Freezing in Complex Prefields

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Abstract

The main goal of this paper is to provide an analysis of a hitherto undetected freezing effect as it shows up with extraction in complex prefield constructions in German that is compatible with (i) the more general strictly derivational approach to freezing developed in Müller (2014), and (ii) the arguments brought forward in Fanselow (1992), Müller, St. (2005) according to which complex prefields involve single VP constituents rather than multiple movement (and freezing is therefore a priori unexpected).

1. Introduction

A well-established generalization concerning German clause structure is that there can only be one constituent preceding the finite verb in main clauses –, i.e., that German main clauses are verb-second clauses. However, in the complex prefield construction, it looks as though two (or more) items can show up in front of the moved finite verb (which, following the standard analysis, I assume to have undergone movement to C). Some typical examples illustrating the complex prefield construction (which is widespread in German sports broadcasts, e.g., in bike race reports) are given in (1).[1]

(1) a. [$_{\text{DP}}$ Den Fahrer] [$_{\text{PP}}$ zur Dopingkontrolle] begleitete ein Chaperon
the rider$_{acc}$ to the doping test accompanied a chaperon$_{nom}$

b. [$_{\text{DP}}$ Fast alles] [$_{\text{PP}}$ im Sitzen] bewältigte Joaquim Rodgriguez auf dem Weg zum Gipfel
almost everything$_{acc}$ seated managed Joaquim Rodgriguez on the way to the peak

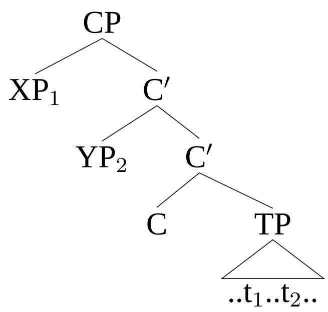
c. [$_{\text{PP}}$ Mit dem Hauptfeld] [$_{\text{PP}}$ ins Ziel] kamen auch Fernando Escartin und Aitor Garmendia
with the peloton into the finish came also Fernando Escartin and Aitor Garmendia

d. [$_{\text{PP}}$ Mit ihm] [$_{\text{PP}}$ in der Spitzengruppe] fuhren Martin Elmiger (IAM), Bryan Nauleau (Europcar) und Serge Pauwels (MTN-Qhubeka)
with him in the first group rode Martin Elmiger Bryan Nauleau and Serge Pauwels

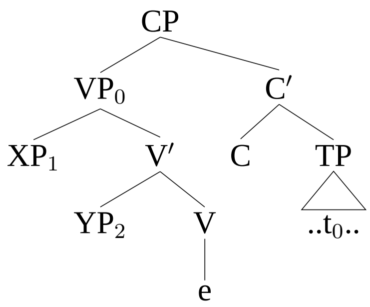
There are two competing analyses for this construction in the literature. According to one view, prefields can be truly complex under certain circumstances. There are thus two (or more) separate constituents in the prefield in (1), as a consequence of an option of multiple fronting (cf. Lötscher (1985), Speyer (2008)); see (2). According to the other view, prefield complexity is only apparent. There is a single constituent in the prefield in (1), viz., a fronted VP with an empty head; see (3). This empty head may be a trace resulting from prior head movement (cf. Müller (1998)), or it may be a separate empty head that does not (directly) participate in a displacement configuration (cf. Fanselow (1992), Müller, St. (2005); Müller, St. (2015)).

[1] In the present paper, I will have nothing to say about the marked nature of the construction, and its apparent confinement to certain contexts and registers.

(2)



(3)



Fanselow (1992) and Müller, St. (2005) present convincing evidence in favour of the analysis in (3). For instance, there is a clause-mate condition on complex prefields which is expected if the construction involves topicalization of a VP with an empty head, and which is entirely unexpected if separate topicalization operations affecting XP_1 and YP_2 are involved; see (4-a) vs. (4-b), and note that long-distance topicalization from an embedded clause as in (4-c) is possible as such (for most speakers).

(4) a. [$_{CP}$ [$_{VP}$ Kindern Bonbons]$_1$ [$_{C'}$ sollte man nie t_1 geben]]
children$_{dat}$ sweets$_{acc}$ should one never give

b. *[$_{CP}$ Kindern$_1$ Bonbons$_2$ [$_{C'}$ sollte man nie t_1 sagen [$_{CP}$ dass sie t_2 essen dürfen]]]
children$_{dat}$ sweets$_{acc}$ should one$_{nom}$ never say that they$_{nom}$ eat may

c. [$_{CP}$ Bonbons$_2$ [$_{C'}$ sollte man Kindern$_1$ nie sagen [$_{CP}$ dass sie t_2 essen dürfen]]]
sweets$_{acc}$ should one children$_{dat}$ never say that they eat may

Note next that against the background of the analysis in (3), a freezing effect with extraction from YP_2 to a position within CP is not predicted (in contrast, such a freezing effect would be expected to show up under the analysis in (2)). Freezing effects occur if movement takes place out of an item that has itself undergone movement, as in (5) in German (where wh-movement applies from a topicalized VP, yielding illformedness).

(5) *Was$_1$ denkst du [$_{VP_2}$ t_1 gelesen] hat keiner t_2 ?
what think you read has no-one

Given that YP_2 is in its *in situ* position in (3) (where, by assumption, a single VP is topicalized), and given that the analysis in (2) (with multiple topicalization) is at variance with the clause-mate restriction (and other pieces of evidence brought forward by Fanselow (1992) and Müller, St. (2005)), the obvious prediction will be that there is no freezing effect with extraction from YP_2 in complex prefield constructions, provided that the landing site is not external to the clause. Crucially, however, this prediction is not borne out – there is what looks like a clear freezing effect with complex prefield constructions in German. Consider the sentences in (6). In (6-a), DP_1 and PP_2 participate in a complex prefield construction. In (6-b), extraction of the R-pronoun *da*$_1$ from PP_2 has taken place to a position in front of DP_1, which gives rise to ungrammaticality. Given the analysis in (3), this instantiates an instance of postposition stranding by scrambling to VP, and it is difficult to see what should be wrong with it: Note that both topicalization (see (6-c)) and scrambling (see (6-d)) of the R-pronoun are possible as such (in varieties of German that allow postposition stranding to begin with); what is more, a minimally different sentence with an uncontroversial case of VP topicalization is fully well formed (see (6-e)).

(6) a. [$_{\text{CP}}$ [$_{\text{DP}_1}$ Dem Team] [$_{\text{PP}_2}$ zum Erfolg] [$_{\text{C}'}$ gratulierte Bernard Hinault]]
the team$_{dat}$ to the success congratulated Bernard Hinault$_{nom}$

b. *[$_{\text{CP}}$ Da$_3$ [$_{\text{DP}_1}$ dem Team] [$_{\text{PP}_2}$ t$_3$ zu] [$_{\text{C}'}$ gratulierte Bernard Hinault]]
there the team$_{dat}$ to congratulated Bernard Hinault$_{nom}$

c. [$_{\text{CP}}$ Da$_3$ [$_{\text{C}'}$ gratulierte Bernard Hinault dem Team [$_{\text{PP}}$ t$_3$ zu]]]
there congratulated Bernard Hinault$_{nom}$ the team$_{dat}$ to

d. dass Bernard Hinault da$_3$ dem Team [$_{\text{PP}}$ t$_3$ zu] gratulierte
that Bernard Hinault there the team$_{dat}$ to congratulated$_{nom}$

e. [$_{\text{CP}}$ Da$_3$ [$_{\text{DP}_1}$ dem Team] [$_{\text{PP}_2}$ t$_3$ zu] gratuliert [$_{\text{C}'}$ hat Bernard Hinault]]
there the team$_{dat}$ to congratulated has Bernard Hinault$_{nom}$

The clear difference between (6-b) and (6-e) is unexpected if the structures underlying these sentences are virtually identical in all relevant expects (i.e., if they both involve a topicalized VP, as in (3)): How can (6-b) give rise to a freezing effect if PP$_2$ has not undergone any movement?[2]

A second set of examples illustrating the same pattern is presented in (7). (7-a) is a complex prefield construction with two PPs, and (7-b) instantiates a freezing effect with R-pronoun scrambling from PP$_2$. As shown by (7-cd), topicalization and scrambling of the R-pronoun are perfectly acceptable in this context if PP shows up in the middle field; and, most importantly, (7-e) shows that a clear case of VP topicalization permits a simultaneous occurrence of R-pronoun scrambling in the prefield. Again, the contrast between (7-b) and (7-e) poses a puzzle.

(7) a. [$_{\text{CP}}$ [$_{\text{PP}_1}$ Zum letzten Mal] [$_{\text{PP}_2}$ mit Funk] [$_{\text{C}'}$ wurde das Rennen “Rund um die Braunkohle” ausgetragen]]
for the last time with radios was the race “Rund um die Braunkohle” held

b. *[$_{\text{CP}}$ Da$_3$ [$_{\text{PP}_1}$ zum letzten Mal] [$_{\text{PP}_2}$ t$_3$ mit] [$_{\text{C}'}$ wurde das Rennen “Rund um die Braunkohle” ausgetragen
there for the last time with was the race “Rund um die Braunkohle” held

c. [$_{\text{CP}}$ Da$_3$ [$_{\text{C}'}$ wurde das Rennen “Rund um die Braunkohle” zum letzten Mal [$_{\text{PP}}$ t$_3$ mit] ausgetragen
there was the race “Rund um die Braunkohle” for the last time with held

d. dass das Rennen “Rund um die Braunkohle” da$_3$ zum letzten Mal [$_{\text{PP}}$ t$_3$ mit]] ausgetragen wurde
that the race “Rund um die Braunkohle” there for the last time with held was

[2] It would not help to adopt a more liberal concept of freezing (cf., e.g., Ross (1967), Wexler & Culicover (1980) for different options), such that an incompatibility of VP-internal scrambling and VP movement could be derived; this would also not discriminate between (6-b) and (6-e), wrongly predicting ungrammaticality in both cases.

e. [$_{\text{CP}}$ Da$_3$ [$_{\text{PP}_1}$ zum letzten Mal] [$_{\text{PP}_2}$ t$_3$ mit] ausgetragen [$_{\text{C}'}$ wurde das Rennen
there for the last time with held was the race
"Rund um die Braunkohle"
"Rund um die Braunkohle"

As a third and final set of examples, consider (8), where two DPs occupy the complex prefield, and the second one (DP$_2$) includes a PP with an R-pronoun in it (see (8-a)). As before, P stranding via fronting of the R-pronoun is completely impossible (see (8-b)), even though movement of the R-pronoun (both with topicalization and with scrambling) is fine if the DP occurs in its in situ position; and as before, uncontroversial cases of VP topicalization (i.e., those where a lexical V shows up) also permit fronting of the R-pronoun (see (8-e)). Thus, again, the apparent freezing effect in (8-b) (vs. (8-e)) a priori qualifies as a mystery, given the structure of complex prefields in (3).

(8) a. [$_{\text{CP}}$ [$_{\text{DP}_1}$ Seinen Sprintern] [$_{\text{DP}_2}$ einen Tipp dafür] [$_{\text{C}'}$ hat der sportliche
his sprinters$_{dat}$ a hint$_{acc}$ there-for has the team
Leiter von Rabobank gegeben]]
manager$_{acc}$ of Rabobank given

b. *[$_{\text{CP}}$ Da$_3$ [$_{\text{DP}_1}$ seinen Sprintern] [$_{\text{DP}_2}$ einen Tipp [$_{\text{PP}}$ t$_3$ für]] [$_{\text{C}'}$ hat der sportliche
there his sprinters$_{dat}$ a hint$_{acc}$ for has the team
Leiter von Rabobank gegeben]]
manager$_{nom}$ of Rabobank given

c. [$_{\text{CP}}$ Da$_1$ [$_{\text{C}'}$ hat der sportliche Leiter von Rabobank seinen Sprintern
there has the team manager$_{nom}$ of Rabobank his sprinters$_{dat}$
[$_{\text{DP}}$ einen Tipp [$_{\text{PP}}$ t$_1$ für]] gegeben]]
a hint$_{acc}$ for given

d. dass der sportliche Leiter von Rabobank da$_1$ seinen Sprintern [$_{\text{DP}}$ einen
that the team manager$_{nom}$ of Rabobank there his sprinters$_{dat}$ a
Tipp [$_{\text{PP}}$ t$_1$ für]] gegeben hat
hint$_{acc}$ for given has

e. [$_{\text{CP}}$ Da$_1$ seinen Sprintern [$_{\text{DP}}$ einen Tipp [$_{\text{PP}}$ t$_1$ für]] gegeben [$_{\text{C}'}$ hat der
there his sprinters$_{dat}$ a hint$_{acc}$ for given has the
sportliche Leiter von Rabobank]]
team manager$_{nom}$ of Rabobank

This, then, constitutes the problem I would like to focus on in the present paper: How can the freezing effect in (6-b), (7-b), and (8-b) follow from a general syntactic theory of freezing, given that there is evidence for a structure of complex prefields in German that looks as in (3) (which in turn implies that whereas a VP with an empty head has undergone topicalization, XP$_2$ itself would still seem to be in its in situ position)? To answer this question, I will proceed as follows. In section 2, I will first lay out a derivational approach to freezing effects that also covers anti-freezing effects as they arise with remnant movement, and that is compatible with standard assumptions about phases and intermediate movement steps in the minimalist program; the discussion will be based on Müller (2014). After that, I will return to complex prefields in section 3, and develop an approach to these construction types that makes it possible to maintain that *both* (2) *and* (3) are correct structures, with the former derived from the latter by an operation Remove that acts as the mirror image of Merge in that it removes (rather than builds) syntactic structure (see Müller (2015)). Finally, in section 4 I put the two strands of research together and show how the freezing effect with extraction in complex prefields in German can be accounted for.

2. Freezing

2.1. The Phenomenon

As noted above, movement out of a moved item typically gives rise to a *freezing* effect in German. Thus, in (9-a) (= (5)), VP topicalization is combined with wh-extraction from VP, which produces an ungrammatical output; in (9-b), VP scrambling (which requires a certain intonational pattern and is somewhat marked to begin with) co-occurs with wh-movement from VP, again yielding ungrammaticality.

(9) a. *Was$_1$ denkst du [$_{VP_2}$ t$_1$ gelesen] hat keiner t$_2$?
what think you read has no-one

b. *Was$_1$ hat [$_{VP_2}$ t$_1$ gelesen] keiner t$_2$?
what has read no-one

In contrast, there is an *anti-freezing* effect with remnant movement, i.e., with configurations where the item that has undergone movement out of a moved XP eventually comes to occupy a lower position (giving rise to an unbound trace, according to traditional assumptions; see Thiersch (1985), den Besten & Webelhuth (1987)). In (10-a), scrambling of DP from VP to (an outer) Specv (with the subject DP staying in situ, in the inner Specv position) is combined with VP topicalization; in (10-b), scrambling to Specv co-occurs with long-distance VP topicalization; and in (10-c), wh-movement of DP out of VP in the embedded clause is accompanied by long-distance VP topicalization, which produces a weak wh-island effect but not severe ungrammaticality as with freezing effects as in (9).

(10) a. [$_{VP_2}$ t$_1$ Gelesen] hat das Buch$_1$ keiner t$_2$
read has the book no-one

b. [$_{VP}$ t$_1$ Zu lesen]$_2$ glaubt sie [$_{CP}$ t$'_2$ hat [$_{DP}$ das Buch]$_1$ keiner t$_2$ versucht]
to read believes she has the book no-one tried

c. ??[$_{VP}$ t$_1$ Zu lesen]$_2$ weiß ich nicht [$_{CP}$ was$_1$ sie t$_2$ versucht hat]
to read know I not what she tried has

Finally, remnant movement becomes impossible again (thereby instantiating what one might call an *anti-anti-freezing* effect) if the two moved items that are in a dominance relation before movement takes place end up targetting the same type of position; this restriction has sometimes been referred to as the *Müller-Takano generalization* (see, e.g., Pesetsky (2012)); it goes back to Müller (1993), Takano (1994). (11-ab) show this effect for a co-occurrence of DP scrambling from VP and VP scrambling.

(11) a. *dass [$_{VP}$ t$_1$ zu lesen]$_2$ keiner [$_{DP}$ das Buch]$_1$ t$_2$ versucht hat
that to read no-one the book$_{acc}$ tried has

b. *dass [$_{VP}$ t$_1$ zu lesen]$_2$ [$_{DP}$ das Buch]$_1$ keiner t$_2$ versucht hat
that to read the book$_{acc}$ no-one tried has

Taken together, the generalizations emerging from the data in the previous subsection are the following. First, a trace in a moved item leads to illformedness when its antecedent is outside of the moved item and c-commands the trace; this is the *freezing* effect (an instance of slightly more general concepts in Ross (1967), Wexler & Culicover (1980)). Second, a trace in a moved item does not have to lead to illformedness when its antecedent is outside of the moved item and does not c-command the trace; this is the *anti-freezing* effect with remnant movement. Third, remnant XPs cannot undergo Y-movement if the antecedent of the unbound trace has also undergone Y-movement (where Y stands for movement-related features – [wh] for wh-movement, [top] for topicalization, [Σ] for scrambling, etc.); this is the *Müller-Takano generalization*. Let us now see how these derivations can be derived.

2.2. A Standard Approach

From the perspective of rule interaction (see Pullum (1979)), freezing configurations involve the transparent interaction of *bleeding*. This implies that by looking at the output representation, it is clear why the representation has the properties that it exhibits (more specifically, why it is ungrammatical: XP_2 movement bleeds XP_1 movement). In contrast, anti-freezing configurations involve the opaque interaction of counter-bleeding (see Chomsky (1951; 1975), Kiparsky (1973)). In this case, by just looking at the output representation, it is not clear why the representation has the properties that it exhibits (in particular, why it can be grammatical, given that well-established rules of grammar seem to be violated: XP_2 movement counter-bleeds XP_1 movement). As is well known, opaque interactions of grammatical operations generally favour derivational analyses over representational ones. In line with this, a main conclusion of Müller (1998) is that the freezing (bleeding) and anti-freezing (counter-bleeding) patterns at hand strongly argue for a derivational approach that relies on the two constraints in (12) and (13).

(12) *Condition on Extraction Domain* (CED; Huang (1982), Chomsky (1986)):
  a. Movement must not cross a barrier.
  b. An XP is a barrier iff it is not a complement.

(13) *Strict Cycle Condition* (SCC; Chomsky (1973), Perlmutter & Soames (1979)):
  Within the current cyclic node α, a syntactic operation may not target a position that is included within another cyclic node β that is dominated by α.

Given the CED in (12) and the SCC in (13), the freezing effect is derived as follows. In a structure ... $[_{XP_2}$ ... XP_1...]..., movement of XP_2 must precede movement of XP_1 (which targets a higher position), given the SCC. However, this violates the CED because there is no movement to complement position, and XP_2 therefore has invariably become a barrier when XP_1 extraction from XP_2 takes place. In contrast, no CED violation is required in anti-freezing contexts. Here, given a pre-movement structure ... $[_{XP_2}$ ... XP_1...]..., movement of XP_2 must follow movement of XP_1 (which targets a lower position), given the SCC. Extraction of XP_1 from XP_2 can therefore respect the CED, provided that XP_2 is not a barrier in its complement position. Finally, it has been observed that the Müller-Takano generalization can be made to follow from the Minimal Link Condition (MLC); see Kitahara (1994; 1997), Fox (1995), Koizumi (1995), Müller (1998): If movement of XP_2 and XP_1 is triggered by the same feature, XP_2 is closer to the attracting head than XP_1 (since XP_2 dominates XP_1), and must therefore move first: Early movement of the lower XP_1 would give rise to a violation of a version of the MLC that is sensitive to domination in the same way that it is sensitive to c-command (as an instance of a *relativized* A-over-A principle as it has been proposed in Chomsky (1973), Bresnan (1976), Fitzpatrick (2002)). Therefore, a CED effect is unavoidable if two identical movement-related features are involved (e.g., two [Σ] features for scrambling, or two [wh] features for wh-movement).

Clearly, this analysis crucially relies on the order of operations (regulated by the SCC) to determine whether a moved XP_2 blocks extraction of XP_1 from it; XP_1 movement is legitimate only if XP_2 is in a complement position *at the point where XP_1 extraction takes place*. In the final output representation, XP_2 is in a specifier position throughout, both in freezing and anti-freezing contexts. Consequently, whereas the transparent bleeding configuration with freezing effects is unproblematic for a representational approach (see Browning (1987)), the opaque counter-bleeding configuration with anti-freezing effects poses a challenge for purely representational approaches to constraints on movement.

Against this background, one can ask whether there are possible ways out for purely representational approaches. It would seem that there are two main strategies that can be pursued. The first one consists in calleding into question the correctness of the empirical generalizations I have adopted here (freezing, anti-freezing, Müller-Takano effects). The second one relies on enriching representations and modifying the CED appropriately. Interestingly, it seems that virtually all existing approaches adopt the former strategy. Thus, it has been claimed that there is in fact no general anti-freezing effect with remnant movement because there is no remnant movement to begin with (see De Kuthy & Meurers (2001), Fanselow (2002), Hale & Legendre (2004), and Thoms & Walkden (2013)). Alternatively, it has been suggested that there is remnant movement, but the generalizations that hold of remnant movement are slightly different ones (see Grewendorf (2003; 2004) and Abels (2008)). On the other hand, it has been argued that there is in fact no syntactic freezing effect – on this view, all freezing effects can be traced back to processing difficulties, and they can typically be improved "with context and prosody" (see Culicover & Winkler (2010)). I will not discuss these proposals here; see Müller (2014, 99-122) for detailed arguments against all these approaches. The second way out under a representational approach could mimic what Barss (1984; 1986) has suggested for the interaction of movement and reflexivization, as in (14).

(14) a. [$_{DP_1}$ Himself], $John_1$ does not really like t_1
b. [$_{DP_2}$ Books about $herself_1$], $Mary_1$ would never read t_2

The problem with (14-ab) is that as a consequence of movement, the reflexive pronoun is not c-commanded by its antecedent anymore, and should thus be expected to violate Principle A, contrary to fact. In a derivational approach where Principle A (or whatever ultimately replaces it; cf. Reuland (2011)) is an Anywhere Principle (see Belletti & Rizzi (1988), and Sabel (2011) for an interesting modification)), (14-ab) are unproblematic: These derivations involve counter-bleeding (of Principle A satisfaction by movement): Movement would bleed Principle A satisfaction but comes too late to do this. In order to account for the counter-bleeding effect in a representational approach, Barss (1984) suggests the concept of *chain-binding* as relevant for Principle A (also see Barss's (1986) notion of *chain accessibility sequences*), such that a reflexive pronoun can satisfy Principle A if it is either c-commanded by its antecedent, or its antecedent c-commands a trace of a category that either is (as in (14-a)), or contains (as in (14-b)), the reflexive pronoun. Something similar can also be assumed for the CED in order to distinguish the anti-freezing effect with remnant movement from the freezing effect with other kinds of movement. The version of the CED in (15) bears an obvious similarity to Barss' version of Principle A that relies on chain-binding.

(15) *Condition on Extraction Domain* (CED; representational version):

a. Two members of a movement chain $< \alpha, \beta >$ must not be separated by a barrier.

b. Two members of a movement chain $< \alpha, \beta >$ are not separated by a barrier iff for all XPs Γ such that Γ dominates β but does not dominate α:

(i) Γ is in a complement position, or

(ii) Γ binds a trace in a complement position, and
Γ c-commands α.

The first clause in (15-b-ii) ensures that for the purposes of CED satisfaction, remnant movement is ignored in the same way that movement is ignored for the purposes of Principle A satisfaction; and the additional c-command requirement in (15-b-ii) accounts for the fact that non-remnant movement cannot be ignored in this way. Although this kind of approach to freezing and anti-freezing would not seem to be a priori inferior to a Barss-type approach to data like those in (14), a version of the CED along these lines has, to the best of my knowledge, never been proposed in the literature. Notwithstanding the question of what this curious asymmetry (with respect to how reconstruction is treated for reflexivization vs. movement) might be due to, I would like to contend that *both* types of representational approaches (i.e., formulating Principle A via a concept like chain-binding, and formulating the CED as in (15)) are indeed fundamentally flawed. The reason is that the *effects of constraint interaction* are integrated into the *definition of a single constraint*, and this makes this constraint extremely implausible (see Grimshaw (1998), Chomsky (2001; 2008) for this general argument): Principle A should be a constraint on reflexive pronouns and possible antecedents for them, but in Barss' version, it also "knows" about the existence of movement and can selectively undo some of its effects that would otherwise be expected under a representational approach; similarly, the CED should be a locality constraint on movement from non-complement position, but in (15), it also "knows" about *other* movement operations and can partially undo the effects that would otherwise be expected under a representational approach.

Summing up so far, it would seem that since anti-freezing effects with remnant involve opaque interactions of operations (movement of XP counter-bleeds extraction from XP), a derivational analysis along the lines just sketched is vastly superior to a representational approach. Unfortunately, closer inspection reveals that this simple analysis in terms of bleeding and counter-bleeding can in fact not be maintained if a version of a derivational approach to syntax is adopted that requires all operations to be highly local. The phase-based approach developed in Chomsky (2001; 2008) is of this type. Given the Phase Impenetrability Condition (PIC), all movement from vP and CP must take place via a specifier (of v and C, respectively). This implies that at least *some* of the relevant movement types in the above examples will have their landing sites beyond the minimal phase in which they originate. If more, or all XPs qualify as phases (as I will assume here, following the reasoning in Müller (2014)), *most* movement types will have their ultimate landing sites in a higher phase. The problem now is the following. In the legitimate cases (anti-freezing with remnant movement), extraction of XP_1 from XP_2 will have to take place immediately to an intermediate phase edge position, before XP_2 undergoes an intermediate movement step itself, so as to respect the CED. The required derivation is shown in (16), with YP assumed to be a phase whose edge must eventually be targetted by both XP_1 and XP_2, because of the PIC (here and henceforth, superscript *a* and *b* stand for different movement-related features).

(16) *Anti-freezing, required first intermediate steps*:

a. $[_{Y'}$ Y $[_{XP_2{}^a}$ $XP_1{}^b$ $[_{X_2'}$ X_2 ...]]]]

b. $[_{Y'}$ $XP_1{}^b$ $[_{Y'}$ Y $[_{XP_2{}^a}$ t_1 $[_{X_2'}$ X_2 ...]]]]

c. $[_{YP}$ $[_{XP_2{}^a}$ t_1 $[_{X_2'}$ X_2 ...]] $[_{Y'}$ $XP_1{}^b$ $[_{Y'}$ Y t_2]]]

In contrast, in the illegitimate cases (standard freezing effects and anti-anti-freezing effects covered by the Müller-Takano generalization), it looks as though extraction of XP_1 from XP_2 will have to follow the first intermediate movement step of XP_2. The required derivations are illustrated in (17) and (18), respectively (again with YP as a phase whose edge must be targetted by intermediate movement steps).

(17) *Freezing, required first intermediate steps*:

a. $[_{Y'}$ Y $[_{XP_2{}^b}$ $XP_1{}^a$ $[_{X_2'}$ X_2 ...]]]]

b. $[_{Y'}$ $[_{XP_2{}^b}$ $XP_1{}^a$ $[_{X_2'}$ X_2 ...]] $[_{Y'}$ Y t_2]]

c. *$[_{YP}$ $XP_1{}^a$ $[_{Y'}$ $[_{XP_2{}^b}$ t_1 $[_{X_2'}$ X_2 ...]] $[_{Y'}$ Y t_2]]

(18) *Müller-Takano generalization, required first intermediate steps*:

a. $[_{Y'}$ Y $[_{XP_2{}^a}$ $XP_1{}^a$ $[_{X_2'}$ X_2 ...]]]]

b. $[_{Y'}$ $[_{XP_2{}^a}$ $XP_1{}^a$ $[_{X_2'}$ X_2 ...]] $[_{Y'}$ Y t_2]]

c. *$[_{YP}$ $XP_1{}^a$ $[_{Y'}$ $[_{XP_2{}^a}$ t_1 $[_{X_2'}$ X_2 ...]] $[_{Y'}$ Y t_2]]

Importantly, the positions reached by XP_1 and XP_2 in (16), (17), and (18) can be (and, in fact, typically are) *intermediate* landing sites; and this creates the problem for the standard approach: If the CED is to be held responsible for the observed asymmetries, the decision whether XP_1 can be extracted before XP_2 (as in (16)) or not (as in (17), (18)) must be made at a point when the relevant information does not yet seem to be present. Thus, a *look-ahead* dilemma arises: The information whether XP_1 will eventually show up in a anti-freezing configuration or in a freezing (or anti-anti-freezing) configuration is typically not yet available after the first intermediate movement step to a phase edge domain.[3] At this point, two general options present themselves. First, one might attempt to pursue a genuine *look-ahead* analysis on the basis of a phase-based approach. However, no obvious possibility to technically implement such a look-ahead analysis suggests itself. For this reason, I take it that there is every reason to pursue the second option: The task should be reconsidered as a *backtracking* problem, such that the decision about the legitimacy of operations in a derivation where XP_1 is at first included in XP_2 and both need to undergo movement is determined with non-intermediate, i.e., *criterial* movement steps, by taking into account earlier information that is nevertheless rendered accessible in a strictly local way (i.e., there is no *actual* backtracking).

2.3. *A New Approach*

Abstractly, the pre-movement configurations discussed so far take the form in (19), with α = XP_2 of the earlier derivations, and β = XP_1.

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[3] Note incidentally that this dilemma is already foreshadowed in Collins's (1994) discussion of *chain interleaving* effects: Collins shows that an intermediate movement step to a VP-adjoined position (as envisaged in Chomsky's (1986) theory of barriers) would undermine an account of freezing effects in terms of the CED. The solution he offers for this problem is to block such local intermediate movement steps here by invoking a trans-derivational economy constraint (Fewest Steps). However, such a constraint cannot be adopted anymore for principled reasons in a minimalist approach; in addition, this way out for the standard CED approach would simply be incompatible with the concept of phases (more specifically, with the PIC).

(19) α*-over-*β *configurations*:
... [$_\alpha$ ... β ...] ...

The main hypothesis now is that movement of β out of α, creating a remnant category α, is in fact per se not completely unproblematic from a theory-internal point of view, even if the CED is respected (pace Stabler (1999), Koopman & Szabolcsi (2000)): I would like to suggest that if some item β moves out of a category α, α is *contaminated* in the sense that β provides a defective value for α's movement-related feature (e.g., [wh], [top], [Σ]), which invariably brings about a crash of the derivation if it is not removed in time, before a criterial position is reached. Thus, the movement-related feature acts as a *buffer* that stores minimal aspects of an earlier part of the syntactic derivation. Note that this does not keep β from undergoing movement itself; a temporary contamination of a movement-related feature is unproblematic as long as a criterial position has not yet been reached. Clearly, the analysis requires a way to undo the contamination of a remnant category. Suppose that a moved item β can in principle *decontaminate* a category α again by removing the defective symbol; but this only happens when β reaches a criterial position, under c-command by α. The concepts of contamination and decontamination are defined in (20).

(20) a. *Contamination*:
Movement of β from a position within α to a position outside of α values a movement-related feature γ on α with β's index.

b. *Decontamination*:
Movement of β to a criterial position deletes β's index on all movement-related features of items that c-command it.[4]

(20-ab) specify the nature of the feature value that turns an XP α from which extraction of β has taken place into an illegitimate item: It is β's *index*, which uniquely identifies β.[5] At this point, two issues need to be clarified. First, why is a value of a movement-related feature that is contaminated by an index of another category (as a consequence of (20-a)) problematic? And second, how can freezing, anti-freezing, and anti-anti-freezing effects be accounted for on the basis of the concepts of contamination and decontamination? I will address these two questions in turn.

The first question is closely related to a more general issue: What are values of movement-related features? In Müller (2014), I suggest that the value of a movement-related feature such as [wh] (on wh-phrases), [top] (on phrases that undergo topicalization) or [Σ] (on phrases that undergo scrambling) is not just [+] or [$-$], as is standardly assumed; rather, the value is an initially empty list of category symbols that is picked up by a moved item as a consequence of edge feature checking in intermediate phase edge positions. So, when, say, a wh-XP moves to the edge of VP (because of the PIC, assuming that every phrase is a phase), the symbol V is placed on the list that acts as the value of wh: [wh:V]; after the next step to a specifier of vP, v is added: [wh:vV], and so on. As soon as a category symbol is read in that matches an earlier one on the list, the older symbol is deleted from the bottom; so a wh-phrase that has

[4] Removal of a defective value under c-command can be viewed as an instance of Agree, with the feature bearing the defective value on α acting as a probe. Crucially, this only becomes possible when β has reached a criterial position; before that, β's index does not qualify as a proper goal.

[5] Other options are possible; but note that indices do not violate the Inclusiveness Condition or the No Tampering Condition (cf. Chomsky (2008; 2013)) given that they are present before the syntactic derivation, and needed anyway for semantic interpretation (Heim & Kratzer (1998)).

undergone a movement step from SpecC to the matrix SpecV position in the course of long-distance movement will have the information [wh:VCTv] (with a potential earlier V symbol obligatorily deleted) associated with it. This way, values of movement-related features act as buffers that temporarily store information about the recent history of movement. As shown in Müller (2014), this makes it possible to formulate the Williams Cycle as a constraint against improper movement (see Williams (1974; 2003)) in a strictly local way: On this view, the Williams Cycle demands that the value of a movement-related feature conforms to f-seq (the functional sequence of heads) *in a criterial position*. Thus, [wh:CTvV] respects the Williams Cycle, whereas [wh:vVCT] does not, and the latter consequence implies that an edge domain of a matrix vP can be used as an intermediate position in the course of long-distance movement (given that the f-seq-violating C and T symbols can eventually be removed by movement to TP and CP edges before a criterial position is reached), but not as a criterial (typically final) landing site for an item from an embedded clause.

From these assumptions, it follows that adding *any* other kind of symbol to the buffer associated with a moved item will invariably lead to a violation of the Williams Cycle if that symbol cannot be removed before the criterial position; as soon as some symbol that is not a category label shows up on a buffer, the list cannot be a proper f-seq anymore. More specifically, if extraction of β from α in (19) establishes β's index on α, α will violate the Williams Cycle in a criterial position unless the incriminating index has been removed again by then, in accordance with (20-b). To simplify exposition, this requirement can be formulated as the Index Filter in (21); but it should be kept in mind that the Index Filter is not a primitive of grammar but rather follows as a theorem from the Williams Cycle.

(21) *Index Filter*:
A movement-related feature (like [wh], [top], [Σ]) must not have an index as part of its value in a criterial position.

As for the second question, the *timing* of movement steps of α and β will be crucial. Criterial remnant movement of α is legitimate if β has been able to remove the fatal symbol from α's feature list before the criterial movement step; this covers anti-freezing contexts. Otherwise, criterial remnant movement of α is illegitimate (freezing, anti-anti-freezing contexts). Ideally, independently motivated constraints on the timing of syntactic operations correctly predict *feeding* (of decontamination, hence Williams Cycle satisfaction, by movement) in the good cases, and *counter-feeding* (of decontamination by movement) in the bad ones. Consider the two constraints on multiple movement to a phase edge (in cases of an initial indeterminacy) in (22).

(22) *Timing of multiple movement*:
a. *C-command contexts*:
If α c-commands β in the pre-movement structure, then α moves first, and β moves after that, to a *lower* specifier.
b. *Domination contexts*:
If α does not c-command β in the pre-movement structure, the order is not fixed; the second item that moves ends up in a *higher* specifier.

The constraint in (22-a) is argued for in Richards (2001) and Branigan (2013), among others (also see Fox & Pesetsky (2005), Stroik (2009), Unger (2010), Assmann & Heck (2013) for related concepts). (22-a) demands that of two items that stand in a c-command relation and need to move to the same domain, the higher one moves first, and the lower one moves second, by tucking in. In contrast, (22-b) states for two items that are not in a c-command relation (i.e., that are either not subject to any relevant syntactic relation, or – more relevantly for the current discussion – that are in a domination relation before movement) that there are no restrictions as to the order of movement, and each movement operation conservatively extends the tree (i.e., tucking in is not permitted here). Consequently, (22-b) permits movement of β to apply first in α-over-β environments (where α, β both initially undergo intermediate movement), which is a precondition for CED satisfaction of any derivation in which this configuration occurs.[6]

Is there any reason why the two constraints in (22-ab) should be the way they are? I believe that there is, because as a whole (22) brings about a *minimization of changes to existing structures*, as required under a (non-categorical) version of the No Tampering Condition (NTC, Chomsky (2007; 2008; 2013)) that incorporates Pullum's (1992) assumptions about the origins of (strict) cyclicity. Thus, (22-ab) ensure that once established, linear order is preserved throughout the derivation as much as possible (i.e., as long as triggers for movement can be satisfied, etc.), even at the cost of counter-cyclic tucking in operations (cf. (22-a)); but such violations are not permitted when maintaining linear order is not an issue (cf. (22-b)).

With all the required assumptions in place, let me now turn to the relevant possible derivations on the basis of α-over-β configurations.

2.4. Derivations

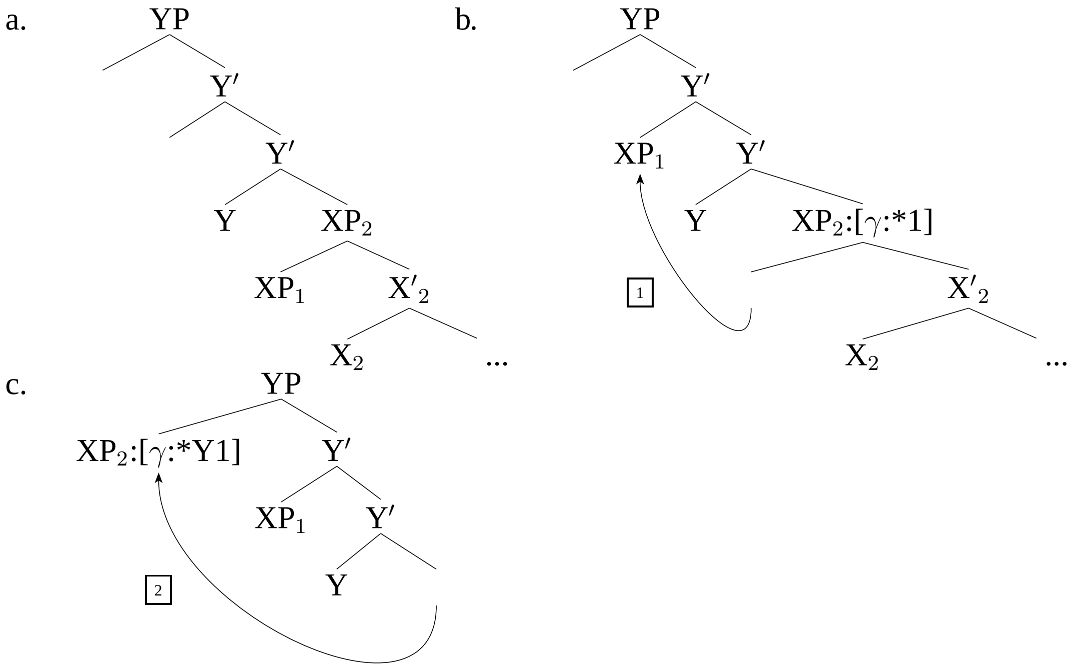
It makes sense to approach the derivations by first looking at initial steps, then investigating the options for intermediate steps, and finally turn to criterial movement steps of α and β.

2.4.1. Initial Steps

Recall that I assume all XPs to be phases, such that the PIC forces movement through every intervening XP edge domain (this assumption is not in any way crucial for the general mechanics of the approach, but it may make the issues at hand slightly more transparent). Also, whereas the CED in (12) and the SCC in (13) hold, the MLC does not (see the last footnote). The first relevant stage of the derivation then looks as in (23-a), where XP_2 (= α) and XP_1 (= β) are in an α-over-β configuration, with both of them bearing movement-related features, and both of them required to move to the next higher phase edge (i.e., specifiers of YP), as a consequence of the PIC; XP_1 is in a specifier position of XP_2 either because it is base-generated there, or because it has undergone an intermediate movement step as required by the PIC. At this point, the constraints in (22) become potentially relevant. (22-a) applies vacuously since XP_2 and XP_1 are not in a c-command relation; (22-b) applies non-vacuously (since XP_2 dominates XP_1 in (23-a)) but is compatible with either of the two moving next. In this situation, the CED ensures that XP_1 is moved out of XP_2 first (as long as XP_2 is still in its in situ position), and thereby contaminates XP_2's movement-related feature (here represented as γ) by adding its index to the otherwise empty list; see (23-b). After that, XP_2 moves to an outer specifier of YP (because of (22-b)).

[6] This pressuposes that there can be no MLC, or at least no relativized A-over-A principle as part of it; see Müller (2011) for independent arguments, and for a proposal of how to derive most of the intervention effects that the MLC is supposed to cover.

(23) *Initial steps in α-over-β configurations*

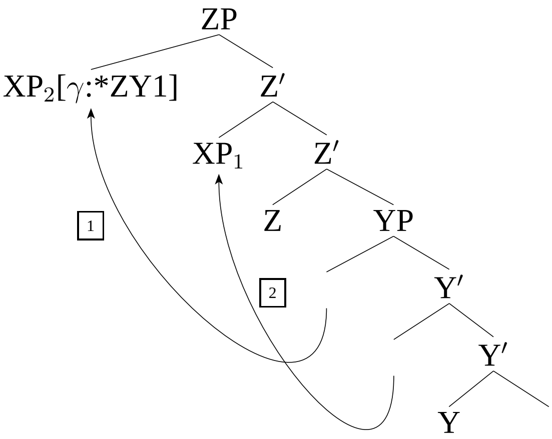


Note that both XP_2 (in (23-c)) and XP_1 (in (23-b)) obtain the category symbol of the new phase domain (i.e., Y) as a new additional value on the buffer associated with their movement-related features. (Here and in what follows, this is not shown for XP_1, to simplify exposition.) Also note that since this first part of the derivation does not discriminate between freezing and anti-freezing configurations yet, and can satisfy the CED across the board, it is clear that the CED cannot be held responsible anymore for the difference between freezing and anti-freezing: It is not violated in the former case either.

2.4.2. Intermediate Steps

Multiple initial movement in (23) has created a c-command relation of XP_2 and XP_1, so at this point, (22-a) becomes relevant to determine the order of the next multiple movement steps. Suppose that both XP_1 and XP_2 still fail to reach their criterial landing site in the next domain ZP that they have to move to because of the PIC. Then, the derivation proceeds as in (24), with XP_2 (which c-commands XP_1) moving first to a specifier of Z, and XP_1 subsequently moving to a lower specifier of the same domain, so as to preserve the order on the previous cycle. In addition, the buffers associated with the movement-related features are enriched by Z symbols on top of the list, both with XP_2 and (although this is not shown here) XP_1. XP_2's buffer continues to be contaminated by XP_1's index, due to the original extraction of XP_1 from XP_2, but this is unproblematic at this stage since XP_2 has not yet reached a criterial position, and the Index Filter (i.e., the Williams Cycle) can therefore not be violated at this point.

(24) *Intermediate steps in α-over-β configurations*

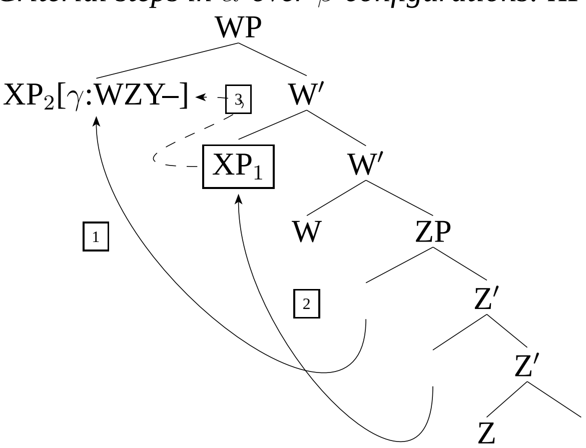


Building on either (23-c) or (24), criterial movement steps of either XP_1 (β), XP_2 (α), or both XP_2 and XP_1 can now take place, giving rise to anti-freezing, freezing, and Müller-Takano (anti-anti-freezing) effects.

2.4.3. Anti-Freezing

Suppose that the derivation has reached the stage in (24), with both XP_1 and XP_2 in specifier positions of the same domain, and XP_2 occupying the higher one. Given (22-a), XP_2 now needs to move first to the next domain (WP). Suppose that XP_2 does not reach a criterial position yet as a consequence of this movement; i.e., it undergoes another intermediate movement. Subsequently, movement of XP_1 takes place to an inner specifier. Suppose that this is a criterial movement step. According to (20-b), this latter operation then removes XP_1's index from XP_2. Consequently, XP_2 is free to undergo criterial movement from now on; it can satisfy the Index Filter (hence, the Williams Cycle) once the incriminating index has been removed from its buffer. Thus, there is a feeding interaction of operations: Decontamination feeds criterial remnant movement. All this is shown in (25); and (26) (= (10-a)) illustrates a typical case of remnant movement instantiating this derivation.[7]

(25) *Criterial steps in α-over-β configurations: XP_1*



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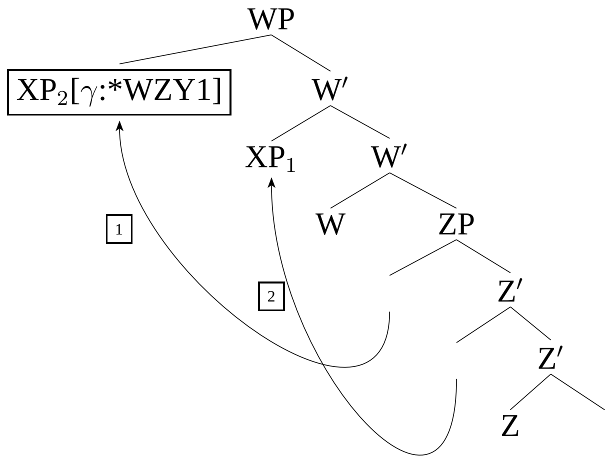
[7] Here, $\boxed{1}$ signals intermediate movement of XP_2, $\boxed{2}$ subsequent criterial movement of XP_1; and $\boxed{3}$ index removal (while XP_1 is c-commanded by XP_2); a box around a category indicates that the category has reached a criterial position.

(26) [$_{VP_2}$ t_1 Gelesen] hat das Buch$_1$ keiner t_2
read has the book no-one

2.4.4. *Freezing*

In contrast, freezing configurations involve a counter-feeding interaction of operations: Criterial movement of XP_1 comes far too late to remove the fatal index from XP_2. Let us assume again that the derivation has reached the stage in (24). As before, XP_2 has to move first, given (22-a), and XP_1 moves later, to an inner specifier. However, suppose now that it is XP_2 that reaches a criterial position on this cycle, whereas XP_1 undergoes intermediate movement. As a consequence, the Index Filter (Williams Cycle) will have to be violated: XP_2 undergoes criterial movement when it still has a contaminated value on its buffer; decontamination can only take place once XP_1 has reached a criterial position, which it does not within WP (criterial movement of XP_1 to a higher domain comes much too late – the Index Filter is already fatally violated at this point). This account of the freezing effect is illustrated in (27); and a typical example that can now be derived as ungrammatical in this way is repeated in (28) (= (5)).

(27) *Criterial steps in α-over-β configurations: XP_2*

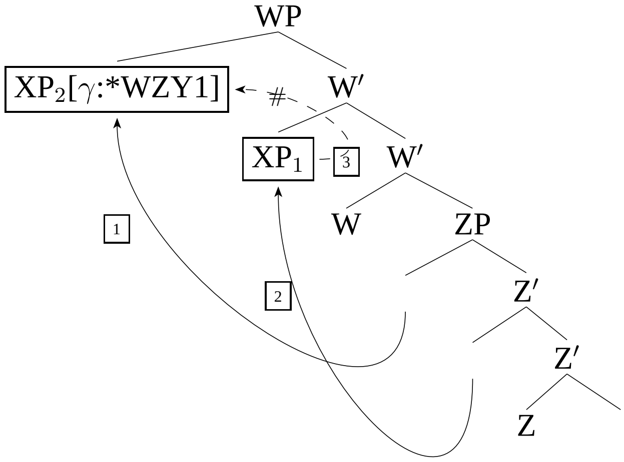


(28) *Was$_1$ denkst du [$_{VP_2}$ t_1 gelesen] hat keiner t_2 ?
what think you read has no-one

2.4.5. *Müller-Takano Generalization*

The third possible continuation of a derivation involving criterial movement on the basis of (24) is that both XP_2 and XP_1 undergo criterial movement to a given specifier domain. This is the situation underlying Müller-Takano effects, and it also involves counter-feeding under present assumptions: This time, criterial movement of XP_1 comes *a bit* too late to be able to remove the fatal index from XP_2: Given (22-a), XP_2 undergoes criterial movement first and thereby violates the Index Filter; cf. (29). Subsequent criterial movement of XP_1 (via tucking in) creates a configuration in which the defective index on XP_2 could be removed (signalled by $\boxed{3}$), but at this point of the derivation, it is too late – the derivation has already been classified as ungrammatical as a consequence of the prior, illicit movement step of XP_2. A relevant example illustrating the Müller-Takano effect that can be accounted for along these lines is repeated in (29) (= (11-b)).

(29) *Criterial steps in α-over-β configurations: XP_1 & XP_2*



(30) *dass [$_{VP_2}$ t$_1$ zu lesen] [$_{DP_1}$ das Buch] keiner t$_2$ versucht hat
that to read the book$_{acc}$ no-one tried has

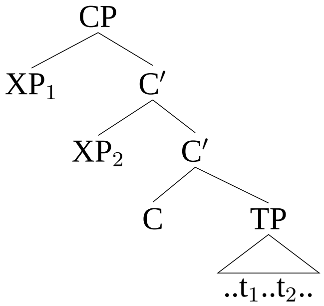
2.4.6. Interim Conclusion

This concludes the discussion of standard freezing, anti-freezing, and anti-anti-freezing effects. Needless to say, there are many further aspects of the analysis that would need to be considered (e.g., pertaining to situations where an *initial* movement step as in (23) is already a criterial one, or pertaining to configurations where *three or more* phrases are initially in a dominance relation and need to move to external positions); and there are many consequences that need to be explored (e.g., concerning the scope of Müller-Takano effects, or concerning the expectation that a temporarily deficient XP_2 with a contaminated buffer should behave differently from a minimally different XP_2 without a contaminated buffer, with respect to index-sensitive operations like binding and scope). For all this, see Müller (2014, ch. 3). For present purposes, the main conclusion to be drawn is that if the present account of freezing effects is on the right track, we expect that the freezing effect showing up in the complex prefield construction (as in (6-b), (7-b), and (8-b), with (6-b) repeated here as (31)) can be traced back to XP_2 reaching a criterial position with a contaminated buffer (due to prior XP_3 extraction).

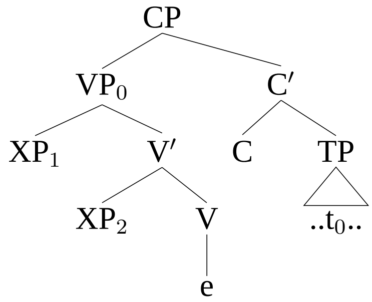
(31) *[$_{CP}$ Da$_3$ [$_{DP_1}$ dem Team] [$_{PP_2}$ t$_3$ zu] [$_{C'}$ gratulierte Bernard Hinault]]
there the team$_{dat}$ to congratulated Bernard Hinault$_{nom}$

If complex prefields were derived as in (2) (repeated here as (32)), as argued by Lötscher (1985), Speyer (2008) and others, the freezing effect could be accounted for without further ado: If some item δ is to be extracted from XP_2, this must happen early, when XP_2 is still in its in situ position (because of the CED), with XP_2 subsequently undergoing an intermediate movement step to a higher specifier. This would establish c-command of δ by XP_2, and these two phrases would then undergo all further movement steps hand in hand, with XP_2 moving first and δ second, to a lower specifier position, in each domain. Thus, XP_2 would invariably end up in a criterial position *before* δ could itself reach such a position, and a violation of the Index Filter would be unavoidable. However, recall from section 1 that Fanselow (1992) and Müller, St. (2005)) present strong evidence against (32), and in favour of an analysis of complex prefields in terms of single VP movement, as in (3) (repeated here as (33)). Here, XP_2 has not undergone movement at all, and assuming that δ can end up in a VP-internal position, it is completely unclear how a freezing effect can be derived – (31) should be well formed for exactly the same reasons as the minimally different example where a VP fronting analysis is uncontroversial (because of an overt V in the prefield), as in (6-e) above, repeated here in (34).

(32)



(33)



(34) [$_{CP}$ Da$_3$ [$_{DP_1}$ dem Team] [$_{PP_2}$ t_3 zu] gratuliert [$_{C'}$ hat Bernard Hinault]]
there the team$_{dat}$ to congratulated has Bernard Hinault$_{nom}$

Given this state of affairs, I will now suggest an analysis that resolves the problem of conflicting structure assignments (cf. (2) vs. (3)) in a principled way.

3. Structure Removal

In Müller (2015), I develop a general approach to syntactic phenomena that strongly suggest conflicting structure assignments. The core assumption is that next to the operation *Merge* that generates syntactic structure (Chomsky (2001)), there is also an operation *Remove* in the grammar that removes syntactic structure. These two operations emerge as two sides of the same coin, and they are assumed to be subject to identical restrictions – they both have to respect strict cyclicity in the same way, they are both driven by designated features of some head, and so on. Most importantly in the present context, they can both either apply to phrases or heads. Remove applying to phases takes out whole subtrees from syntactic representations; this is assumed to underlie cases of argument demotion in passives, applicatives and other diatheses, and certain ellipsis constructions like sluicing. In contrast, Remove applying to heads only takes out the head of a projection; given bare phrase structure, this implies that the projection of this head is also removed, but all other XPs in the domain of the removed head's projection remain accessible, and are reassociated with the original structure in a way that is maximally structure-preserving. Thus, in this latter case, what is removed is just the top-most shell of some complement or specifier, not the complement or specifier as such.[8] Remove applying to heads is assumed to underlie constructions for which tradiditionally a concept of *reanalysis* has been proposed, e.g., restructuring infinitives (which, on this view, result from recursive applications of Remove to the heads of the complement clause, triggered by the matrix verb's features).

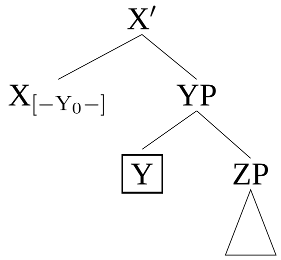
(35) and (36) illustrate Remove operations applying to heads, for complements and specifiers, respectively; removal of the top-most shell implies that lower material becomes reassociated with the projection of the head that triggers the operation, in a way that preserves c-command and linear order if more than one XP is involved (as it is in (36), which gives rise to two specifiers after structure removal because the head Y affected by the operation takes both a

[8] Concepts related to Remove applying to heads are *tree-pruning* (see Ross (1967)) and *exfoliation* (see Pesetsky (2016)).

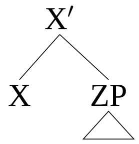
complement and a specifier).[9]

(35) *Remove applying to heads: complements*

a. Merge($X_{[\bullet Y_2 \bullet] \succ [-Y_0-]}$,YP):

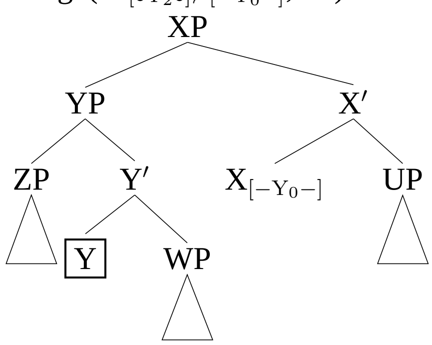


b. Remove($X_{[-Y_0-]}$,Y):

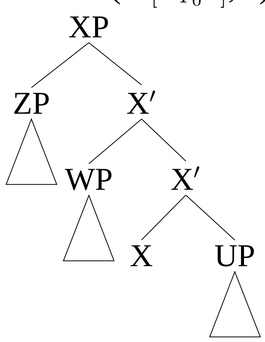


(36) *Remove applying to heads: specifiers*

a. Merge($X'_{[\bullet Y_2 \bullet] \succ [-Y_0-]}$,YP):



b. Remove($X'_{[-Y_0-]}$,Y):



I would like to propose that Remove applying to heads is also responsible for the solving the

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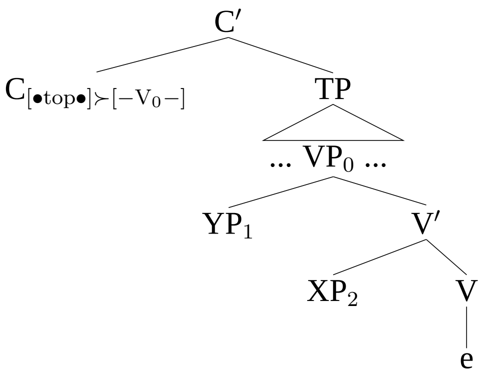
[9] Some remarks on notation. I assume that all Merge operations are triggered by designated features: [$\bullet Y_2 \bullet$] on some head X encodes the instruction that X is to be merged with a YP, and the feature is deleted once the operation has been carried out (see Heck & Müller (2007); [$\bullet Y_0 \bullet$] would do the same for a Y head). Similarly, [–Y_0–] on X encodes the instruction that X is to remove a head Y ([–Y_2–] would do the same for a YP); again, the feature is deleted after the operation has taken place. Furthermore, such features triggering operations are ordered on lexical heads (indicated by $\succ$), and only the top-most feature on a list can be discharged at any given point.

conundrum posed by the need to assign conflicting structure assignments to complex prefield constructions in German.[10] In a nutshell, (32) and (33) can *both* emerge as well-formed structures, but not simultaneously: In effect, (32) is derived from (33) by Remove.

As a first step towards such an analysis, it can be noted that structure removal applying to specifiers (as in (36)) does not per se discriminate between base-generated specifiers and specifiers derived by movement; i.e., it is expected that movement (internal Merge) of some item to a specifier position can feed subsequent Remove of this item.[11] For concreteness, suppose that in complex prefield constructions, remnant VP fronting (triggered by [•top•] on C, or by some other movement-triggering feature on C targetting the VP) feeds removal of the VP shell (triggered by [–V_0–] on C). The derivation in (37) shows how structure removal in complex prefields is brought about. The first step is that V has left the VP, thereby creating a remnant VP from which the verb is missing; see (37-a).[12] Next, in (37-b) VP topicalization takes place. Finally, structure removal is effected, triggered by [–V_0–] on C. In (35) and (36) above, I have illustrated this by a single representation. This time, for the sake of clarity, the two steps that are required for this are indicated in two separate representations, viz., (37-c) (where the VP shell is removed as a consequence of C's [–V_0–] feature, thereby creating two floating phrases that were part of VP's minimal domain) and (37-d) (where the floating daughters YP_1 and XP_2 of the original VP are reassociated with the triggering head's projection in a structure-preserving way).

(37) a. *Pre-movement structure*:

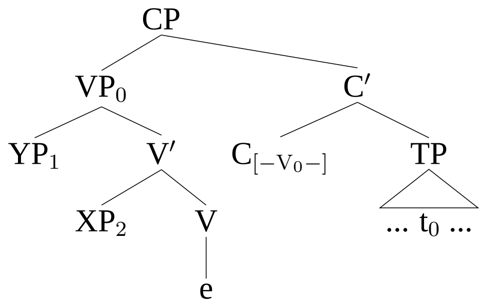


[10] Closer inspection reveals that there are actually quite a number of arguments, both for a multiple XP movement approach and for a single VP movement approach to complex prefields, in addition to the two arguments presented in the present paper (viz., clause-mate condition vs. freezing). Thus, the problem of conflicting structure assignments is indeed a fairly general one; see Müller (2016).

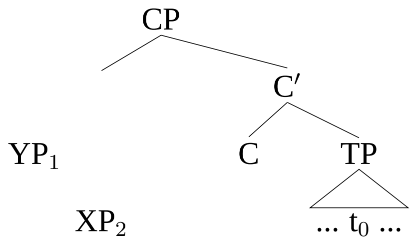
[11] Also see Murphy (2014) on such an interaction of movement and structure removal, based on evidence from stacked passives in Turkish. Also, strictly speaking, VP_0 must have undergone intermediate movement steps to Specv and SpecT before C is merged, given the PIC. I abstract away from these operations to simplify exposition.

[12] In (37), e is the trace of a moved lexical V. V may be in C or in a TP-internal right-peripheral position adjoined to some functional head; this must hold irrespective of whether V is finite or non-finite (e.g., a past participle).

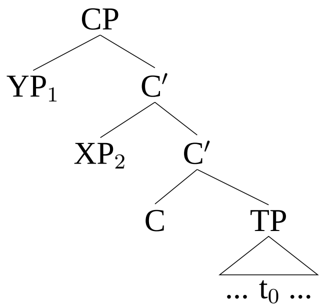
b. *VP fronting*:



c. *Structure removal*:



d. *Reassociation*:



Thus, the two representations in (32) and (33) are both valid, but at different stages of the derivation (see (37-d) vs. (37-b)). On this view, those processes that favour (33) take place early in the derivation. For example, the clause-mate condition on complex prefields follows from the fact that matrix C has only one structure-building feature for topicalization; so it is impossible that two (or more) separate constituents move to the specifier domain of this head. On the other hand, those processes that favour (32) take place at a later stage. Clearly, this will hold for the freezing effect.

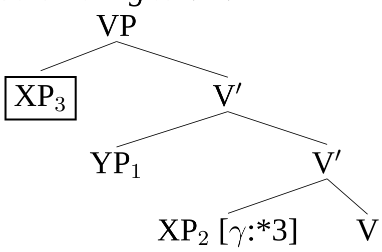
4. Freezing in Complex Prefields

The first thing to note is that if the final output representation in (37-b) is the one that is relevant for determining the legitimacy of extraction, the freezing effect in complex prefields would directly follow from a purely representational approach (as in Browning (1987)): XP_2 in (37-d) occupies a specifier position as a consequence of reassociation after VP removal, so it will act as a barrier and block extraction. However, recall from section 2.2 that the representational approach to freezing is incompatible with the existence of anti-freezing effects with remnant movement, so this solution is not viable.

The question then is whether the derivational approach in terms of counter-feeding developed in section 2.3 can account for the freezing effect with complex prefields on the basis of derivations as in (37). For this to work, it has to be ensured that the prefield item from which extraction takes place has a contaminated buffer that then violates the Index Filter (more generally, the Williams Cycle). But does it, in the cases at hand? At no stage of the derivation is either of the multiple specifiers in (37-d) actually targetted by a movement operation (only their original VP mother is); these items reach a displaced specifier position *without* undergoing movement. Therefore, if only those XPs have buffers that can be affected by contamination that have a special movement-related feature, such as [top] or [wh] (see (20-a)), the items that eventually form multiple specifiers in complex prefields in German cannot be contaminated by extraction, and the freezing effect will remain unaccounted for after all. So, I would like to conclude that *all* XPs are equipped with a movement-related feature; in the absence of a specific instantiation like [top] or [wh], this will be some neutral, multi-purpose feature [γ] whose value acts as a buffer. This implies that *in all cases of extraction from XP* (including successive-cyclic movement from vP, TP, CP, etc.), XP has a buffer, and the moved item will contaminate XPs buffer, independently of whether XP itself undergoes movement or not. If an XP from which extraction has taken place does not undergo movement itself, this index will never be removed (due to lack of c-command of the moved item by XP; see (20-b)). However, this is typically unproblematic if nothing happens to XP in the remainder of the derivation (base positions do not count as criterial positions in the sense of the Index Filter/Williams Cycle, only derived positions do). Still, there is one context where failure of decontamination of a buffer of an XP from which extraction has taken place may be fatal after all even though XP itself does not undergo movement, and that is the configuration where XP comes to occupy a non-base, derived position as a consequence of some operation other than movement: This is what happens with structure removal in complex prefields.

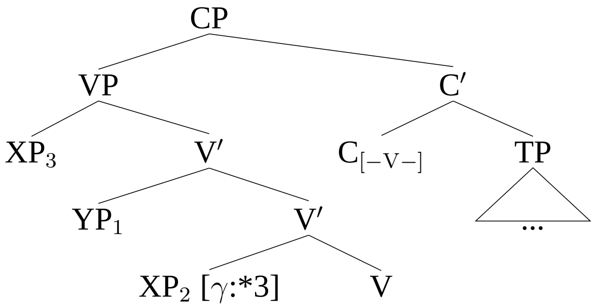
Let us look at the individual steps of the derivation giving rise to freezing effects with complex prefields. First, suppose that a VP is constructed which includes YP_1 and XP_2, and that some XP_3 has been extracted out of XP_2 (with XP_2 in situ) to higher specifier of VP, via scrambling. XP_3 movement contaminates XP_2's buffer with its index (recall that γ is a multi-purpose feature here that is borne by all XPs); see (38). Immediate decontamination cannot take place even though XP_3 has reached a criterial position, due to lack of c-command of XP_3 by XP_2.

(38) *Scrambling to VP*:



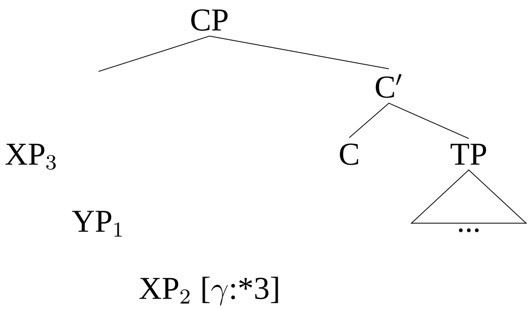
The derivation continues, and on the CP cycle, VP is topicalized; cf. (39).

(39) *VP-topicalization*:



By assumption, C also has a feature [–V–] which brings about removal.[13] As soon as VP has undergone movement to SpecC, this feature becomes active (the feature triggering VP topicalization has been discharged) and triggers removal of the VP shell; see (40). As a consequence of VP shell removal, XP_3, YP_1 and XP_2 (as specifiers and complement of the original VP) have temporarily lost direct attachment to the clause.

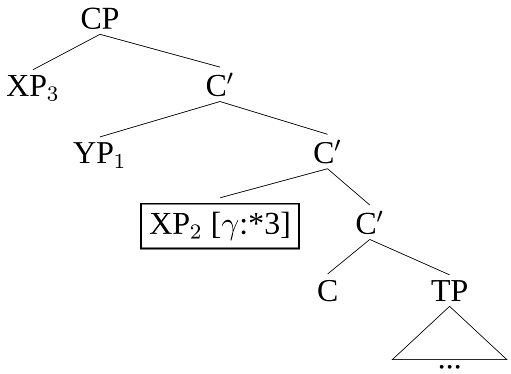
(40) *Structure removal*:



In the next step, reassociation of XP_3, YP_1 and XP_2 takes place, in a maximally structure-preserving way (i.e., by maintaining the original c-command and precedence relations). Given that only one operation can apply at any given step in a strictly derivational approach to grammar, it is clear that reassociation also needs to apply stepwise, and in a bottom-up fashion, as demanded by strict cyclicity. So, in (41), XP_2 becomes a specifier of C first; this violates the Index Filter (Williams Cycle) because XP_2 now occupies a criterial position; after that, YP_1 might be reassociated, and then XP_3; but by this time, the damage has already, and irrevocably, been done, and the sentence is derived as ungrammatical

[13] Of course, this removal feature needs to be optional. As a matter of fact, placement of this feature on C (in the numeration) must be highly restricted, given the marked nature of complex prefield constructions. As noted in footnote 1, I have nothing insightful to say here about the contexts and registers in which complex prefield constructions can be used felicitously, but I take this issue to be orthogonal to the mechanics of the operation as such.

(41) *Reassociation*:



This accounts for the freezing effect in (6-b) (= (31)), (7-b), and (8-b). As with standard cases of freezing, there is an initial α-over-β configuration, and α (= XP_2) eventually reaches a criterial position with illegitimate information on its buffer that can be traced back to prior extraction of β (= XP_3). However, the interesting difference to standard cases of freezing is that with freezing in complex prefields in German, α comes to occupy a derived specifier position without being moved to that position.[14]

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[14] Note incidentally that just as the approach developed here can account for certain instances of freezing without movement, it can in principle also handle cases of movement that do not give rise to freezing. For instance, it has been claimed by Meinunger (1995), Bayer (2004), and Winkler et al. (2014)) that freezing effects in α-over-β configurations often improve or disappear in German if β is (contrastively) focussed; cf. (i) (where focussed material is in italics).

(i) a. Dass den Minister Journalisten kritisiert haben, weiß ich schon, aber
that the minister$_{acc}$ journalists$_{nom}$ criticized have, know I PRT, but

b. ?Was$_1$ haben [$_{DP_2}$ t$_1$ *für Ärzte*] denn den Minister kritisiert ?
what have for doctors PRT the minister$_{acc}$ criticized

This could be accounted for by assuming that a movement-related feature [foc] on α resists the placement of an index of an extracted item β on α's buffer. If so, α is not contaminated to begin with, and will be able to reach a criterial position before β eventually does without violating the Index Filter. To be sure, there is little explanatory depth to this proposal, but it is worth noting that the system is at least able to express the generalization (if it can indeed be substantiated as such). Also, I would like to contend that stating the generalization does not appear to be in any sense simpler in other (e.g., non-structural) approaches to freezing.

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