V-Clustering and Clause Union – Causes and Effects

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1. *Overview: descriptive generalizations and their theoretical implications*

The background assumptions and claims defended in this paper are as follows:

- In Dutch and German, clustering involves *any* dependent *verbal* category (i.e. V_{Inf}, V_{PII}, $zu_{Germ.}/te_{Du.}$+V_{Inf}): Clustering is *obligatory* with non-sentential complements, that is, with bare V_{Inf} and V_{PII} heads.[1]
- In German, in contrast to Dutch, infinitival complements with *zu*+V_{Inf} are *optionally* clustering if the superordinate verb selects a sentential infinitival complement.[2] As in Dutch, clustering is *obligatory* for subsentential ('raising' predicates) complement types.
- Derivational accounts in terms of phrasal movements (of remnant clauses or remnant V-projections) prove empirically inadequate.[3]
- Clause-union effects are predicted, if clustering starts from a base-generation option of head-to-head selection and merger. Serialization patterns follow from local head movement (adjunction, cliticization, VP-shell formation).
- German and Dutch represent minimally different grammatical implementation options of clustering: Both employ verbal cliticization to the right. As to rearrangements targeting the left side, Dutch implements head-movement by adjunction to the left whereas German uses (directionally non-canonical) VP-shell projections.
- Clustering is a property of recursive head-final projections: V-clustering has the effect of minimizing center embedding for V-projections and their lexical or functional extensions. It follows from a UG-principle that guarantees parser friendliness.

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1 PII is an abbreviation for the *second participle*, that is, the perfect & passive participle.

2 However, clustering is possible only for an unmarked argument, that is, the argument without specific lexical requirements in terms of case marking or subcategorization. This is – in surface grammar terms – the direct object argument or the unaccusative subject argument.

3 Fanselow (1989) suggested an analysis of verbal clustering in terms of remnant clausal constituents (IPs). Koopman & Szabolcsi (2001) develop a similar analysis in terms of remnant V-projections. Both accounts fail to capture the relevant generalizations (details below). The need for ad hoc 'complexity filters' for adjusting structures to the data is a sign of a poor coverage of the empirical generalization by a phrasal movement analysis.Í

Grammar theory offers in principle three different ways of modeling the V-clustering phenomenon and its relation to the non-clustering variant. One possibility is that clusters are clusters from the beginning, that is, cluster formation is a base-generation option (*head-to-head merging*), and that the non-clustering construction is a separate construction from the beginning. Second, clusters can be derived from the non-clustering construction by movement operations, either in terms of *phrasal movement* (for instance by *CP-* or *VP-evacuation and movement of the remnant CP or VP*, respectively) or by *head-movement* (for instance by *V-to-V adjunction* or *head chains in a VP-shell projection*) with or without restructuring (cf. Wurmbrand 2001).[4] Third, cluster formation may involve a combination of cluster base generation and head movement. Here, it will be argued that minimally different implementations of the third approach are necessary and adequate for an empirically adequate coverage of both the German and the Dutch variants of clustering, respectively.

2. *A descriptive survey of V-clustering and clause union in German*

2.1 *The structure of the clusters*

The data reviewed in this section are core data for the construction and they provide evidence for the crucial question: What is the phrasal architecture of the cluster? Does it involve more complex, phrasal projections or is it simply a cluster of X°-type elements?

The evidence to be discussed here is drawn from three independent sources. First, there is comparative OV-VO evidence: In German and Dutch, clustering is reflected by a strict adjacency requirement for the verbs in the cluster. This is not expected if the cluster consists of stacked projections (including remnant CPs or VPs). Second, left dislocation and topicalization provide evidence for V-clusters as head clusters, rather than V-projections, and third, clustering affects the argument structure of dependent verbs (clause union effects), which is unexpected if the cluster consists of projections. Additional, independent evidence for a monoclausal structure is reviewed briefly at the end of the subsection.

Let us start with the robust and characteristic adjacency property of the elements in the cluster. A comparison of English and German reveals a clear difference in the organization of V-projections that involve auxiliaries. In English, they behave as is expected for stacked VPs, in German (and Dutch), however, they do not. The verbs seem to cluster.

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4 This solution was first proposed by Seuren (1972) and Evers (1975).

(1) a. The new theory certainly may possibly have indeed been badly formulated (Quirk et al. 1986: § 8.20, p. 495)

b. daß die Theorie wohl tatsächlich schlecht formuliert (*) worden (*) sein (*) mag
that the theory possibly indeed badly formulated been be may

The fact that it is possible to separate auxiliaries by intervening adverbials tells that the structure for (1-a) is one with stacked phrasal projections. Each auxiliary projects a VP (and functional layers on top of it, if you like) and selects a VP (or a functional extension thereof) as its complement. In German, the series of verbs is the mirror image of the English pattern, but intervening material is strictly excluded. This is indicated by the bracketed asterisks in (1-b). Adverbials must precede the chain of verbs. This is not at all a peculiarity of adverbs, but it holds for any potentially postverbal material as potential intervener. A comparison with topicalized (remnant) VPs is instructive. These data show that (remnant) VPs may contain extraposed material, hence potential postverbal interveners in clusters.

(2) a. [*Gerechnet damit*]$_i$ hat sie nicht mehr e$_i$
reckoned it-with has she not anymore

b. *daß sie nicht mehr *gerechnet damit* hat
that she not anymore *reckoned it-with* has

c. daß sie nicht mehr *gerechnet* hat *damit*

d. [*Gesagt, wie es funktioniert*] hat er dem Kollegen leider nicht
told how it works has he to the colleague unfortunately not

e. *daß er dem Kollegen leider nicht *gesagt wie es funktioniert* hat
that he the colleagues unfortunately not *told how it works* has

f. daß er dem Kollegen leider nicht *gesagt* hat *wie es funktioniert*
that he the colleagues unfortunately not *told* has *how it works*

Note furthermore, that clustering is not a by-product of raising heads out of the VP to a higher functional head position on the right.[5] This can be demonstrated with the following set of data.

Note first, that the VP is a potential extraposition site for (relative) clauses, as in (3-a). But extraposed material cannot be sandwiched between verbs in the cluster. Overt reconstruction of (3-a) into its extraction site is ungrammatical (3-b). The extraposed (relative) clause is clause-final (3-c). If clustering were a side effect of something like V-to-I clustering, an extraposed relative clause should be able to occur right before the raised sequence of verbs, as in (3-d). This is the counterpart of (3-a), with a VP-

5 This applies both to analyses in terms of V-movement to a clause-final functional head position, as well as to an analysis that derives the German/Dutch patterns from English-like patterns by movement to the left (see Zwart 1993).

internal extraposed relative clause, but with the verbs raised to a clause final functional head. Note that moving the verb out of the VP would not prohibit extraposition, as illustrated by (3-e), where the verb moved to the top functional-head position.

(3) a. [$_{VP}$ *Jenen* etwas gegeben *die ihn darum gebeten haben*] hat er noch nie
those [who him it-for asked have] something given has he yet never
'that he has never yet given something to those who asked him for it'

b. *daß er [$_{VP}$ *jenen* etwas gegeben [*die ihn darum gebeten haben*] hat
that he those something given [who him it-for asked have] has

c. daß er *jenen* etwas gegeben hat, *die ihn darum gebeten haben*
that he those something given has [who him it-for asked have]

d. *daß er [$_{VP}$ *jenen* etwas e_i [*die ihn darum gebeten haben*]] gegeben$_i$ hat
that he those something [who him it-for asked have] given has

e. Er gab$_i$ [*jenen* etwas e_i, [*die ihn darum gebeten haben*]]
He gave those something [who him it-for asked have]

What these data show is, first, that the cluster structure of auxiliaries and the main verb does not leave any room for intervening material. There would be enough room, however, if the clusters consisted of stacked (remnant) projections, because, on the one hand a (remnant) VP allows extraposed material (see VP-Topicalization with extraposition in (2-a,d)), and on the other, English shows that V-projections (plus their functional extensions) allow intervening material. So, the 'no intervener' property is not reducible to a constraint that would hold for Vs selecting V-projections or their functional extensions.

Second, the effect cannot be reduced to head-movement since the 'no-intervener' property already holds for the base positions (see 3-d). Head-movement would not destroy the base constellation of the V-projections and therefore would not account for these side effects.

Let me emphasize that the 'no-intervener' property is clear counterevidence to any analysis of cluster construction that operates with V-projections (or higher ones) as minimal building units of clusters. This applies to Koopman & Szabolcsi (2000) as well as to Wurmbrand (2001). Unfortunately, both publications pay no attention to this crucial property of clusters.

Let us now compare topicalization and left dislocation (LD). As discussed in Haider (1990), there is a mismatch between VP-topicalization and VP-in-situ. In situ, the auxiliaries are obligatorily clustered (see also Haider 1993, Chapter 9) but VP-topicalization seems to display a stacked-VP structure. However, left-dislocation is a good source of evidence for deciding between a clustering analysis and one that assumes remnant VPs. The examples in (4) show that a verb cluster can be topicalized or left dislocated. In the first option, the verb cluster is moved to the Spec position

of the functional head that hosts the finite verb. In the latter option, the Spec position contains a pronominal bound by the left-dislocated phrase.

(4) a. [Wiedererkennen können]^{i} (das^{i}) müßte er sie schon
identify be-able (this) must he her well

b. [Vorsingen lassen müssen]^{i} (das^{i}) wird man ihn schon
audit let must (this) shall one him well
'One will have to let him audit'

c. [Übersehen haben]^{i} (das^{i}) wird man sie sicher nicht
overlooked have (this) will one her surely not

d. [Übersehen worden]^{i} (das^{i}) ist sie noch nie
overlooked been (this) has she never ever

e. [Zu reparieren versucht]^{i} (das^{i}) hat man ihn nicht
to repair tried (this) has one it not

In these examples, the argument structure of the main verbs is of the unmarked transitive format, that is, the argument structure contains only arguments without lexical specifications. Interestingly, only the left dislocation option becomes ungrammatical once the argument structure of the verb contains lexical specifications, for instance, *lexical case features* or selection requirements for *wh-features* (in case of selected *wh*-complements). In this case, only topicalization is allowed, but not left-dislocation.

(5) a. *[Zeigen müssen] (*das) hätte er es ihr sofort
show must (this) had he it her immediately
'he had have to show it to her immediately'

b. [Sagen müssen], (*das) hätte er aber schon, ob er will
tell must (this) had he however well, whether he wants

c. [Sagen müssen, ob er will] (das) hätte er aber schon
tell must whether he wants (this) had he however well

d. [Interessieren müssen] (*das) hätte ihn doch, ob das Ergebnis
interest must (this) had him well whether the result
stimmt
correct-is

e. [Zu zeigen versucht] (*das) hat er ihr nicht, wie es funktioniert
to show tried (this) has he her how it works

Obviously, left dislocation is more restricted than topicalization. The predicate pro-form *das* (= *this/it*) does not transmit argument structure specifications to the chain headed by the pronominal predicate. This is the crucial fact. Another way of looking at it is this: whenever the LD-construction is acceptable, the LD-constituent is optional. In other words, dropping the LD-constituent leaves the sentence grammatical. So we expect that the restriction that holds in (5) is the same as the restriction in anaphoric sequences as in (6):

(6) a. Hat er Maria wiedererkannt? – Das hat er sie sicher nicht.
has he Mary identified this has he her surely not

b. Hat er Maria das Bild gezeigt? –*Das hat er es ihr sicher nicht.
has he Mary the picture shown this had he it her surely not

c. Hat ihn etwas interessiert? –*Ob das Ergebnis stimmt, das
has him something interested whether the result holds, this
hat ihn nicht
has him not

The fact that left-dislocation involves a predicate pro-form and that this pro-form does not transmit the full argument structure of the left dislocated cluster indicates that the left-dislocated constituent is a verbal cluster and not a remnant VP. The left dislocated constituent cannot be a remnant VP because it does not fully reconstruct. Hence the traces of arguments in the remant VP could not be bound. The crucial difference between topicalization and LD is easy to identify. The topicalized element is the head of a chain, the left-dislocated constituent does not head a chain. It is anaphorically construed by means of a pronominal. Additional and independent evidence comes from split-NP constructions (see Haider 1990):

(7) [Aufsätze publiziert] (*das) hat er nur zwei kurze
papers published (this) has he only two short$_{AGR}$

The predicate pro-form obviously does not establish the relation between the N in the left dislocated V-projection and the rest of the NP. This is additional evidence that the pronominal that links the LD constituent to the clause blocks reconstruction and that the LD-constituent is an independently generated constituent.

Note that this result cuts both ways. If the LD constituent is a verbal cluster rather than a remnant VP, then the topicalized constituent may be a cluster, too. The differences between the two constructions reduce to an independent fact: The topicalized cluster is related to its base position by a chain dependency. The LD constituent is related by means of a bound pronominal, which itself is a predicate proform selected by the auxiliary. The chain dependency allows reconstruction, the pronominal dependency does not. This is the independent source of the differences with respect to the argument-structure selectivity illustrated by the examples above. So we may conclude that V-clusters in the LD-constituent as well as in the topicalized V-projection are not remnant VPs but smaller units.

Occasionally, clustering affects the projection of the argument structure. This is the so-called clause-union property. This property becomes particularly perspicuous if one compares a clause with a sentential infinitival complement and the V-clustering counterpart.

Höhle (1978) discovered a phenomenon that is now known as ‘long distance passive’ (see the discussion of (8) below): passivizing the matrix

verb triggers subject case for the object of the infinitival complement. In Haider (1986), this peculiarity is derived as a by-product of the V-cluster variant of the infinitival complementation constructions. By virtue of being members of a head-to-head clustering structure, the argument structures of the verbs in the cluster are pooled into a single argument structure format for the cluster as an effect of selecting a head rather than a phrasal complement. The concomitant clause-union effect is best illustrated with optionally clustering infinitival constructions (see Haider 1993, ch.9; 1994). In this construction, the direct object of the dependent, infinitival verb ends up in the nominative when the matrix verb lacks a nominative argument. This happens when the matrix verb is transitive and passivized, or, when the matrix verb is unaccusative. In each of the two constellations, the object of the infinitive is the only active structural-case-checking argument in the pool and therefore ends up in the external case, that is, nominative, when the clause is finite.

(8) a. daß *den*$_{ACC}$/*der*$_{NOM}$ Wagen zu reparieren versucht wurde
that the car to repair tried was

b. daß versucht wurde, *den*$_{ACC}$/**der*$_{NOM}$ Wagen zu reparieren
that tried was the car to repair

c. [Zu reparieren versucht] wurde **den*$_{ACC}$/*der*$_{NOM}$ Wagen nicht
to repair tried was the car not

d. daß uns *der*$_{NOM}$/*den*$_{ACC}$ Erfolg auszukosten erlaubt wurde
that us the success to-test-to-the-full permitted was

e. daß uns erlaubt wurde, *den*$_{ACC}$/**derNOM* Erfolg auszukosten
that us permitted was the success to-test-to-the-full

f. [Auszukosten erlaubt] wurde uns **den*$_{ACC}$/*der*$_{NOM}$ Erfolg nicht
to-test-to-the-full permitted was us the success not

g. daß uns *den*$_{ACC}$/**der*$_{NOM}$ Erfolg auszukosten *nicht*/*selten*
that us the success to-test-to-the-full not/rarely
erlaubt wurde
permitted was

The case alternation in (8-a,d) is a consequence of the ambiguous structure. The infinitival verb can be the lexical head of a sentential infinitival complement. In this case, the direct object surfaces as accusative and the subject of the sentential infinitival complement is PRO, that is, the covert infinitival subject. The other possibility is the clustering construction. In this case, the infinitival verb is part of the verbal cluster. It does not project a separate VP and hence no separate infinitival clause is projected. The arguments of the infinitival verb and the matrix verb are pooled, and the subject argument of the infinitival is directly identified with the controlling argument. It thereby becomes syntactically inactive and is not projected. In the argument pool, a single candidate for structural case is left. By virtue of

the priority of external case checking over internal checking ('Burzio's Generalization', see Haider 1999) it must surface with nominative case. This 'case conversion' is a straightforward consequence of the lack of sentential embedding of the infinitive. So the clustering construction behaves like a simple clause, not like a clause with an embedded infinitival clause.

In (8-b,e) the infinitival clause is extraposed, so it is sentential and consequently case conversion is not possible. This shows that the case switch presupposes cluster formation. This is confirmed by (8-c,f): Topicalization of the cluster is correlated with the case switch. This is a straightforward result: if the cluster is topicalized, there must be a cluster, and hence nominative is the only option. (8-e), finally, shows that without clustering there is no case switch. If the verbs are not adjacent there can be no cluster (see the 'no intervener' property, above). If they cannot cluster, there is no way of assigning nominative to the object of the infinitival verb because it is the object of an infinitival sentential complement clause.

The same patterns are predicted for *impersonal unaccusative* matrix verbs like *gelingen* (succeed) and *mißlingen* (fail) since they start out with an A-structure format that a passivized transitive verb ends up with:

(9) a. daß ihm nicht gelungen ist [*den*$_{ACC}$/**der*$_{NOM}$ Text zu entziffern]
that him$_{DAT}$ not succeeded is the text to decipher
'he did not manage to decipher the text'

b. Zu entziffern gelungen ist ihm *der*$_{NOM}$ Text nicht
to decipher succeeded is him the text not

In both verb classes, the clausal infinitival is the direct object of the matrix verb. The difference between the unaccusative verb and the transitive verb is simply that the former lacks the designated argument, that is, the would-be subject. Passivization turns a transitive argument format into an unaccusative one, whence the parallel behavior in clustering and clause union.

It is easy to provide further independent evidence for the clause union effect of clustering, and its consequence, the pooling of the argument structures once the verbs belong to a cluster. Verbs in the cluster by definition do not project their argument structure separately; otherwise a cluster could not remain a cluster. Two independent pieces of evidence will be called upon. First, reflexives need antecedents. If a reflexive is bound by the PRO subject in the clausal construction, it will lose its antecedent in the clustering construction and become ungrammatical. Second, a clause is a domain of sentential negation. Sentential infinitives are separate domains of negation, clustering infinitives are not.

(10) a. daß ihnen^{i} nicht erlaubt wurde [PRO^{i} sich^{i}/es zu entfernen]
that them not permitted was [themselves/it to remove]

b. daß [PRO^{i} sich^{i}/es zu entfernen] ihnen^{i} (nicht) erlaubt wurde
that [themselves/it to remove] them (not) permitted was

c. [Zu entfernen erlaubt] wurde *es/*sich* ihnen nicht
to remove permitted was it/themselves them not

d. daß ihr^{i} [PRO^{i} sich^{i}/ihn zu befreien] gelang
that her [herself/him to free] succeeded

e. [Zu befreien gelungen] ist *er/*sich* ihr nicht
[to liberate succeeded is he/herself her not

In the clustering construction (10-c,e), the infinitive is part of the VC of the matrix clause. There is no PRO-subject projected. Control is handled by identification of the respective arguments in the pooled argument structure of the VC. As a consequence, reflexives become ungrammatical. In (10-c,e), the reflexive would have to be directly bound by the dative objects, but reflexives cannot be bound by datives in German, for independent reasons. In (10-a,b,d), the reflexive is bound by PRO, which is controlled by the dative object of the matrix verb. In the clustering construction, the dative argument and the reflexive are co-arguments. The reflexive is the single structural argument that would surface as nominative. This is the second source of ungrammaticality. When the reflexive is replaced by a personal pronoun in (10-c,e), the sentence is grammatical. The pronoun, however, switches into the nominative, which cannot be seen in the case of *es* (it) in (10-d), because the form remains the same in nominative and accusative, but in (10-e), the switch from accusative to nominative (*ihn* vs. *er*) is obvious.

The scope of sentential negation is a clear indicator of clause union triggered by clustering. As in English, the combination of a negative indefinite DP with the negation particle (Ger. *nicht*) in a simple clause amounts to negation canceling by double negation (i.e. $\neg\neg p \equiv p$), since standard German does not allow negative concord. In the clause union construction, there is only a single negation domain since there is only a single sentence, whence the canceling effect.

(11) a. daß keiner [ihn nicht zu stören] versuchte
that nobody [him not to disturb] tried

b. Keiner hat versucht [ihn nicht zu stören]
nobody has tried [him not to disturb]

c. ??[Zu stören versucht] hat ihn keiner nicht (negation cancelled)
to disturb tried has him nobody not

d. daß keinem [ihn nicht zu stören] gelang
that nobody$_{DAT}$ [him not to disturb] succeeded

e. ??[Zu stören gelungen] ist er keinem nicht (negation cancelled)
to disturb succeeded is he nobody not

In Haider (1993,1994) additional evidence for the clause-union effect induced by clustering, originally noted by Bech (1955), is discussed. The matrix verb is in the scope of the negation of an object of the infinitival (12).

(12) a. daß ihr niemand zu beleidigen gelang (narrow/wide scope)
that her nobody to insult succeeded (she did not succeed in insulting anybody/she succeeded in insulting nobody)

b. daß ihr niemand zu beleidigen oft gelang (narrow scope only)
that her nobody to insult often succeeded

c. Zu beleidigen gelungen ist ihr niemand (wide scope only)
to insult succeeded is her nobody (she did not succeed in insulting anybody)

The scope ambiguity of (12-a) is due to the structural ambiguity. The negated indefinite in the sentential infinitival complement in (12-c) has, as expected, narrow scope only. Crucially, the cluster construction in (12-c), does not allow the narrow scope reading.

Pronominal serialization is another source of evidence. In the simple clause, they are serialized in the order NOM-ACC-DAT. When a series of pronominals is not ordered this way and the clause is grammatical (see (13-b)), the pronouns cannot be clause mates. The fact that (13-a) is grammatical shows that the two pronouns are clause mates, and hence that the verbs are clustering. Long distance extraction is not a possible source, as (13-c) demonstrates. The verbs are not adjacent, so they are not clustering and pronoun fronting turns out to be blocked.

(13) a. Zu entziffern gelang *es ihr*/**ihr es*
to decipher succeeded it her / her it
'she managed to decipher it'

b. daß *ihr* [*es* zu entziffern] gelang
that her [it to decipher] succeeded

c. *daß *es*$_i$ den Experten [e$_i$ zu entziffern] *nicht*/*oft* gelang
that it the experts$_{DAT}$ [to decipher] not/often succeeded

Yet another independent source of evidence for clustering is locality constraints. If the locality domain is the domain of the simple clause, it is different for the clustering and the non-clustering construction. This can be shown with the extraposition constructions (14-a,b). Extraposition of argument clauses is clause-bound. The cluster construction is a simple clause, hence the extraposition of an argument of the infinitival verb remains clause-bound. (14-b) is a clear case of sentential embedding, and it respects the locality constraint on extraposition. The sentence is ungrammatical because of the violation of this constraint. Only local extraposition, that is, within the embedded clause is possible, as in (14-c).

(14) a. daß uns nie [[zu erklären] versucht wurde], *warum man uns*
that us_{DAT} never [to explain tried was] why they us
festhielt
detained

b. *daß [uns zu erklären] nie versucht wurde, *warum man uns*
that [us to explain] never tried was why they us
festhielt
detained

c. daß [uns zu erklären *warum man uns festhielt*] nie versucht
that [us to explain why they us detained] never tried
wurde
was

Let us finally turn to a clear contrast between the cluster construction and a construction with sentential complement. The infinitival verb may appear topicalized if it is part of the cluster but not if it is the head of a sentential infinitival (15).

(15) a. *Zu $erklären_i$ hat man gar nicht versucht [uns das Problem e_i]
to explain has one not at all tried [us the problem]

b. Zu $erklären_i$ hat man uns das Problem gar nicht [e_i versucht]
to explain has one us the problem at all not [tried]

c. *Zu $erklären_i$ hat [uns das Problem e_i] man gar nicht versucht
to explain has [us the problem] one at all not tried

d. daß [uns das Problem zu erklären] man gar nicht versucht hat
that [us the problem to explain] one at all not tried has

The main verb or a projection of it cannot be extracted out of an infinitival clause (15-a,c). (15-c) is a derivational variant of (15-d). The apparent exception (15-b) is not an exception if the infinitival verb is not part of an infinitival clause but rather a part of the cluster. In this case, it is a variant of topicalizing a part of the verbal cluster as in (16).

(16) a. $[Erklären]_i$ müßte man das [e_i können]
explain $must_{SUBJUNCTIVE}$ one that be-able
'One ought to be able to explain it'

b. $[Erklären\ können]_i$ müßte man das e_i
[explain be-able] must one that

The comparison of Dutch and German in the following section will help to identify the crucial differences that reflect different derivational histories of derivations starting with a base generated V-cluster. A good starting point for a comparison of the Dutch and German V-clustering properties is the IPP-phenomenon since the clear and robust contrasts between German and

Dutch provide insights into the minor but far-reaching differences in the grammatical set-up for the given grammars.[6]

2.2 *Comparison of German and Dutch VCs, especially with respect to IPP*

2.2.0 *Introduction*

In the grammar of German the term *Infinitivus pro Participio* (IPP, Dutch grammar tradition) or *Ersatzinfinitiv* (German grammar tradition) refers to the switch from the participial form to the bare infinitival form on the dependent verb when the (auxiliary) verb that governs the participial form precedes rather than follows the dependent verb:[7]

(17) a. daß er sie nicht hätte fragen *können* (??fragen gekonnt hätte)
that he her not had ask can$_{INF}$

b. daß er sie nicht hätte zu fragen brauchen (??zu fragen gebraucht hätte)
that he her not had to ask need

c. daß er sie nicht hätte fragen lassen (??fragen gelassen hätte)
that he her not had ask let$_{INF}$
'that he would not have let her ask'

In German, the class of verbs subject to the IPP construction is restricted in the following way: The *dependent verbs*, with the exception of the 'raising' predicate *brauchen* (17-b),[8] govern a bare infinitive, that is, modals, verbs of perception (*sehen*-see, *hören*-hear), and the causative/permissive *lassen* (let). The *fronted verb* is the perfective auxiliary *haben* (see 17), – not the perfect auxiliary *sein* (be) or the passive auxiliary (details below) – or the future auxiliary *werden.* Since the latter auxiliary governs bare infinitive anyway, fronting does not change the verbal morphology on the dependent verb.

(18) a. daß er sie nicht wird fragen können (or: fragen können wird)
that he her not willl ask can$_{INF}$

b. daß er sie nicht wird zu fragen brauchen (or: zu fragen brauchen wird)
that he her not will to ask need

c. daß er sie nicht wird fragen lassen (or: fragen lassen wird)
that he her not will ask let

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6 For a comprehensive description of the phenomena in German, Bech (1956) still is the classic source to consult.

7 In spoken Austrian vernacular, especially in the Viennese variety, IPP is found even without inverted verb order: daß er sie nicht fragen *können* / *müssen* / *lassen* hätte (that he could / should not have asked her / that he would not have let her ask).

8 In dialects, *brauchen* is used with bare infinitive:
(i) Das brauchst Du nicht tun (this need you not do).

However, fronting plus IPP is ungrammatical with the passive auxiliary *werden*,[9] and, more interestingly, the perfect auxiliary *sein.* German, in comparison to Dutch (see 2.2.5 below), is exceptional with respect to the exclusion of the perfect auxiliary *sein* (see 19-d).

(19) a. daß in diesem Jahr viele Vorhaben fallen gelassen wurden
that in this year many projects fall let_{PII} were
'that in this year many projects were cancelled '

b *daß in diesem Jahr viele Vorhaben *wurden* fallen *lassen*
that in this year many projects were fall let_{INF}

c. daß er nicht arbeiten gegangen ist
that he not $work_{INF}$ gone is
'that he has not gone to work'

d. *daß er nicht *ist* arbeiten *gehen*
that he not is $work_{INF}$ go_{INF}

Finally, when the triggering verb is embedded in the verb cluster, reordering starts with the top verb in the cluster and proceeds until the triggering verb is fronted. In (20-a), the trigger is the perfective auxiliary, governed by the future auxiliary. In the result (20-b), both auxiliaries end up in the inverted, mirror image order. More complex clusters tend to become clumsy in the result, but the pattern is nevertheless uncontroversial (20-d):

(20) a. daß er sie nicht fragen gedurft haben wird
that he her not ask be-allowed have will

b. daß er sie nicht *wird haben* [fragen *dürfen*]
that he her not will have ask be allowed

both: 'that he will not have been allowed to ask her'

c. daß er ihn nicht weglaufen gesehen haben müssen würde
that he him not run-away seen have $must_{INF}$ would

d. daß er ihn nicht *würde müssen haben* [weglaufen *sehen*]
that he him not would $must_{INF}$ have run-away see

both: 'that he would not have had to see him run away'

Let us recapitulate. In descriptive terms, a German verbal cluster starts out in the order (21), with right-to-left dependencies between the verbs. This order may be replaced (when the conditions described above are met) by an inverted order in which the original order is mirrored. In (22), this is illustrated for a sequence of 5 verbs. The minimal sequence left in the originally sequence consists of at least two verbs (22d). This is a simple

9 'Passive' is the effect of combining a participle (as the unaccusative verbal variant) and an auxiliary with an unaccusative format. IPP would destroy the effect of the participle, namely the blocking of the external argument. Therefore, passive must be spared by IPP in German and in Dutch.

consequence of the fact that IPP-triggers are verbs that select verbs in a cluster (modals, etc.). In German, IPP is inapplicable to main verbs.[10]

(21) $V_1 \leftarrow V_2 \leftarrow V_3 \leftarrow V_4 \leftarrow V_5 \ldots$

(22) a. $[V_1 \leftarrow V_2 \leftarrow V_3 \leftarrow V_4 \leftarrow V_5]$ [untersucht worden sein müssen wird]
examined been be must$_{INF}$ will$_{INF}$
'will have to have been examined'

b. $V_5 \ldots [V_1 \leftarrow V_2 \leftarrow V_3 \leftarrow V_4]$ wird [untersucht worden sein müssen]

c. $V_5 V_4 \ldots [V_1 \leftarrow V_2 \leftarrow V_3]$ wird haben [untersuchen lassen müssen]

d. $V_5 V_4 V_3 \ldots [V_1 \leftarrow V_2]$ wird müssen haben [weglaufen sehen]
will must have run-away seen
'will have to have seen run away'

The pattern in (22) is a pattern of 'full inversion', that is, the fronted verbs are fronted across the entire cluster. Another possibility is splitting the cluster by inversion, as illustrated in (23). In this case, the inverted auxiliaries follow the main verb. I use the term *splitting*, because the adjacency requirement is not lifted. The main verb that precedes the inverted auxiliary in (23a-c) therefore cannot be analyzed as the left edge of a VP, whose verb does not participate in clustering. (23-d) illustrates that the minimal requirement is that the auxiliary that would trigger the participial form is fronted across its dependent verb.

(23) a. … für jemandem, der öffentlich in Stücke geschnitten *hätte*
… for someone, who publicly in pieces cut$_{PII}$ had$_{SUBJ}$ werden sollen[11]
be$_{INF}$ shall$_{INF}$
'… for someone who should have been cut in pieces in public'

b. … sondern was gemacht *hätte* werden sollen[12]
… but what done had$_{SUBJ}$ be$_{INF}$ shall$_{INF}$
'… but what should have been done'

c. … ob die Todesgefahr erkannt *hätte* werden müssen[13]
… whether the mortal-danger realized had$_{SUBJ}$ be$_{INF}$ must$_{INF}$
'… whether the mortal danger should have been realized'

d. … ob die Todesgefahr erkannt werden *hätte* müssen
… whether the mortal danger realized be$_{INF}$ had$_{SUBJ}$ must$_{INF}$
'… whether the mortal danger should have been realized'

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10 This can be tested with the main verb usage of a modal like *wollen* (want):
(i) daß sie das nicht *gewollt* hätte
(ii) *daß sie das nicht hätte *wollen*. But:
(iii) daß sie das nicht hätte machen *wollen*.

11 From a newspaper report (*Stuttgarter Zeitung* 10/89 p.4).

12 *Zeit* Nr. 52, 10 Dec. '85, p. 34, 2nd col.

13 *Evening News*, 3 July 2001, Austrian Radio.

As with full inversion (cf. 20), the roll-up structure is also found with split-inversion (see 2.2.1 for details). This is illustrated in (24). In the main-clause order, that is, with the finite verb in the verb-second position, the split pattern may appear as if the auxiliary had been wrongly sandwiched, but a comparison with the corresponding base order reveals the regular pattern: compare (24-b) with (24-c).

(24) a. daß er es (nicht) *würde haben* in die Tasche stecken müssen
that he it (not) would have into the pocket put_{INF} $must_{INF}$

b. daß er es (nicht) in die Tasche stecken *würde haben* müssen
both: 'that he would (not) have had to put it into his pocket'

c. Er *würde*$_i$ es (nicht) in die Tasche stecken e_i *haben* müssen
he would it (not) in the pocket put_{INF} have $must_{INF}$
'He would not have had to put it into his pocket'

2.2.1 *IPP with non-verbal interveners (non-adjacency) in German, but not in Dutch*

The sequence of verbs in the IPP-construction does not form a cluster in German. This is reflected by the fact that non-verbal material may intervene between the fronted auxiliaries and the left edge of the original cluster. In Dutch, this is ungrammatical.

(24) a. daß er für ihn nicht *hatte* die Firma am Leben halten wollen
that he for him not had the company alive keep $want_{INF}$
'that he had not wanted to keep the company alive for him' (Th. Mann)

b. Gerda, die sie nicht *hatte* in der Familie grau werden sehen
Gerda, whom she not had in the family grey turn see
'Gerda, whom she had not seen turn grey in the family' (Th. Mann)

c. daß der Tod ihr *werde* in unabsolviertem Zustand auflauern dürfen
that the death her would in unabsolved state wait-for may_{INF}
'that death should be allowed to lie in wait for her while she was unabsolved' (F.Werfel)

d. *dat hij graag wilde de kraanvogels fotograferen (ANS:949)
that he with-pleasure wanted the cranes photograph
'that he would like to photograph the cranes'

e. *... wil *naar huis* gaan (Koopman & Szabolcsi 2000:151)
... want to home go

f. ... wird *nach Hause* gehen wollen
... will to home go want

The pattern illustrated in (24-a-c) is not restricted to single fronted auxiliaries. Additional slots are opened if more than one auxiliary is fronted.[14]

The clear contrast between German and Dutch in terms of admissible, non-verbal interveners is evidence for a structural difference that calls for a principled solution (see section 3).

2.2.2 *No clustering with particle verbs as governing verbs in Dutch*

If the selecting verb is a particle verb, clustering is ungrammatical in Dutch, but not in German. This can be tested only with the optionally clustering infinitival constructions, since there are no auxiliaries of this type:

(25) a. *dat Anita de kinderen ophield te verwennen (Hoeksema 1988:157)
that Anita the children stopped to pamper
'that Anita stopped pampering the children'

b. [Zu verwöhnen aufgehört] hat sie die Kinder nie
[to pamper stopped] has she the children never
'Stopped pampering is what she never did to the children'

The relevant difference between clustering in Dutch and German is the word order change in Dutch. In German, the cluster variant and the non-cluster variant do not differ in word order. A governing particle verb would produce a cluster with a stranded particle within the cluster since the word-order operations in the cluster strand particles, as can be observed with *dependent* particle verbs (see below). The offending property is that the fronted verb would cross the particle. Licit stranding does not cross. Stranding by fronting is possible for particle verbs that precede the particle (as in English), or by moving to the right for particle verbs that follow (as in Dutch, see below). In each case, the particle is not crossed.

2.2.3 *No topicalization (out) of the inverted VC in Dutch (and German)*

This is a contrast that can be reduced to the property identified in 2.2.1. Topicalization of the cluster is possible only for the non-inverted part. Since in Dutch, the cluster tends to be inverted completely. as in (26-a), topicalization is impossible, as shown in (26-b). German provides the testing ground because it provides uninverted and inverted clusters, as in (26-c) and (26-d), respectively.

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14 This holds likewise for clusters with more than one fronted verb, such as the cluster in (i), where the "+" sign marks alternative positions for inserting e.g. *damit* (with-it):

(i) daß er ihn + nicht + *würde* + *müssen* + *haben* + [weglaufen *sehen*]

The intervening prepositional object can follow the first, second or third of the fronted auxiliaries. The resulting patterns are restricted variants of the so-called 'V-projection raising' construction (van Riemsdijk & Haegeman 1986). The difference between standard German and varieties with 'V-projection raising' seems to be just the range of the fronting construction in terms of the participating verbs and the scope of fronting.

(26) a. dat hij het boek zeker zou willen lezen
that he the book surely would want read$_{INF}$
'that he would surely want to read the book'

b. *[Willen lezen] zou hij het boek zeker

c. [Lesen wollen] würde er das Buch sicher
read want would he the book surely

d. *[Haben lesen wollen] wird er das Buch sicher
have read$_{INF}$ want will he the book surely

The ungrammaticality of (26-b) and (26-d) is due to the ungoverned trace of the topicalized constituent. The trace follows the base position of the finite verb. In Dutch and German, the canonical government for verbs is from right to left. Clustering inverts the canonical order in Dutch. Immediate evidence is the contrast in (27-a) and (27-b). Topicalization is possible, if it starts from the canonical serialization:

(27) a. Stelen heeft ze nooit e_i gewild/*willen e_i
steal has she never wanted/want$_{INF}$

b. Werken$_i$ heeft Pieter nooit e_i gehoeven/*hoeven e_i
work has Pieter never needed/need$_{INF}$ (Hoeksema 1988:159)

2.2.4 *No IPP with zu+Aux in German*

A particularly clear-cut contrast between Dutch and German is the ban against infinitival IPP constructions in German. IPP in German is confined to finite clauses and is ungrammatical in sentential infinitival constructions. as shown in (28-c,d).

(28) a. zonder hem *te* hebben laten wachten
without him to have let wait
'without having let him wait'

b. om de ontwikkelingen *te* hebben kunnen volgen
so-as-to the developments to have can$_{INF}$ follow
'so as to have been able to follow the developments'

c. *ohne ihn *zu haben* warten lassen
without him to have wait let

d. *um die Entwicklungen zu haben verfolgen können
so-as-to the developments to have follow can$_{INF}$

e. ohne daß man ihn *hat* warten lassen
without that one him has wait let

f. ohne daß man die Entwicklungen *hat* verfolgen können
without that one the developments has follow can$_{INF}$

As noted already by Bech (1955), there is a compromise construction that switches the infinitive marker *zu* from the inverted auxiliary to the rightmost

verb in the verbal cluster. In my judgment, the construction is nevertheless deviant:

(29) a. ??ohne/anstatt ihn *haben* warten *zu* lassen (cp. 28-c)
without/instead him have wait to let

b. ??um die Entwicklungen *haben* verfolgen *zu* können (cp. 28-d)
so-as-to the developments have follow to can_{INF}

This contrast highlights the different status of the IPP construction in Dutch and German. The infinitival verb cannot be removed out of the verbal cluster. In Dutch, it remains within the cluster, as the no-intervener property betrays. In German, it would be removed in the IPP construction (since IPP allows non-verbal interveners). Removal, a case of head-movement, would strand the infinitival particle. This is the source of the compromise construction. The stranded particle is precliticized to the verb to its left.

One might feel tempted to entertain the alternative hypothesis that IPP is the result of moving the finite auxiliary to a tense-head position, that is T°, and that this differentiates correctly between a tensed auxiliary and an untensed infinitival form that must stay in situ. But this hypothesis fails in view of the following contrast: if the perfect tense auxiliary is *sein* (be), IPP is ungrammatical. Movement to T° would not differentiate between the two perfect auxiliaries.

2.2.5 *IPP with all auxiliary types in Dutch, but not in German*

As noted already in section 2.2.0, the inverted order in the V-cluster (with IPP) is not found with the auxiliary *sein* (be) in German, but only with *haben* (have) and the future auxiliary *werden.*

(30) a. dat hij het boek was komen halen
that he the book was $come_{INF}$ fetch
'that he had come to fetch the book'

b. *daß er das Buch war holen (ge-)kommen
that he the book was fetch come

c. dat hij is blijven liggen
that he is $remain_{INF}$ lie-down
'that he has continued to lie down'

d. *daß er ist liegen bleiben/geblieben
that he is lie-down remain/remained

e. dat hij is weggestuurd (geworden)
that he is away-sent (been)
'that he has been sent away'

f. *daß er ist weggeschickt worden/werden
that he is away-sent been/be

An automatic IPP rule that fronts the finite auxiliary in the sequence V_{INF} + V_{PART} + Aux_{TENSE} would produce correct results with perfective *haben* (have), but not with perfective *sein* (be).

2.2.6 *No infinitival clauses in the midfield in Dutch*

In Dutch, sentential infinitival complements cannot be projected in the position nominal complements would be projected in. They are either replaced by a clustering construction or extraposed.

(31) a. *dat Jan [het boek terug te geven] (niet) vergat
that Jan [the book back to give] (not) forgot

b. daß Jan [das Buch zurückzugeben] (nicht) vergaß
that Jan [the book back-to-give] (not) forgot

c. eine Kür, die$_i$ sicher [*PRO* e$_i$ spektakulär zu nennen] nicht übertrieben wäre[15]
a free-exercise, that surely [spectacular to call] not exaggerated would-be

For verbs that optionally allow a clustering construction in German, these sentences are systematically ambiguous between a construction with clausal embedding and a simple clause structure with V-clustering.

(32) a. daß uns [zwischen zwei Strukturen zu wählen] erlaubt wird
that us [between two structures to choose] permitted is
'that we are allowed to choose between two structures'

b. daß uns zwischen zwei Strukturen [zu wählen erlaubt wird]
that us between two structures [to choose permitted is]

This ambiguity is the source for the case alternation in the construction with a matrix passive or a matrix unaccusative verb:

(33) a. daß der$_{NOM}$/den$_{ACC}$ Brief einzuwerfen vergessen wurde
that the letter to-post forgotten was
'that one forgot to post the letter'

b. daß uns (?)der$_{NOM}$/den$_{ACC}$ Text zu entziffern gelungen ist
that us$_{DAT}$ the text to decipher succeeded is
'that we succeeded in deciphering the text'

If the clausal construction is forced by splitting the potential verbal cluster, the nominative option is canceled, as expected, since the nominative is licensed only in the clustering construction.

(34) a. daß [*der$_{NOM}$/den$_{ACC}$ Brief einzuwerfen] *leider* vergessen wurde
that [the letter to post] unfortunately forgotten was

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15 Commentary (Eurosport channel, 22 Febr. 2002) on gold-medal-winning Sarah Hughes' performance.

b. daß uns [*der$_{NOM}$/den$_{ACC}$ Text zu entziffern] *endlich* gelungen ist
that us$_{DAT}$ [the text to decipher] finally succeeded is

It is not evident what could be the (micro-)parametric source of this grammatical contrast between the German and the Dutch system of sentential complementation.

2.2.7 *No particle stranding in German V-clusters*

V-movement strands particles both in Dutch and German when the verb moves to the clause-initial position in finite clauses (35). So, particle stranding is an indicator of movement because the particles themselves do not move.[16] In Dutch, but not in German, particles may be stranded in the V-cluster. This is a good indicator of re-arrangement processes within the V-cluster in Dutch.

(35) a. Hij *legde$_i$* iets *weg*-e$_i$
b. Er *legte$_i$* etwas *weg*-e$_i$
he put$_{PAST}$ something away

(36) a. dat hij het boek *weg* had moeten hebben *gelegd*
that he the book away had must$_{INF}$ have put$_{PII}$
b. daß er das Buch hat weggelegt haben müssen
that he the book had away-put$_{PII}$ have must$_{INF}$
c. *daß er das Buch *weg* hat *gelegt* haben müssen

The fact that the particle may surface in between the verbs of the cluster in Dutch indicates that there must be a possible position for the verbal companion of the particle as well, which is indeed the case (Seuren, this volume). (37) lists but a subset of possible patterns, since the verb does not necessarily have to end up as the final element in a cluster. It may be placed in prefinal positions as well but it must follow the particle in each case.

(37) a. dat hij het boek *weg* had moeten hebben *gelegd*
that he the book away had must$_{INF}$ have put$_{PII}$
'that he should have put away the book'
b. dat hij het boek *weggelegd* had moeten hebben
c. dat hij het boek had *weg* moeten hebben *gelegd*
d. dat hij het boek had *weggelegd* moeten hebben
d. (?)dat hij het boek had moeten *weg* hebben *gelegd*
e. dat hij het boek had moeten *weggelegd* hebben
f. dat hij het boek had moeten hebben *weggelegd*

16 This is true also for particle stranding in English and other VO-languages. As argued in Haider (1997), the stranded particle marks a possible V-position in the VP-shell structure of complex, head-initial V-projections.

The descriptive generalization is simple: The particle position is a possible position for the particle verb, and moving the verb strands the particle. Note, first, that the verb must not precede the particle. Hence there must be movement to the right within the cluster.[17] Second, nothing else than a verbal particle may occur within the cluster. Hence it is safe to conclude that we are dealing with a cluster internal process.

3. *Towards an empirically adequate modeling of the clustering phenomena*

The discussion above highlighted empirical generalizations that must be captured if the theoretical reconstruction of the phenomenon is to meet the indispensable standards of empirical adequacy.

- *No non-verbal interveners in the cluster*, except particles in Dutch. [Implication: a cluster cannot consist of stacked phrasal projections, that is, (remnant) VPs or higher projections, since these would provide positions for interveners, such as adverbials or extraposable material].
- *A main verb in the cluster is mobile* in Dutch (for cliticization), but *not* in German. [Implication: no particle stranding can occur in German clusters, but it can in Dutch clusters].
- *Position of fronted auxiliaries in IPP*: the fronted auxiliaries in the IPP construction in Dutch are left-adjoined to the cluster, and are thus cluster-internal. In German, the auxiliaries are projected in a VP-shell structure, whence the possibility of intervening non-verbal constituents in German. [Implication: no IPP-fronting with infinitivals in German, because of stranding of the infinitival particle in a V-chain].

With particle stranding as prime evidence for movement within the cluster, the conclusion will be unavoidable that Dutch and German clusters involve *two* types of *head* movement, namely *left adjunction* to the root node of the cluster and local *right-adjunction* (verbal cliticization) to the right adjacent verbal head. The various possible combinations of these two independent processes are responsible for the puzzling variety of patterns in the cluster constructions.

Let us start with the basic patterns in German and Dutch. These are identical structures, namely clusters that result from merging verbal heads, with the dependent element preceding the selecting head. In Dutch, the basic order is ill-formed as a surface order (see 38b) when the cluster contains bare infinitives. A possible surface order is (38c):

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17 Note that this phenomenon is direct counterevidence for approaches that take fronting to be the only source of the verb cluster patterns in Dutch (or German), as in various antisymmetry-based accounts (Zwart 1993, Koopman and Szabolcsi 2000).

(38) a. daß er das Buch [$_{V°}$*weggelegt* [$_{V°}$haben [$_{V°}$müssen wird]]]
that he the book away-put$_{PII}$ have must$_{INF}$ will
'that he will have to have put away the book'

b. *dat hij het boek [$_{V°}$*weggelegd* [$_{V°}$hebben [$_{V°}$moeten zal]]]
that he the book away-put$_{PII}$ have must will
'that he will have to have put away the book'

c. dat hij het boek zal moeten hebben *weggelegd*
that he the book will must have away-put$_{PII}$

In German, the base order is a possible surface order (except for IPP triggers). In Dutch, a licit surface order is illustrated by (38c): the base order is mirrored by switching the sister constituents in the cluster (which consists of binary mergers of V°s) from top to bottom. Technically, this requires left-adjunction (V° to V°) to the top node of the basic cluster. For (38c), this is indicated, step-by-step in (39).[18]

(39) a. dat hij het boek [$_{V°}$zal$_i$[$_{V°}$*weggelegd*[$_{V°}$moeten[$_{V°}$hebben e$_i$]]]]
that he the book will away-put$_{PII}$ have must

b. dat hij het boek [zal$_i$ [moeten$_j$ [*weggelegd* [hebben [e$_j$ e$_i$]]]]]

c. dat hij het boek [zal$_i$ [moeten$_j$ [hebben$_k$ [weggelegd [e$_k$[e$_j$ e$_i$]]]]]]

3.1 *Deriving the Dutch cluster – left-adjunction and/or cliticization to the right*

That (38b) must be the base order becomes evident not so much on the basis of comparing German and Dutch, but on the basis of genuine Dutch evidence, namely the particle distribution. The fact that a particle may appear in a cluster-initial position shows that this is a possible position for the particle verb (see 37a). If the cluster were structured as a right-branching, left-to-right selecting head-to-head merged structure, the lexical main verb would always be at the cluster-final bottom position. In this case, the word order of (39c) would be the only available serialization.[19]

Particle stranding is obviously a process of stranding the particle by moving the verb to the *right*, since the verb never crosses and thereby precedes the particle, and since particles do not move. The adequate

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18 Note that the technical implementation is either an iteration of merger plus left-adjunction, or the generation of a verbal cluster in which every left-branch head (except the lowest) is related to a gap in the right-hand complement selecting position (= base-generated filler-gap structure).

19 It is presupposed that particles do not move by themselves. If particles moved, they ought to be found within the middle field as well as in the sentence-initial spec-position. A detailed analysis of particle distribution in English as well as in Scandinavian languages in terms of stranding rather than particle shift is presented in Haider (1997).

theoretical tool for modeling this process seems to be verbal *post-cliticization*, that is, strictly local head-to-head adjunction to the right of the adjacent verbal head. The particle is stranded, once the verb cliticizes to the right. This is the second crucial process responsible for the sequencing of verbs in the cluster (the first one being left adjunction). Since this process of verbal cliticization may apply iteratively, that is, a clitic complex may be cliticized again. The overall result may be a mirror image sequence of the verbal cluster, as in the left adjunction option, but with the particle stranded in the initial position:

(40) a. *dat hij het boek [*weggelegd* [hebben [moeten [zal]]]] (= 38b)
that he the book away-put have must will

b. *dat hij het boek [*weg* [hebben+*gelegd* [moeten zal]]]

c. *dat hij het boek [*weg* [moeten+hebben+*gelegd* zal]]

d. dat hij het boek [*weg* [zal+moeten+hebben+*gelegd*]]

Note that verbal cliticization is a process that in principle may affect the whole cluster, as in (40). The part of the cluster that is not mirrored by top-down inversion is inverted by bottom-up cliticization. But cliticization is not a fully obligatory process.[20] It may, therefore, come to a halt before the whole cluster is affected. This, plus the combination with left adjunction is the grammatical source of the great variety of possible surface linearizations in the verbal clusters.

Let me illustrate the combination of the two processes illustrated with the examples (37-d,e), repeated for convenience in (41-a,b):

(41) a. (?)dat hij het boek had moeten weg hebben gelegd
that he the book had must$_{INF}$ away have put$_{PII}$

b. dat hij het boek had moeten weggelegd hebben

In both sentences, the two top auxiliaries are inverted by top-down left adjunction. In (41-a), the particle verb is cliticized and hence the particle is stranded. In (41-b) cliticization is not applied; hence the bottom of the cluster remains in the base order. Note that the order in (42) is the result of only top down inversion, without cliticization, since the particle is not stranded:

(42) dat hij het boek had moeten hebben weggelegd
that he the book had must have away-put$_{PII}$

The somewhat marginal status of the construction (41-a), which is judged acceptable by Pieter Seuren (this volume), but claimed to be close to deviant by Hans den Besten, indicates that there seems to be a preference for inversion by adjunction rather than by cliticization. (43) presents a

20 It is obligatory only if the selected verb is infinitival.

systematic survey of the derivations starting with the same base configuration as in (38-b), with another example:

(43) a. *dat ze deze liedjes meegezongen hebben kunnen zouden — base order
that they these songs together-sung have can$_{INF}$ would

b. dat ze deze liedjes *zouden kunnen hebben* meegezongen — 3x inv. by adj.

c. dat ze deze liedjes *zouden kunnen* meegezongen hebben — 2x inv. by adj.

d. dat ze deze liedjes meegezongen *zouden*+[*kunnen*+*hebben*] — 2x clit. (not main verb)

e. dat ze deze liedjes mee *zouden*+[*kunnen*+[*hebben gezongen*]] — 3x clit.

f. dat ze deze liedjes *zouden kunnen* mee *hebben*+*gezongen* — 2x inv., 1x clit.

g. dat ze deze liedjes *zouden* mee *kunnen*+[*hebben*+*gezongen*] — 1x inv., 2x clit.

h. dat ze deze liedjes *zouden* meegezongen kunnen+*hebben* — 1x inv., 1x clit. (not m.v.)

Seuren (this volume) and Kempen & Harbusch (this volume) list three additional patterns, namely (44-a-c), but some appear to be controversial and likely to be rejected by some speakers.[21] In the system proposed above, (44-a) and (44-b) could be derived, but only with an additional assumption, namely, that the first step of cliticization may be *pre*-cliticization to the right rather than *post*-cliticization, that is, the participle is pre-cliticized to the following verb, as in German. The following cliticizations are regular post-cliticizations. (44-c), however, is underivable and is, therefore, paragrammatical in the system proposed here.[22]

(44) a. dat ze deze liedjes mee *zouden*+[*kunnen*+[gezongen+*hebben*]]
that they these songs together should be-able-to sung have

b. dat ze deze liedjes *zouden* mee *kunnen*+[gezongen+*hebben*]

c. dat ze deze liedjes mee *zouden* gezongen *kunnen hebben*

On the basis of the system proposed above, these examples are predicted to be rated from marginal to unacceptable, a prediction that could be checked with a dialectally representative sample of native Dutch evaluators.

3.2 *The German cluster structure and IPP inversion*

The three crucial micro-parametric differences that separate German from Dutch are the following. First, inversion in German is obligatory only for a subset, namely the combinations of participles of infinitive-selecting verbs (modals, causative, verbs of perception), as illustrated in (45-a,b). Second, a main verb is *immobile* in the German verbal cluster. Unlike Dutch, it cannot be cliticized (see the discussion above).

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21 I want to thank Henk van Riemsdijk for helpful information on ‘cluster creeper’ data.

22 In order to derive it, the clitic cluster [gezongen+hebben] would have to be first pre-cliticized to *kunnen* followed by excorporation plus post-clitiziation of *hebben*. This is definitely beyond a resonable and plausible account, in my opinion.

(45) a. daß man nicht schlafen können wird
that one not sleep can$_{INF}$ will

b. *dat men niet slapen kunnen zal
that one not sleep can$_{INF}$ will

Third, the structure of the inverted cluster is different. In Dutch, fronting is left-adjunction to the cluster. In German, the position of the fronted auxiliaries is cluster-external. This is evidenced by the contrasting data for nonverbal interveners in the cluster. In German, but not in Dutch, IPP movement creates a VP-shell structure. Thus, German and Dutch represent two different grammatical implementation possibilities for fronted heads: In Dutch it is local adjunction of a head to a complex projections of head-elements (i.e. a head-head cluster). In German, it is the recruiting of a structural option that is the standard structure for complex head-initial projections namely the projection of a lexical V-projection shell. To be more precise, it is on a par with an OV language VP-shell structure with a stranded element in the base position as a non-verbal intervener.

(46) a. [$_{VP}$ send$_i$ [$_{VP}$ the clients [$_{V'}$ e$_i$-*out* a letter]

b. [$_{VP}$ hätte$_i$ [$_{VP}$ *aus der Tasche* [$_{V°}$[$_{V°}$[$_{V°}$ziehen] müssen] e$_i$]
had out-of the pocket pull must$_{INF}$

The particle distribution in English and in Scandinavian languages provides immediate evidence for the empty verb positions in the VP-shell structure, if the language allows stranding particles (like English and Norwegian). The particles can be stranded in either position and their distribution reflects the distribution of verb positions (details in Haider 1997). (46-a) represents a VP-shell with the fronted V° belonging to a minimal cluster, that is a combination of verb plus particle. The particle is stranded in (46-a), and so is the cluster in (46-b).

Even if the German construction employs an admissible option in terms of the universal syntactic repertoire, this option does not fully fit. IPP fronting deprives the auxiliary verb of its directional licensing domain by moving it across its selected head. This is on the one hand the source of the switch from the participle form to the neutral form (i.e. bare infinitive). On the other hand, the structure remains a patch-up option (as a kind of last resort effort) because the shell-structure is not triggered, as in English, by the fronted element (i.e. by its directionality requirement), but by an avoidance requirement, that is, by grammatical altruism. The result is a grammatical compromise: the recruited structure is admissible, but it is not canonical, that is, it is peripheral. A directionality exception is admitted in order to avoid an ineffability situation, in order to be able to form a pluperfect with modals.

The fact that IPP is a non-canonical option is instrumental for the understanding of the existence of the cliticization option. Both in Dutch and

German, inversion in the cluster destroys the directionality relation for the inverted elements, and so does cliticization. If cliticization is the solution for the serialization in (47-a,b) in German, it starts from the base version (47-c), and by reordering avoids the selection of the participial form for the modal. (47-d) illustrates the other option, namely the VP-shell option.

(47) a. erkannt *hätte*+[werden+müssen]
recognized had be must$_{INF}$
'would have had to be recognized'

b. erkannt werden *hätte*+müssen

c. *erkannt [[[werden] gemußt] *hätte*]

d. *hätte*$_i$ [erkannt werden müssen e$_i$]

e. ??/*erkannt *hätte*+[müssen+werden]

The fact that (47-e) is deviant shows, however, that cliticization cannot work as it does in Dutch. (47-e) results when post-cliticization is applied iteratively, as in Dutch. (47-e) is generated if only post-cliticization is applied: first the passive auxiliary is post-cliticized to the modal, followed by post-cliticization of the clitic complex to the finite auxiliary, just as in Dutch.

The situation in German is as follows. Cliticization is pre-cliticization, except for the immediate IPP-context, that is, in avoidance of participle selection. This yields (47-a) and avoids (47-e).[23] Thus, cliticization, being string-vacuous, becomes identifiable only when there is a clitic complex (as in (47-a) that ends up as a post-cliticized element.

Note once more that the crucial difference between the shell-structure and the clitic structure is the fact that in German, the former allows non-verbal interveners between the fronted auxiliary and the rest, the latter, of course, does not. Consequently, the latter cannot be a derivational variant of the former.

The fronted heads in the auxiliary shell are heads without a specified A-structure, and hence the shell-structure and the V-cluster structure are equivalent in terms of the A-structure properties projected. The German IPP structure is equivalent to an English complex VP consisting of a main verb projection selected by a non-finite auxiliary:

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23 An apparent Dutch order could be seen in constructions like (i), derived from the basic order (ii). This impression is deceptive, however, because (ii) requires double inversion, since the IPP-triggering auxiliary is selected by the matrix verb, so both need to be inverted (as in the V-shell construction (iii)).

(i) daß er sie nicht fragen wird haben dürfen
that he her not ask will have may$_{INF}$

(ii) daß er sie nicht fragen dürfen haben wird

(iii) daß er sie nicht *wird haben* [fragen *dürfen*]

(48) a. that the theory could well
[$_{VP}$-*be* be [$_{VP}$-*formulate* much more carefully [formulated]]

b. daß die Theorie nicht [$_{VP}$-*hat* hätte [$_{VP}$-*cluster* besser
that the theory not had$_{SUBJ}$ better
[formuliert werden können]
formulated be can$_{INF}$
'that the theory could not have been formulated better'

The question of whether the Dutch and the German implementation are two independent alternative choices from the pool of available structuring options, I prefer to leave open. At the moment, I am not in a position to produce reasons for a deterministic account, i.e. an account that would demonstrate that for Dutch only the adjunction option, and for German, only the shell option is admissible, given the determinants of the two grammatical systems. In other words, one would have to produce reasons as to why the converse situation, German with the Dutch and Dutch with the German implementation, is ruled out.

3.3 *The grammatical causality of clustering*

The clustering constructions raise several non-trivial questions for an adequate grammar-theoretic coverage and modeling. First, what is the grammar-theoretic motivation for the existence of cluster constructions instead of stacked V-projections? Second, why is clustering correlated with head-final projections?[24] Third, why is clustering obligatory in some contexts (bare infinitival and participle selection) and optional in others (clausal infinitival construction in German)?

Let us start with the first two questions and a comparison of the structures found with auxiliary plus main verb combinations. In English, as mentioned at the beginning, there is good evidence for stacked VPs, as in (49-a)), whereas in German, the evidence points to the conclusion that the verbs are clustering, as in (49-c) rather than projecting separate VPs, as in (49-b).

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24 Contrary to Koopman & Szabolcsi's claim (2000), Hungarian should be analyzed as a VO-language, with DP-fronting into pre-VP topic and focus positions. As for the verbal complex formation, the obligatory order of verb and particle (namely V+particle, e.g. be (*in*) menni (*go*$_{INF}$) vs. *menni be; see Koopman & Szabolcsi 2000:16f.) is evidence for an OV base order. In VO, particles follow the position of the verb. The possible reorderings are the result of two processes: (a) fronting of the finite verb, and (b) optional reordering in the verbal complex of the Dutch type, that is left adjunction. Koopman & Szabolcsi's account in terms of remnant VPs overgenerates massively. For this reason they suggest a number of filters.

(49) a. [$_{VP}$ V_1 [$_{VP}$ V_2 [$_{VP}$ V_3 …]]]
b. [$_{VP}$ [$_{VP}$ [$_{VP}$ … V_1] V_2] V_3]
c. [$_{VP}$ ... [$_{V°}$[$_{V°}$ V_1 V_2] V_3]]

A look at the bracketed representations in (49) provides a first cue. In (49-a), but crucially not in (49-b), the left-to-right order corresponds to the top-to-bottom organization of the phrase. (49-a) is a syntactic structure that is friendly to a parser (more below).[25] In a right branching structure, the parser can unambiguously identify the top-most node of the projection after encountering the first element of the projection, i.e. V_1. (49-b), however, is not parser-friendly. The parser would have to guess how many brackets there might be, because their number – or in other words, the depth of embedding of the left-most element – depends on the number of verbs to come. General top-down information on the possible structure of a VP will not help guessing, because the number of auxiliaries is not context-dependent. Structure (49-b) is a case of centre-embedding by stacking instances of the same category, namely VP. This is known to be an extremely parser-unfriendly data structure.

The clustering construction narrows down the domain of structural uncertainty from an unbounded phrasal domain (e.g. stacked VPs) to a local domain, namely the verbal cluster. When the parser meets V_1 and it cannot decide whether this is the main verb or not, the decision can be made in the next step.

These considerations suggest an answer to the first question: clustering constructions enhance parser-friendliness for head-final projections. It does not yet answer the second question, however. Parser-friendliness is not sufficient for establishing a grammar-driven condition. If there is a context of obligatory clustering there must be a *grammatical* principle that enforces clustering. Parser-friendliness by itself is a performance property and would not be strong enough to yield obligatoriness. Only in the perspective of the cognitive evolution of grammars, parser-friendliness could have been a driving force in the selection of UG-principles. A UG principle to this extent, the BBC, was proposed in Haider (1992) and in later papers:

BBC (*Basic Branching Constraint*):
Projection-internal branching nodes of the (functionally or lexically extended) projection line follow their sister node.

This principle of phrase structuring forbids right-branching basic projections and its functional or lexical extensions. Therefore, the BBC rules out a

25 The data-to-parser fit is optimal if the parser – a left corner parser – can simultaneously operate bottom-up and top-down, i.e. continuous data processing (bottom-up) plus grammar guidance (top-down information on possible structures). This presupposes right-branching structures.

structure like (49-b) if the VP-nodes belong to an *extended projection* of a VP.

An extended projection is either a *functionally extended projection* or a *lexically extended projection.* The functional extension is the cascade of functional projections on top of the lexical projections targeted by overt head movement of the head of the lexical projection. The lexical extension is a cascade of selected lexical projections whose pooled lexical features are equivalent to the feature format of a single verb. This amounts to the following situation:

> The verbs in the stacked VP do not introduce arguments, or else the arguments are pooled. The verbs are related by morphosyntactic government relations and argument merger. There is only one verb that introduces an event variable.

These conditions single out auxiliary and modal verbs (no argument structure, no event variable), and verbs of perception, if the event variable is not instantiated.[26] These are obligatorily clustering verbs in German. The types of obligatorily clustering verbs are listed in (50) and illustrated in (51):

(50) a. V° governs bare infinitival V°: *werden* (future tense aux.), modals, causative verbs.[27]

b. V° governs past participle V°: *werden* (passive aux.); *haben, sein* (perfect tense aux.).

c. V° governs bare infinitival *zu*+V°: *scheinen* (seem); *haben, sein* (deontic).

(51) a. daß sie ihn *fragen* wird/kann/ließ
that she him ask will/can/let

b. daß er *gestoppt* hat/wurde
that he stopped has/was

c. daß er *zu stoppen* scheint ‘that he seems to be stopping’
that he to stop seems

d. daß er *zu stoppen* hat ‘that he has to stop’
that he to stop has

e. daß er *zu stoppen* ist ‘that he [is to be/can be] stopped’
that he to stop is

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26 Note that this is an explanation for the well-known peculiarity of infinitival perception verb constructions, namely, the direct perception quality:

(i) I heard that he worked in his office (direct or indirect perception)
(ii) I heard him work in his office (direct perception only)

27 Perception verbs and *lassen* (let) cluster, but they do not obligatorily yield a passive effect. This means, the subject of the infinitival is not obligatorily inactivated, which implies that the cluster is either not base-generated or that the ecm-construction they instantiate is the result of an exceptional argument pooling.

Having briefly introduced the necessary background, we can return to the question under discussiony: why is clustering in the relevant contexts obligatory in German and Dutch (and other OV-languages)? The answer is this: clustering is obligatory in an extended V-projection because BBC rules out VP-stacking for head-final projections:

(52) a. *[$_{VP}$ [$_{VP}$ [$_{VP}$ ... V_1] V_2] V_3]

b. [$_{VP}$ V_1 [$_{VP}$ V_2 [$_{VP}$ V_3 ...]]]

c. [$_{VP}$ ... [$_{V°}$[$_{V°}$ V_1 V_2] V_3]]

(52-a) is ruled out because BBC forbids right-daughter nodes of nodes on the main projection line of a projection. (52-b), a head-initial (extended) projection is well-formed with respect to BBC: there are no left brackets adjacent to each other. This is just another way of expressing the fact that there are no right daughters of nodes on the main projection line. The right daughter is always a node on the projection line.

(52-c), as the grammatical alternative for (52-a), does not violate BBC. The projection line of the VP starts with the highest V° node. It is the projection line of a simple VP. This is the answer to the third question raised at the beginning of this subsection.

Let us summarize and recapitulate the main points by means of the tree diagrams in (53): (53-a) is a subtree of a stack of V-projections in a head-initial projection. It respects BBC and it is parser-friendly. Once the parser reaches V_1 in the input, it can project the top VP-node, proceed to the next item and instantiate the next VP, and so forth. Compare this with (53-b), the structure of stacked VPs in a head-final projection. One difference is immediately obvious, namely the difference in depth of embedding: Before the parser can reach the head node of the top VP it must have parsed the dependents of the top VP plus all embedded VPs. This is just the burden of centre-embedded structures.

What is more crucial, however, is the following difference. In (53-a), the parser can postulate the top node once it reaches the first element of the top projection. In (53-b), however, it would have to guess how many verbs there will come in order to be able to decide how many V projections need to be projected once ‘XP’ is reached.

The V-projection with the cluster (53-c) reduces the potential VP-stacks considerably. The structural complexity is shifted from the phrasal projections to the V-cluster. But this is a local domain, which makes backtracking easy.[28]

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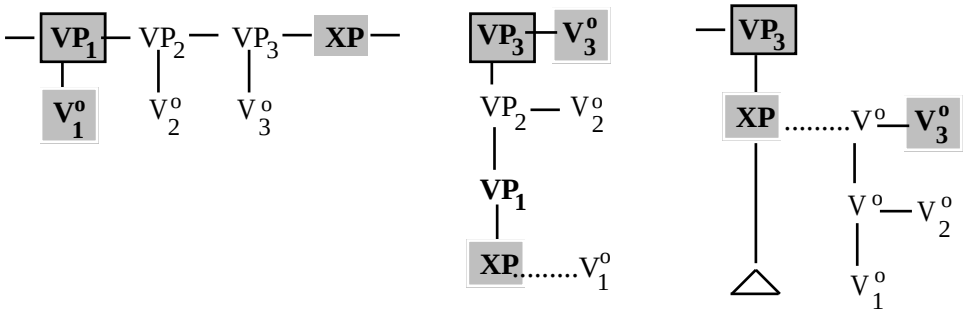
28 Note that the indices of the verbs only refer to the relative order in the input, not to the dependency relations. V_1 is the first verb in the input. In VO, this is the highest, in OV it is the lowest one.

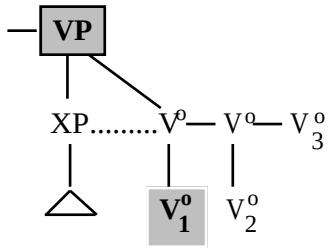
(53)a. VO b. OV c. OV + clustering



These considerations indicate that clustering contributes to parser-friendliness. This notwithstanding, the grammatical causality of clustering is BBC, not the enhancement of parsing. Parsing functionality comes into play only in an evolutionary perspective as the selecting force of the cognitive environment on UG as the grammatical source for data structures.

(53c) still is a sub-optimal solution. The optimal structure is a completely right-branching cluster as in (54). This is the Dutch solution of the problem. In Dutch, the verbs not only cluster (as in 53-c) but also raise within the cluster (by adjunction or cliticization). The resulting structure of a fully inverted cluster (traces omitted) is (54):

(54) Dutch raising (by adjunction and/or cliticization)



What remains to be accounted for is the third question. Why is clustering optional for sentential infinitival constructions in German? The trivial answer is: in Dutch, but not in German, sentential arguments are ungrammatical in clause internal positions, that is, not extraposed nor topicalized. The non-trivial answer, namely the answer that uncovers the grammatical causality of this contrast between German and Dutch, I am unable to provide for the time being.

Finally, it is a positive outcome that V-clustering in head-initial V-projections is unexpected. Why is it unexpected? Because the resulting cluster would be left-branching, given the directionality of licensing. Therefore, the clustering option would violate the constraint against left-branching structures, whereas the stacked-VP option is perfect.

4. *Grammar-theoretical afterthoughts*

The devices proposed in this paper (X°-to-X° adjunction, X°-to-X° cliticization) are means that belong to the standard tool kit of grammar theory. What may be considered non-standard is the assumption of head-to-head merger as a base-generation option that produces the initial verb-cluster constituent. Head-to-head merger seems to presuppose licensing conditions that single out verbs as the only candidates for clustering:

- The selected heads have selectable morphosyntactic features.[29]
- Head selection is an equivalence relation with argument selection.

The latter property guarantees that the monoclausal, clustering construction is semantically equivalent (as far as the A-structure projections are concerned) with a biclausal construction. Technically, the argument management in the cluster is implementable as functional composition,[30] properly constrained by the morphosyntactic selection properties (see Haider 1994, 2001).

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29 In Bech's original terminology this is the category of verbal status (bare infinitive, supine, *zu*+infinitive). He explicitly refers to 'status government' as the verbal equivalent to case government.

30 The familiar head-complement relation corresponds to functional application.