of V3 are realized on V2), see Wurmbrand (2012, 139).

Thus, in pretheoretic terms, the participial feature 'spreads' to another dependent verb in the auxiliary's c-command domain. This can in fact involve several dependent verbs in Frisian and the Scandinavian languages, see Den Dikken and Hoekstra (1997, 1068) (while in German the selected morphology always occurs only once):[36]

(94) hy soe$_1$ it dien$_5$ kinnen$_4$ wollen$_3$ ha$_2$
he would it do.**ptcp** *can*.**ptcp** *want*.PTCP *have*.INF
'He would have liked to be able to do it.' *Frisian*

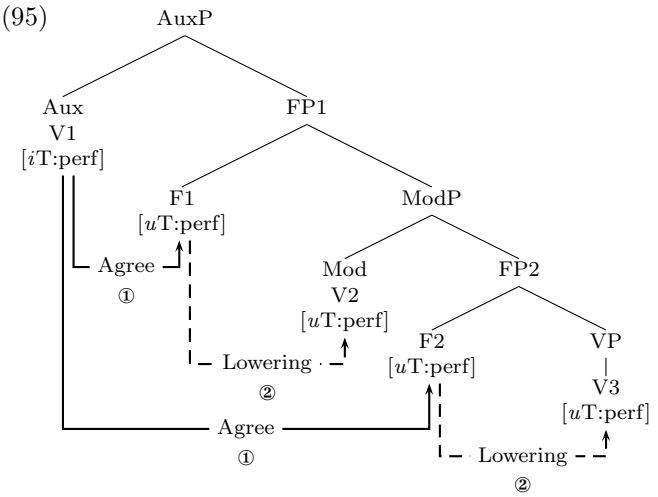
Given that this goes beyond feature-checking in head-complement structures, (94) clearly provides a strong argument in favor of the Agree-approach but seems incompatible with what I have been assuming so far. Since it would be desirable to obtain a unified approach to the placement of non-finite morphology at least within Germanic, I will sketch a proposal that attempts to reconcile Parasitic Participles with displacement in German. Note that it is not my intention to do justice to all aspects of the parasitic construction as this is beyond the scope of this paper; nor do I preclude the possibility that parasitism has a very different source, e.g., involves feature-copying at PF as proposed in Wiklund (2001).

First, I continue to assume that each verb (including auxiliaries) has an F-head above it for inflectional features. Second, this F-head then receives features from the superordinate verb via Agree as in Wurmbrand (2012), a possibility that I have been alluding to, but which would not have had any consequences. Third, languages/varieties differ from each other in the way the content of the functional heads is combined with the verbal stem: This can involve Local Dislocation as in German, which may lead to displacement. Or it involves Lowering so that we obtain faithful realization; this is what we find in Standard Dutch, and, as I will now show, in Frisian/Norwegian/Swedish.

The derivation of parasitic participles under these assumptions thus proceeds as follows: There are F-heads above the modal(s) and the lexical verb which receive the [uT:perfect]-value from the auxiliary. The F-heads are then lowered onto the verbs:

[36] There are a few attested examples of the PPI-construction in earlier stages of German where V2 appears as a participle as well – basically as in Frisian and the Scandinavian languages, see Jäger (2018). At this point, I do not have sufficient information about the construction to assess the possible implications of these examples.

(95)



There remain two challenges for this proposal: First, given that the lower participle is not interpreted but both participles arise via feature copying in syntax, the upper participle cannot contribute to the interpretation of the present perfect either (cf. Den Dikken and Hoekstra 1997, Wurmbrand 2012). Consequently, contrary to what I have been assuming, the perfect/past semantics have to arise in a different way (this also affects my argument from semantic interpretation in Sect. 4 above), thus either from the auxiliary alone or from some other silent functional head above FP1, while FP1/FP2 only take care of the morphological realization. Second, spreading in German needs to be prevented because if the structure were the same, we would also expect parasitic participles in left-branching clusters (arguably not in ascending clusters because the two F-heads would be identical and thus reduced by haplology):

(96) dass ich ihn {*gelesen$_3$/✓lesen$_3$} gesehen$_2$ habe$_1$
*that he him read.***ptcp***/read.***inf** *see.*PTCP *have.1*SG
'that I saw him read'

One way of avoiding this is to assume that while in the parasitic construction infinitive-selecting verbs such as modals never Agree with the F-head below them (as in (95) above), they do in German. This requires an [iT]-feature on modals in German and its optional absence in Scandinavian/Frisian. Since the modal is a closer goal for F2 in (95), F2 will be valued as [+Inf] in German, thereby blocking the spreading of participle features from V1.

Needless to say, there remain a number of open issues; but I hope I have been able to show that the prospects of reconciling parasitic participles with displacement in German are quite good.

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