11

Verb clusters

With the term *verb cluster* I refer to the string of verbs appearing to the right of the middle field in Dutch (i.e. in the right bracket of (4.1)). The properties of verb clusters are best inspected in embedded clauses, where the finite verb is also part of the cluster. Verb clusters are typical of Continental West Germanic languages, though subtle differences exist in the order of elements in the cluster, both within and across languages/dialects (see Zwart 1996a, Wurmbrand 2004).

The main theoretical question surrounding verb clusters in Continental West Germanic concerns the way clusters are created in the course of a syntactic derivation. This assumes that clusters are a surface phenomenon, derived from an underlying structure in which a verb takes a clausal complement. In this situation, the complement clause can either be extraposed ((11.5); see section 9.2.2), or the verb of the matrix clause and the verb of the complement clause are somehow joined, yielding a verb cluster. There are two sides to the process of cluster formation: first, the operation yielding a string of verbs, and second, the resultant transparency of the embedded clause, as evidenced by the position and interpretation of embedded clause material ('restructuring'). A related, but separate, question concerns the order of the elements in the cluster, and the typology of verb clusters depending on the nature of the matrix verb.

The process of joining two verbs into a cluster is now generally called *verb raising*. In the literature, the term 'verb raising' (dating from Evers 1975) is also used to refer to (constructions containing) the verb clusters themselves. In view of the complexity of the data, a representative list of verb clusters is repeated here (see also section 4.2).

In (11.1), we see verb clusters with up to four members. The hierarchically highest member is marked *1*. Clusters can be ascending (*1–2* etc.), as in (11.1a,c,e-h), or descending (*2–1* etc.), as in (11.1b,d). (Orders not given are ungrammatical.) A marked feature of verb raising is that the participle is replaced by an infinitive when followed by another verb in the cluster (11.1f-h), the Infinitivus-Pro-Participio (IPP) effect (see section 4.2).

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(11.1) *Verb raising*

… dat Tasman het Zuidland
C Tasman DEF.N.SG South Land

a. wil ontdek-ken [1–2]
want:SG discover-INF
'… that Tasman wants to discover the South Land.'

b. ontdek-ken wil [2–1]
discover-INF want:SG (same as a.)

c. heeft ontdek-t [1–2]
have:3SG GE:discover-D
'… that Tasman discovered the South Land.'

d. ontdek-t heeft [2–1]
GE:discover-D have:3SG (same as c.)

e. probeer-t te ontdek-ken [1–2]
try-3SG to discover-INF
'… that Tasman is trying to discover the South Land.'

f. heeft wil-len ontdek-ken [1–2–3]
have:3SG want-INF discover-INF
'… that Tasman wanted to discover the South Land.'
(NB *willen* shows the IPP effect)

g. heeft prober-en te ontdek-ken [1–2–3]
have:3SG try-INF to discover-INF
'… that Tasman tried to discover the South Land.'
(NB *proberen* shows the IPP effect)

h. heeft wil-len prober-en te ontdek-ken [1–2–3–4]
have:3SG want-INF try-INF to discover-INF
'… that Tasman wanted to try and discover the South Land.'
(NB *willen* shows the IPP effect)

Verb raising (verb clustering) effectuates a reshuffling of the sentence, such that the arguments of all the verbs involved end up together in the middle field, though in a strict order, such that arguments of hierarchically higher verbs come first ('cross-serial dependency'):

(11.2) *Verb raising with cross-serial dependency*

… dat de VOC Tasman het Zuidland
C DEF.SG VOC Tasman DEF.N.SG South Land

a. wil-de lat-en ontdek-ken [1–2–3]
want-PAST.SG CAUS-INF discover-INF

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'… that the VOC [Dutch East India Company] wanted to let Tasman discover the South Land.'

b. heeft prober-en te lat-en ontdek-ken [1–2–3–4]
have:3SG try-INF to CAUS-INF discover-INF
'… that the VOC [Dutch East India Company] tried to let Tasman discover the South Land.'
(NB *proberen* shows the IPP effect)

Confusingly, verb clusters can also be interrupted, as illustrated in (11.3).

(11.3) *Verb projection raising (interrupted cluster)*
… dat Tasman de Maori-s niet heeft wil-len in
C Tasman DEF.PL Maori-PL NEG have:3SG want-INF in
de steek lat-en [1–2–X–3]
DEF.SG lurch CAUS-INF
'… that Tasman didn't want to leave the Maoris in the lurch.'
(NB *willen* shows the IPP effect)

In the literature, interrupted verb clusters are referred to as *verb projection raising* constructions (see section 11.2). Verb cluster interruption is a characteristic feature of the Dutch of Belgium, but it was common in the entire Dutch-speaking area well into the twentieth century (Hoeksema 1994), and it is still productive with particles (Bennis 1992).

To complicate matters further, Dutch has a third construction type (called *third construction*, after Den Besten *et al*. 1988), which shows clustering but without the IPP effect:

(11.4) *The third construction*
… dat Tasman het Zuidland heeft ge-probeer-d te
C Tasman DEF.N.SG South Land have:3SG GE-try-D to
ontdek-ken [1–2–3] (cf. (11.1g))
discover-INF
'… that Tasman tried to discover the South Land'
(NB *geprobeerd* does not show the IPP effect)

This type typically alternates with complement clause extraposition (see 11.5), and so it involves a different class of verbs from the class giving rise to verb raising.

(11.5) *Extraposition*
… dat Tasman heeft ge-probeer-d het Zuidland te
C Tasman have:3SG GE-try-D DEF.N.SG South Land to
ontdek-ken
discover-INF
'… that Tasman tried to discover the South Land'

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The third construction type is useful to illustrate cross-serial dependency once more:

(11.6) *The third construction with cross-serial dependency*

… dat	de	regering	de	VOC	Tasman	het
C	DEF.SG	government	DEF.SG	VOC	Tasman	DEF.N.SG
Zuidland	heeft	ge-vraag-d	te	lat-en	ontdek-ken	[1–2–3–4]
South Land	have:3SG	GE-ask-D	to	CAUS-INF	discover-INF	

'… that the government asked the VOC [Dutch East India Company] to have Tasman discover the South Land.'

In (11.6), *de regering* 'the government' and *de VOC* 'the VOC' are arguments of *vragen* 'ask,' and *Tasman* and *het Zuidland* 'the South Land' are arguments of *ontdekken* 'discover.'

The literature on verb clusters in Dutch (let alone Continental West Germanic) is vast, and my purpose in this chapter is to present just the main analyses and to point out their relevance to the theory of syntax.

11.1 Structuralist work on verb clusters

In the European structuralist tradition, the question of cluster *formation* was not raised. Structuralist discussions of verb clusters, starting with De Groot (1949) and Bech (1955), are primarily concerned with questions of internal organization of the cluster, including word order inside the cluster. Yet Bech's (1955) analysis can easily be transferred to a generative model, as pointed out by Evers (1975: 52f).

De Groot (1949: 126f.) discusses the internal organization of verb clusters headed by a modal (11.1a/b) or temporal (11.1c/d) auxiliary, and concludes that the two types of clusters are syntactically very different. In particular, temporal auxiliaries like *hebben* 'have' and *zijn* 'be' belong to the morphological system and are in a tighter connection with the participle than are the modal auxiliaries with the infinitive. In De Groot's intuition, the subject of (11.1a/b) is an argument of the modal verb *willen* 'want,' while the subject of (11.1c/d) is an argument of the main verb *ontdekken* 'discover' (De Groot 1949: 139). In this connection, De Groot points to the fact that modal verbs in Dutch can be used autonomously (cf. (7.80)). De Groot (1949: 126) likewise suggests that an added adverbial modifies the infinitive in the case of (11.1a/b), but the entire cluster in the case of (11.1c/d). For example, *spoedig* 'soon' takes scope below *wil* 'wants' in (11.7a) (=(11.1a)), but over the entire complex *ontdekt heeft* 'has discovered' in (11.7b) (=11.1d)).

(11.7)

… dat	Tasman	het	Zuidland	spoedig
C	Tasman	DEF.N.SG	South Land	soon

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a. wil ontdek-ken
want:SG discover-INF
'… that Tasman wants to discover the South Land soon.'

b. ontdek-t heeft
GE:discover-D have:3SG
'… that Tasman soon discovered the South Land.'

De Groot's distinction between infinitival and participial verb clusters was not picked up in the generative analysis of Dutch, where auxiliaries were not taken to be functional elements but verbs (e.g. Evers 1975: 62, and discussion in Hoekstra 1984: 283).

Nevertheless, subsequent research of Dutch dialects and spoken Dutch (Pauwels 1953, Verhasselt 1961, Stroop 1970, Haeseryn 1990, Barbiers *et al*. 2009) brought out an important distinction between infinitival clusters and participial clusters, namely that the overall preferred word order is ascending (*1–2*) with infinitival clusters (as in (11.7a)) but descending (*2–1*) with participial clusters (as in (11.7b)) (see 4.35a). In clusters of more than two verbs, the ascending order (*1–2–3*) becomes the rule, except that when the participle is hierarchically lowest in the cluster, it may appear first (yielding *3–1–2*; see (4.35bii)), or, in some varieties, in intermediate positions (yielding *1–3–2* for example), partially restoring the descending order of participial clusters (see (4.39) for examples). A connection between word order in the cluster and cluster type was not pursued by De Groot (1949), however.

Interrupted clusters ('verb projection raising', cf. (11.3)) were studied by Koelmans (1965) for Early Modern Dutch and by Vanacker (1964, 1970) for Belgian Dutch dialects. Vanacker (1970) used tape-recordings of West Flemish and East Flemish dialects to establish that cluster interruption was most common with stranded prepositions and selected prepositional complements (a ratio of 3 to 1), followed by directional, resultative, and other secondary predicates (1:1), and finally with (nonpronominal) direct objects (1:2) (Vanacker 1970: 156).

The IPP effect (see (11.1f,g,h)) was much studied in the philological and pre-generative structuralist tradition, focusing mainly on the question of its origin and historical development. Factors identified as relevant to the development of the IPP effect included (i) the early existence of past participles without the completive prefix *ge-* (see discussion in Kern 1912: 49 and references cited there), (ii) a process of analogical leveling or morphological assimilation of the participle to the infinitive in its complement domain (Paul 1920: 128), and (iii) the special nexus character of the participle–infinitive combination (De Vries [1920–1921] 1972: 138). See Ponten (1971) and Duinhoven (1975) for a survey of the analyses and speculations.

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By far the most influential structuralist treatment of the Continental West Germanic verb cluster was Bech's (1955) study of the nonfinite verb in German. Bech takes the fundamental structural unit of the sentence to be the 'verb field' (*Verbalfeld*; 1955: 43f), which is defined by the presence of a (finite or nonfinite) verb (i.e. a clause in current terminology). However, the fundamental unit of word order is the 'coherence field' (*Kohärenzfeld*; 1955: 60f), which contains one or more verb fields, and is structured into an 'end field' (*Schlussfeld*) and a 'residual field' (*Restfeld*). The end field contains the verb or verb cluster in final position (i.e. it is identical to the right bracket in the topological fields analysis in (4.1)), and the residual field contains everything that precedes it.

A verb cluster construction, then, is a sentence that contains several clauses (verb fields), joined in a coherence field, where all the verbs are lined up in the end field, and the remaining material occupies the residual field. In contrast, an extraposition construction involves two coherence fields.

Zooming in on the verb clusters themselves, Bech (1955: 63) observes a regularity in German that suggests to him that the end field is likewise composed of two parts, which he calls the upper field (*Oberfeld*) and the lower field (*Unterfeld*). The upper field precedes the lower field, and the distinction is based on the observation that German verb clusters may show a mixed ascending–descending word order. In those cases, there appears to be a cut-off point, such that the verbs to the left of it (i.e. in the upper field) show ascending order, and the verbs to the right (i.e. in the lower field) descending order. This is illustrated in (11.8):

(11.8) *Mixed order in the German verb cluster (adapted from Bech 1955: 67)*

die	Verba	die	den	Infinitiv	würd-en
DEF.PL	verb:PL	REL.PL	DEF.M.SG:ACC	infinitive	would-PL

hab-en regier-en kön-nen [1–2–4–3]
have-INF govern-INF can-INF
'the verbs that would have been able to govern the infinitive'
(*können* is the infinitive replacing the participle by the IPP effect)

In German, the lower field may stretch all the way to the left end of the cluster, yielding consistent descending (*4–3–2–1*) order, but the upper field never stretches all the way to the right end, since consistent ascending order (*1–2–3–4*) is not attested in German.

Bech's ingenious description of the German verb cluster could not be carried over to Dutch, as multiverb clusters in Dutch are basically ascending throughout, with the exception of the participle (the lowest element in the cluster), which may appear first or last in the cluster (and marginally in intermediate positions as well; see (4.35)).

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11.2 The classical verb-raising analysis

The classical generative analysis of the verb-raising pattern, proposed in Evers (1975), can be summarized as follows:

(11.9) *Classical generative verb-raising analysis (Evers 1975)*
a. The verb phrase in Dutch is head-final (Koster 1975)
b. A verb-raising verb selects a nonfinite complement clause (to its left)
c. The nonfinite verb raises up to the verb-raising verb (rightward movement)
d. The structure is flattened by removing the complement clause node (pruning)

To illustrate, consider the example in (11.10) and its derivation in (11.11).

(11.10) … dat Tasman het Zuidland probeer-t te ontdek-ken
C Tasman DEF.N.SG South Land try-3SG to discover-INF

(11.11) a. *Deep structure*
dat [Tasman [het Zuidland te ontdekken] probeert]
b. *Verb raising*
dat [Tasman [het Zuidland **[e]**] [probeert **te ontdekken**]]
c. *Pruning*
dat [Tasman het Zuidland [probeert te ontdekken]]

In terms of Bech's (1955) analysis, the brackets in (11.11a) indicate the verb fields (clauses), and the end result of the transformational process (11.11c) shows the coherence field (the outer brackets) with a clear division in an end field (the cluster in the inner brackets) and the residual field (the rest of the coherence field).

Evers (1975) presents a range of arguments showing that the verb cluster in (11.11c) forms a surface structure constituent (see also Evers 1982). For example, the cluster undergoes gapping (11.12), nominalization (11.13), and coordination (11.14).

(11.12) *Gapping of the verb cluster*
… dat Tasman Tasmanië probeer-t te ontdek-ken en Cook
C Tasman Tasmania try-3SG to discover-INF and Cook
de Cook-eilanden (*sc.* probeert te ontdekken)
DEF.PL Cook Islands
'… that Tasman tries to discover Tasmania and Cook [tries to discover] the Cook Islands.'

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(11.13) *Nominalization of the verb cluster*

het prober-en te ontdek-ken van het Zuidland
DEF.N.SG try-INF to discover-INF of DEF.N.SG South Land
(werd een obsessie voor Tasman)
became an obsession for Tasman
'trying to discover the South Land (became an obsession for Tasman)'

(11.14) *Coordination of the verb cluster*

… dat Tasman het Zuidland ofwel probeert te
C Tasman DEF.N.SG South Land either try-3SG to
ontdek-ken ofwel besluit te verget-en
discover-INF either decide:3SG to forget-INF
'… that Tasman either tries to discover or decides to forget about the South Land.'

In addition, Evers (1975) points to transparency effects of the infinitival complement motivating the pruning transformation (the flattening of the structure after verb raising, later called 'restructuring'). For example, a clitic (weak object pronoun) cannot move in front of the subject of its own clause in Dutch, but it can after verb raising. Compare:

(11.15) a. *No subject–clitic inversion*

… dat (*'t) Tasman ('t) ontdek-te
C OCL:N.SG Tasman OCL.N:SG discover-PAST.SG
'… that Tasman discovered it.'

b. *Subject–clitic inversion after verb-raising*

… dat Cook ('t) Tasman ('t) zag ontdek-ken
C Cook OCL:N.SG Tasman OCL.N:SG see:PAST.SG discover-INF
'… that Cook saw Tasman discover it.'

In Evers' analysis, (11.15b) is derived from a structure where *zag* 'saw' takes a clausal complement *Tasman 't ontdekken* [Tasman it discover] 'Tasman discover it,' of which *Tasman* is the subject. Since clitic placement is clause-bound, the order in (11.15b) where the clitic precedes *Tasman* can only come about after the S-node of the embedded clause is 'pruned.'

A similar argument shows that a floating quantifier associated with the subject can appear to the right of embedded clause material after verb raising:

(11.16) *Floating quantifier after verb raising*

… dat **de** **Maori-s** Tasman **allemaal** zag-en vertrek-ken
C DEF.PL Maori-PL Tasman all see-PAST.PL leave-INF
'… that the Maoris all saw Tasman leave.'

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On the assumption that a floated quantifier cannot be associated with a subject outside its own clause (or: cannot be lowered into an embedded clause), the complement clause of *zagen* 'saw' must have disappeared after verb raising, to make the placement of *allemaal* to the right of the embedded clause subject *Tasman* possible.

Likewise, the negative adverb *niet* 'not' in (11.17a) has clausal scope even if its position suggests that it belongs to the embedded clause (surrounded by embedded clause material). Similarly, clausal negation can blend with the indefinite determiner of an embedded clause noun phrase (11.17b).

(11.17) *Scope of negation after verb raising*

a. … dat Tasman de Maori-s niet trompet hoor-de
C Tasman DEF.PL Maori-PL NEG trumpet hear-PAST.SG
spel-en
play-INF
'… that Tasman did not hear the Maoris play the trumpet.'

b. … dat Tasman de Maori-s geen kokosnot-en
C Tasman DEF.PL Maori-PL NEG:INDF coconut-PL
zag breng-en
see:PAST.SG bring-INF
'… that Tasman did not see the Maoris bringing coconuts.'

Evers (1975: 1) notes that his analysis of verb raising has important theoretical consequences. First, when the order in the verb cluster is descending (as in (11.1b)), we must allow for the possibility of string-vacuous transformations (i.e. operations affecting structure, but not linear order). Secondly, we must allow for nonroot transformations that are not structure-preserving (see (9.10)). Third, there must be a transformation that prunes nonempty structure (cf. Ross 1967: 56).

No clustering?

The idea that the verbs strung together in clause-final position form a cluster was challenged by Hoeksema (1980), Den Besten and Broekhuis (1989), and Kroch and Santorini (1991), who follow Zaenen (1979) in assuming that the *1–2* order is the result of some form of clausal extraposition (see also Coppen and Klein 1992 and Van Noord and Bouma 1998 for analyses of verb raising without cluster formation).

Indeed, the gapping argument (11.12) is not particularly strong, as we would not want to conclude from the gapping of *probeert* 'tries' and *te ontdekken* 'to discover' in (11.18) that *probeert te ontdekken* 'tries to discover' is a constituent:

(11.18) Tasman probeer-t Tasmanië te ontdek-ken en Cook
Tasman try-3SG Tasmania to discover-INF and Cook

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de Cook-eilanden
DEF.PL Cook Islands
'Tasman tries to discover Tasmania and Cook [tries to discover] the Cook Islands.'

See Kroch and Santorini (1991) for further arguments against the idea that verb raising yields clusters, and Evers (2003) for continued backing of the analysis of verb clusters as resulting from head-adjunction.

The most serious problem for the clustering analysis (not addressed in Evers 2003) is that the finite verb remains available for movement into the verb-second position (e.g. *probeert* 'tries' in (11.18)). If verb-raising yields a cluster, one would expect the finite verb to be locked inside the cluster after verb raising, contrary to fact. Rutten (1991: 154f) and Roberts (1991: 216) explore an excorporation account to overcome the problem, but the suspicion that the verb strings are not really clusters remains.

Trigger for verb raising

What triggers verb raising? Evers (1981, 1982) proposes that all verbs need to be associated with TENSE (the 'AUX-filter', Evers 1982: 23). Nonfinite verbs with *te* 'to' may be marked [−tense] or unmarked for tense, and nonfinite verbs without *te* 'to' are always unmarked for tense. Verb raising serves to connect a verb that is unmarked for tense with a tense-marked verb. Verbs marked [−tense] do not undergo verb raising but extraposition.

This connection between verb raising and some tense-licensing requirement on nonfinite verbs returns frequently in the literature after Evers (1981), most notably Bennis and Hoekstra (1989a, 1989b) and Wurmbrand (2001). However, it is not clear that association with TENSE requires movement, instead of just government (local c-command), as pointed out by Den Besten and Broekhuis (1989: 130f) (cf. also Rutten 1991: 155).

Variation within the cluster

What explains the order of elements in the verb cluster? Here, too, no solid conclusions could be drawn. Rutten (1991: 132) assumes an additional licensing relation (additional to tense-linking) between a verb and its nonfinite complement, called verbal case (adapted from Fabb 1984; see also Scherpenisse 1986: 67). Just as with noun phrases (see section 8.1), we may now suppose that nonfinite complements are generated in one position and licensed (via verbal case) in another, yielding a trigger for verb raising similar to the trigger for object shift. Rutten then proposes (1991: 136) that languages differ in the direction in which a matrix verb assigns verbal case to its nonfinite complement, with German assigning verbal case to the left (yielding descending orders) and Dutch to the right (yielding ascending orders).

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However, the problem with the order of verbs in the cluster is its variability, as recognized by Den Besten and Broekhuis (1989). As we have seen ((4.35), (11.1)), two-verb clusters in Dutch allow two orders, and clusters of three and more verbs allow some variability in the placement of the participle as well. Likewise, German shows its own pattern of word-order variability in the cluster, as discussed by Bech (1955; see section 11.1).

To account for the word-order variability in two-verb clusters in Dutch, Den Besten and Broekhuis (1989: 91) assume that verb raising in Dutch takes place optionally, and involves only right-adjunction. On this view, the ascending (*1–2*) order is the result of verb raising, but the descending (*2–1*) order signals absence of verb raising.

An influential approach to ordering was proposed by Den Besten and Edmondson (1981). To account for the German mixed orders discussed by Bech (1955), of the type illustrated in (11.8), Den Besten and Edmondson (1981: 39) formulate an inversion rule that essentially causes two sister nodes to trade places. In (11.8), the rule would have to apply twice (starting from *regieren können haben würden (4–3–2–1)*), first causing *regieren können (4–3)* and *haben (2)* to invert, yielding *haben regieren können (2–4–3)*, and then causing that complex to invert with *würden (1)*, yielding *würden haben regieren können (1–2–4–3)*. On this approach an ascending order is always the result of inversion, and since Dutch multiverb clusters are strictly ascending, the inversion rule has to apply to every pair of sisters in the structure.

The inversion mechanism ('flip') was further explored in Haegeman and Van Riemsdijk (1986), Hinrichs and Nakazawa (1989, 1994), Kathol (2000a), Meurers (2002), and Wurmbrand (2006). In this connection, Meurers (2002: 237–238) notes the possibility of irregular orders in the German cluster, e.g. of the type *4–1–3–2*, where a clear cut-off point between Bech's upper and lower field does not seem to exist, suggesting a problem for the inversion mechanism.

In unpublished work of the early 1980s referred to by Haegeman and Van Riemsdijk (1986: 419f), Riny Huybregts proposed an analysis of verb raising using inversion (viewed as a phonological process) in conjunction with reanalysis. Reanalysis turns the deep structure (11.11a), repeated here as (11.19a), into a rebracketed structure (11.19b), after which inversion applies to the two verbs to yield the verb-raising order (11.19c) (=(11.11c)).

(11.19) a. *Deep structure*
dat [Tasman [het Zuidland te ontdekken] probeert]
that Tasman the South Land to discover tries

b. *Reanalysis*
dat [Tasman [het Zuidland **[**te ontdekken probeert**]**]

c. *Inversion*
dat [Tasman [het Zuidland [probeert te ontdekken]]

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Verb projection raising

Cluster interruption in West Flemish (see (11.3)) was analyzed as a special case of verb raising in Den Besten and Edmondson (1981: 48), also needed for cluster interruption by particles in standard Dutch and German. Den Besten and Edmondson propose that in the relevant dialects (West Flemish, earlier Dutch, Swiss German) the verbal element raised (see (11.11b)) may be a projection of the verb as well (hence 'verb projection raising'). Since cases exist where the verb projection includes the direct object, but excludes the indirect object, as in (11.20), Den Besten and Edmondson conclude that the verb phrase in Dutch is hierarchically structured (confirming the findings of Daalder and Blom 1976; cf. (9.40); see also Bresnan *et al.* 1982: 620).

(11.20) *Partial verb projection raising in West Flemish (Haegeman 1988:677)*

… da-n	ze	**al**	**die**	**student-en**	dierv-en
C-3PL	SCL:3PL	all	DEM.PL	student-PL	dare:PAST-PL
geen	**boek-en**	**gev-en**			
NEG.INDF	book-PL	give-INF			

'… that they dared to give none of the students any books.'

In (11.20), the element raised and adjoined to the matrix verb *dierven* 'dared' would have been a partial verb phrase, including the verb *geven* 'give' and its sister *geen boeken* 'no books,' but excluding the indirect object *al die studenten* 'all those students.'

Haegeman and Van Riemsdijk (1986) argue against a movement + adjunction analysis of verb projection raising, because elements of the verb phrase may be scattered across the verb cluster in examples like (11.21), from Zurich German ((43b) in Haegeman and Van Riemsdijk 1986: 435).

(11.21) *Scattered verb projection raising (Zurich German)*

a. *Deep structure*

… das	[er	[[em	Karajan	**en**	**arie**	**vor**
C	3SG.M.NOM	DEF.M.DAT	Karajan	INDF.SG	aria	fore
sing-e]	chön-e]	wil]				
sing-INF	can-INF	want:3SG				

b. *Verb projection raising*

… das	er	em	Karajan	wil	**en**
C	3SG.M.NOM	DEF.M.DAT	Karajan	want:3SG	INDF.SG
arie	chön-e	**vor**	**sing-e**		
aria	can-INF	fore	sing-INF		

(both) '… that he wants to be able to sing an aria for Karajan.'

In (11.21b), *en arie* 'an aria' interrupts the verb cluster *wil chöne vor singe* 'wants to be able to sing for,' but *en arie* and *vor singe* 'sing for' are not adjacent in

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the surface structure, so that the order cannot be the result of adjunction of the verb projection *en arie vor singe* (*pace* Koster 1987: 281). As Haegeman and Van Riemsdijk (1986: 436f) show, a reanalysis + inversion analysis à la Huybregts can derive (11.21b) from (11.21a), provided reanalysis can yield the structure in (11.22c).

(11.22) a. *Deep structure*
das [er [[em Karajan en arie vor singe] chöne] wil]
b. *Reanalysis I*
das [er [em Karajan en arie **[**vor singe chöne**]**] wil]
c. *Reanalysis II*
das [er em Karajan **[** en arie [vor singe chöne] **]** wil]
d. *Inversion (twice)*
das [er em Karajan [wil [en arie [chöne vor singe]]]]

Such scattered verb projection raising constructions were already noted for West-Flemish in Vanacker (1970: 145), so the argument carries over to Dutch dialects:

(11.23) *Scattered verb projection raising in West Flemish (St Baafs Vijver)*
voor te kun-nen **band-en** gaa-n **open** **doe-n**
C to can-INF tire-PL go-INF open do-INF
'in order to be able to go and turn tires open'

At the time of writing of Haegeman and Van Riemsdijk (1986), a movement + adjunction analysis of verb projection raising faced at least two problems. First, contemporary movement theory acknowledged only head movement and movement of entire phrases. But an intermediate type, moving part of the verb phrase, is needed for the partial verb projection raising type in (11.20) (Haegeman 1988). Second, the theory allowed phrases to adjoin only to phrases, not to heads. But verb projection raising as defined in Den Besten and Edmondson (1981) involves the adjunction of a phrase to a head.

The first problem could be solved after Den Besten and Webelhuth (1987) demonstrated the mechanism of remnant movement, needed for verb phrase topicalization. Consider the pair in (11.24).

(11.24) *Remnant topicalization*

a. **Het** **Zuidland** **ge-vond-en** heeft Tasman n-ooit
DEF.N.SG South Land GE-find-N have:3SG Tasman NEG-INDF.TEMP
'Tasman never found the South Land.'

b. **Ge-vond-en** heeft Tasman **het** **Zuidland** n-ooit
GE-find-N have:3SG Tasman DEF.N.SG South Land NEG-INDF.TEMP
(same as a.)

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In (11.24a), the verb phrase *het Zuidland gevonden* 'found the South Land' is topicalized (i.e. moved into the specifier position of CP; see section 9.2.2 under *fronting*). This is a well-behaved movement of a phrase into a phrase position. In contrast, topicalization of *gevonden* 'found' in (11.24b) appears to move a head into a phrase position, which would be odd. But Den Besten and Webelhuth (1987) analyzed *gevonden* 'found' in (11.24b) not as a head, but as a verb phrase containing a trace of the scrambled object *het Zuidland* 'the South Land' (i.e. as a remnant verb phrase).

Given the possibility of remnant movement, *geen boeken geven* 'give no books' could be analyzed as a remnant verb phrase with the indirect object *al die studenten* 'all those students' scrambled out of it prior to verb projection raising (Vanden Wyngaerd 1989b, Haegeman 1992: 185). This solves the first problem (partial verb phrase movement) of a movement + adjunction analysis of verb projection raising.

The second problem, adjunction of a phrase to a head, could be circumvented by simply assuming that adjunction in verb projection raising does not target a head, but its projection (Vanden Wyngaerd 1989b, Haegeman 1992). From here, it would be only a small step to propose that verb raising is in fact remnant verb projection raising, involving not verb-to-verb adjunction, but adjunction of a remnant verb phrase to the matrix verb phrase (e.g. Den Besten and Broekhuis 1989: 97–98), but Rutten (1991: 59) and Haegeman (1994) argued against this reduction of verb raising to verb projection raising.

See further Broekhuis (1993) for a survey of the issues surrounding the analysis of verb projection raising.

The IPP effect and the third construction

In research following Evers (1975), the replacement of the participle by the infinitive illustrated in (11.1f) (the Infinitivus-Pro-Participio [IPP] effect), was taken to be a sign of cluster formation, and hence the hallmark of verb raising. However, the morphosyntactic explanation of the effect, though much studied, remained unclear (see IJbema 1997 for a survey of the issues involved).

The distribution of the IPP effect across Continental West Germanic dialects suggests that it is limited to those dialects or clusters which show ascending (*1–2–3*) orders (Weijnen 1966: 320). For example, the effect is present in Dutch, but not in Frisian, which has strictly descending order in the cluster (Van der Meer 1990). In German, strictly descending orders show no IPP effect, but mixed orders like (11.25) do.

(11.25) … dass Humboldt die Quelle des Amazonas
c Humboldt DEF.F.SG:ACC source DEF.M.SG:GEN Amazon
hät-te erreich-en **wol-len** [1–3–2]
have:PAST.SBJV-SG reach-INF want-INF
'… that von Humboldt would have liked to reach the Amazon source.'

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The IPP effect also occurs in mixed orders of the *2–3–1* type, as illustrated in (11.26), from West Flemish (Zwart 1996a: 248):

(11.26) … da Jan 't **zie-n** gebeur-en ee-t [2–3–1]
c John OCL:N.SG see-INF happen-INF have-3SG
'… that John saw it happen.'

This suggests that *some* ascending order is needed/sufficient for the IPP effect to occur, but even this might be too strong in view of dialect facts from Achterhoek Dutch and Swabian German:

(11.27) *IPP in descending clusters*

a. *Achterhoek Dutch (Blom and Hoekstra 1996: 76)*
… dat ik schriev-m **will-n** had
c 1SG.NOM write-INF want-INF have:PAST.SG
'… that I had wanted to write.'

b. *Swabian (Steil 1989: 16)*
… daß d Anna ons bsuach-a **well-a** had
c DEF.F.SG Anna 1PL:ACC visit-INF want-INF have:3SG
'… that Anna wanted to visit us.'

What remains, then, is the generalization that the IPP effect is exceptionless in ascending verb clusters.

It has also been noted that the IPP effect is absent with dialects that do not employ the prefix *ge-* in the formation of the past participle (Hoeksema 1980: 248, Lange 1981: 64). Languages/dialects without *ge-* include Frisian and the Low Saxon Stellingwerf dialect, which indeed lack the IPP effect, but are also strictly descending. A dialect without *ge-* but with ascending order in the cluster (as one of the options) is the North-Hollandic Westfries dialect discussed in Hoekstra and Taanman (1996). Here the IPP effect does occur, which Hoekstra and Taanman (1996: 22) interpret as an effect of interference from Standard Dutch.

Given the systematic occurrence of the IPP effect in ascending (*1–2–3*) clusters, the absence of the IPP effect in examples like (11.4) (repeated here) is striking (see Zwart 2007 for the distribution of this type across Continental West Germanic dialects).

(11.4) *The third construction*
… dat Tasman het Zuidland heeft **ge-probeer-d**
c Tasman DEF.N.SG South Land have:3SG GE-try-D
te ontdek-ken [1–2–3]
to discover-INF
'…that Tasman tried to discover the South Land'

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Den Besten, Rutten, Veenstra, and Veld (1988) and Den Besten and Rutten (1989) concluded that the ascending orders without IPP illustrated in (11.4) constitute a separate type (the 'third construction'), very different from verb raising. In their analysis, (11.4) is derived by a combination of (a) verb raising of *geprobeerd* 'tried' to *heeft* 'has', (b) extraposition of the clause *het Zuidland te ontdekken* 'to discover the South Land' (as in (11.5)), and (c) scrambling of *het Zuidland* out of the extraposed clause into the middle field.

An argument for distinguishing the third construction from verb raising is that in three-verb clusters with verb raising the order is fixed (*1–2–3*), but in (11.4) *heeft* 'has' and *geprobeerd* 'tried' can occur in either order (*1–2–3* or *2–1–3*) (Den Besten and Rutten 1989: 47):

(11.28) *The third construction with 2–1–3 order*

… dat	Tasman	het	Zuidland	ge-probeer-d	heeft	te
C	Tasman	DEF.N.SG	South Land	GE-try-D	have:3SG	to
ontdek-ken	[2–1–3] (cf. (11.4))					
discover-INF						

'… that Tasman tried to discover the South Land'
(NB *geprobeerd* does not show the IPP effect)

The idea that scrambling out of an extraposed clause is possible is supported by double object examples like (11.29), where only one object is scrambled (as in the partial verb projection raising example (11.20)), and the *2–1–(X)–3* order indicates that it must be extraposition and not verb projection raising (see Den Besten and Rutten 1989: 53).

(11.29)

… dat	Tasman	de	Maori-s	ge-probeer-d	heeft
C	Tasman	DEF.PL	Maori-PL	GE-try-D	have:3SG
kral-en	te	gev-en			
bead-PL	to	give-INF			

'… that Tasman tried to give the Maoris beads.'

Den Besten and Rutten (1989: 55) also noted that the complementizer *om*, which is optional in extraposed infinitival clauses, is degraded in the third construction, arguably because it would block the scrambling process (cf. (4.33)).

A consequence of the extraposition + scrambling analysis of the third construction is that a simple cluster like *probeert te ontdekken* 'tries to discover' in (11.1e) can now be analyzed as a case of either verb raising (adjunction of *ontdekken* 'discover' to *probeert* 'tries') or the third construction (extraposition + scrambling). The way to find out is to turn the construction into the 'perfect' with *hebben* 'have' (i.e. the relative past) and to test whether the IPP effect shows up.

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Cross-serial dependency

Verb clusters in Dutch featured in a discussion of the position of natural language in the Chomsky hierarchy of formal languages (Chomsky 1956). In particular, Huybregts (1976) argued that verb clusters with cross-serial dependency (like (11.2) and (11.6)) show that Dutch could not be a context-free language (the proof was contested by Pullum and Gazdar 1982, but essentially confirmed by Bresnan *et al.* 1982 and Huybregts 1984 for Dutch and by Huybregts 1984 and Shieber 1985 for Swiss German).

The Chomsky hierarchy is a classification of formal languages (or of the grammars generating those languages) in a subset relationship, as detailed in (11.30).

(11.30) *Chomsky hierarchy of languages/grammars*
finite state (regular) < context-free < context-sensitive < unrestricted

The grammars generating the different types of languages are characterized by different types of rewrite rules. Chomsky (1956) showed that the rule type of a finite state grammar (rewriting a single nonterminal as either a single terminal or a string of a single terminal and a single nonterminal, i.e. $A \rightarrow a(B)$) does not suffice to generate strings of the type $a^m b^n$ (where $m = n$), i.e. a sequence of an arbitrary number of *a*s and an identical number of *b*s, which Chomsky argued occur in natural language expressions like center-embedded conditional clauses of the type *If (if it rains, then it pours) then it pours*. This means that the grammar generating natural languages must be of a type higher than the finite state grammar on the Chomsky hierarchy (11.30). Huybregts' (1976) argument was intended to show that the grammar generating natural languages must also be higher than the context-free type.

Context-free grammars are characterized by rules rewriting a single nonterminal as a string of terminals and nonterminals. Crucially, they contain no reference to the context in which the nonterminal occurs (adding that information is what characterizes the rules of context-sensitive grammars). Huybregts (1976: 32) argued that strings of the type $a^m b^n$ (where $m = n$), with the added property that a crossing dependency exists among the terms of the two strings (such that the first element of the *a*-string is dependent on the first element of the *b*-string, and so on with the second, third, etc. elements) cannot be generated by a context-free grammar. Such crossing dependencies are found in the verb clusters in Dutch (e.g. (11.2), (11.6)).

Pullum and Gazdar (1982) objected that a context-free grammar can in fact generate the right strings of noun phrases and verbs in the Dutch verb clusters, if not the exact cross-serial dependency (i.e. the grammar can generate the right strings, though not the right structures). Since the overlapping dependency is not formally encoded in the syntax, there is no need to require that the rewrite rules

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produce it. But Huybregts (1984: 89) and Shieber (1985) pointed out that Swiss German has the same verb clusters as Dutch, with the overlapping dependency syntactically encoded by case-marking on the noun phrases. It follows that the grammar must not just derive the right number of noun phrases and verbs, but also the right structure, and this is impossible for a context-free grammar (see also Bresnan *et al*. 1982: 621).

11.3 Minimalist analyses

The classical verb-raising analysis of Evers (1975) was seriously affected by the assumption that the Dutch verb phrase is not head-final but head-initial (see section 9.3). Most notably, verb raising could be dispensed with in the derivation of ascending (*1–2* etc.) clusters, as the verbs are already lined up in the correct order (Zwart 1996a).

Recall that ascending order is obligatory with multiverb clusters in Dutch, and preferred with two-verb infinitival clusters (see (4.35)). This means that for most verb clusters in Dutch, no verb movement needed to be assumed. A special statement needed to be made only for the dispreferred descending two-verb infinitival clusters (11.1b), and for the participle (e.g. (11.1d)), which generally appears to prefer a position at the front end of the cluster (although other positions in the cluster are not excluded, and normative pressure favors strictly ascending orders with participles as well; see (4.35)). To derive these (descending) patterns, it appeared that leftward movement (to a head or specifier position) sufficed (Zwart 1996a).

If verb raising does not exist (at least not in ascending clusters), the appearance of verb clusters in Dutch is mostly illusory. That is, the string of verbs appearing in the right bracket is not the end result of a process of cluster formation, but is what remains when all excess embedded clause material is removed. Consider the derivation of the 'verb cluster' of (11.10), repeated here, in the classical (head-final) analysis (11.11) and in the minimalist (head-initial) analysis (11.31).

(11.10)	… dat	Tasman	het	Zuidland	probeer-t	te	ontdek-ken
	c	Tasman	DEF.N.SG	South Land	try-3SG	to	discover-INF

(11.31) a. *Argument structure*
dat [Tasman probeert [te ontdekken het Zuidland]]

b. *Object shift*
dat [Tasman **[het Zuidland]** probeert [te ontdekken **[e]**]

The derivation in (11.31) shows the movement of the object from its argument structure position to its grammatical function position that must be obligatory if

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Dutch is head-initial (see (9.46b)). A cluster results when the grammatical function position is in the matrix clause (cf. Zwart 1993a: 345). When the grammatical function position is in the embedded clause, the extraposition order results:

(11.32) *'Extraposition'*
dat [Tasman probeert [**[het Zuidland]** te ontdekken **[e]**]

On this analysis, 'extraposition' does not refer to a type of (rightward) movement, but to a construction type previously analyzed as involving rightward movement. As in Bech's (1955) coherence fields analysis, the 'extraposition' clause has a more independent character, realizing its own grammatical function positions.

Cluster interruption ('verb projection raising')

The minimalist analysis of verb cluster formation, involving no verb movements but leftward shift of embedded clause objects, yielded a natural analysis of cluster interruption ('verb projection raising'; see (11.3)). It could now be stated that cluster interruption arises whenever material belonging to the embedded clause does not move all the way up to the matrix clause middle field, but only part way. For example, Kaan (1992: 111) and Zwart (1993a: 345, 1996a: 240) assume that cluster interruption by an object arises when the grammatical function position for the embedded object (Spec,AgrOP) is merged below the matrix verb position:

(11.33) *Cluster interruption*

dat	[Tasman	wou	[[**het**	**Zuidland]**	prober-en
C	Tasman	want:PAST.SG	DEF.N.SG	South Land	try-INF
[te	ontdekken	**[e]**]]]			
to	discover-INF				

'… that Tasman wanted to try and discover the South Land.'

In the analysis of Zwart (1993a), this analysis carried over to secondary ('small clause') predicates and verbal particles as well (as these, too, are obligatorily moved to the left; see section (9.3)). For adjuncts, no leftward movement was motivated, and the analysis required that adjuncts (including negation) must be base-generated in the common middle field.

Den Dikken (1996), while accepting the general approach to 'verb raising' and 'extraposition' of Kaan (1992) and Zwart (1993a), rejected this extension to 'verb projection raising,' arguing that cluster interruption involves not just a licensing position for the object, but a full clausal domain (TP) in the complement of the matrix verb. His argumentation brought out an interesting fact, namely that cluster interruption in West Flemish creates scopal opacity (Den

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Dikken 1996: 82). Thus, while (11.34a) is ambiguous, (11.34b), with cluster interruption, is not.

(11.34) a. *'Verb raising'*

… da-n ze twee student-en vier boek-en wil-d-en
C-3PL SCL:3PL two student-PL four book-PL want-PAST-PL
gev-en
give-INF
'… that they wanted to give two students four books.'
(i) each student gets four books, eight books total (2 > 4)
(ii) four books total, given to two students (4 > 2)

b. *'Verb projection raising'*

… da-n ze twee student-en wil-d-en vier boek-en
C-3PL SCL:3PL two student-PL want-PAST-PL four book-PL
gev-en
give-INF
'… that they wanted to give two students four books.'
(i) each student gets four books, eight books total (2 > 4)
(ii) *four books total, given to two students (*4 > 2)

According to Den Dikken's analysis, the scopal rigidity in (11.34b) is explained if *twee studenten* 'two students' has its grammatical function position in the complement clause to the right of *wilden* 'wanted,' and is moved into the matrix clause via A′-movement (just like the A′-movement of *who* in *Who loves everyone?* destroys the scopal ambiguity of *Someone loves everyone*). This would follow if the complement of *wilden* 'wanted' is a complete TP, containing licensing positions for all the objects of the embedded clause.

The 'third construction' and the IPP effect

For the minimalist derivation of the 'third construction' (see (11.4)), no combination of extraposition and (long) scrambling needed to be assumed (Kaan 1992: 108, Zwart 1993a: 345). The flexible placement of the object's grammatical function position, needed to derive both 'verb raising' (11.31) and 'extraposition' (11.32), suffices to also derive the order of the 'third construction.' That is, (11.31b) covers both the 'verb raising' type (11.1g) and the 'third construction' type (11.4).

Recall that the two types ('verb raising' and 'third construction') differ in that the participle is replaced by an infinitive (the IPP effect) in the 'verb raising' type, and in that the participle may precede the auxiliary (see (11.28)) in the 'third construction' type. How exactly the two types differ was not made explicit in Kaan (1992), and Zwart (1993a: 345) suggested that the embedded clause in the 'verb

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raising' type is really a verb phrase, whereas it is a larger category in the 'third construction' and with 'extraposition.'

Zooming in on the difference between the 'third construction' and 'extraposition,' Ter Beek (2008: 176) concluded that the complement clause in the 'third construction' can be of several types, but never a CP, whereas the complement clause in 'extraposition' constructions is always a CP. Bearing in mind the analysis of Bech (1955) in terms of coherence fields, this suggests that Bech's coherence field be defined as a CP.

That the complement clause in the third construction is not a CP is suggested by the absence (or deviance) of the complementizer *om* (cf. (4.33)):

(11.35)
a. *Extraposition*
… dat Tasman probeer-t (om) het Zuidland te ontdek-ken
C Tasman try-3SG C DEF.N.SG South Land to discover-INF
b. *Third construction*
… dat Tasman het Zuidland probeer-t (*om) te ontdek-ken
C Tasman DEF.N.SG South Land try-3SG C to discover-INF
(both) '… that Tasman is trying to discover the South Land.'

On the other hand, with some third construction verbs, the complement clause has its own temporal interpretation, showing that it must be larger than a mere verb phrase (most likely a TP; see Ter Beek 2008: 172):

(11.36) … dat Tasman nu op zijn vorig-e reis
C Tasman now up POSS:3SG.M previous-DEF voyage
het Zuidland beweer-t ge-zie-n te heb-ben
DEF.N.SG South Land claim-3SG GE-see-N to have-INF
'… that Tasman now claims that he saw the South Land on his last trip.'

In (11.36), the matrix clause and its complement clause refer to non-overlapping time frames, and the verb of the embedded clause is in the periphrastic infinitival past tense (formed with *hebben* 'have'; see section 2.3). By the same diagnostics, some verbs triggering 'verb raising' (and showing the IPP effect, not illustrated) must also select TP complements (Ter Beek 2008: 152):

(11.37) … dat Tasman het Zuidland moet heb-ben ge-zie-n
C Tasman DEF.N.SG South Land must have-INF GE-see-N
'… that Tasman must have seen the South Land.'

Ter Beek's findings suggest that the third construction type is closer to verb raising than to extraposition, casting doubt on the classical third construction analysis as involving extraposition + scrambling. Ter Beek (2008: 181) concludes that the only element inducing opacity in infinitival complement clauses in Dutch is the

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complementizer (deviating from Wurmbrand 2001, who argued for German that opacity is induced by the presence of tense). If Ter Beek (2008) is correct, transparency ('restructuring') is a function of the syntactic category of the complement clause, not of any movement operation.

Minimalist attempts to explain the IPP effect include Vanden Wyngaerd (1996) and Zwart (2007). Both analyses capitalize on the observation that the IPP effect is not found in dialects that form the past participle without the prefix *ge-* (cf. Hoeksema 1980, Lange 1981).

Assuming a head-adjunction analysis of verb raising, Vanden Wyngaerd (1996) argued that adjunction of an infinitive (ending in *-en*) to a participle marked by *ge-* creates a configuration in which the c-command relations between *-en* and *ge-* are not defined. Adopting the Linear Correspondence Axiom of Kayne (1994), where linear order is a function of hierarchical structure, Vanden Wyngaerd concludes that such configurations cannot be linearized and hence cannot occur.

Zwart (2007: 84) proposes that the difference between three-verb clusters in verb raising (11.1g) and the third construction (11.4) is a difference of subordination (verb raising) vs. coordination (third construction). It would then follow that the IPP effect invariably occurs when a participle takes an infinitival complement. To explain the effect, Zwart (2007) argues that the combination of a participle with an infinitive has aspectual properties that precluded affixation of the completive particle *ge-* to the participle+infinitive-combination at a time when *ge-* was still an independent aspectual particle (Van Swaay 1899). This then gave rise to a construction type marked by a *ge*-less participle, which soon assimilated with the infinitive under analogy pressure (Paul 1920: 128).

Variation in the cluster

The minimalist involvement with verb clusters is marked by a renewed interest in dialectal and crosslinguistic variation in this domain (Zwart 1996a, 2007, Wurmbrand 2004, 2006, Barbiers 2008, Barbiers *et al*. 2009).

Zwart (1996a) argued that assuming head-initial structure, the various attested orders could all be derived either without any movements, in the case of the ascending clusters, or by using leftward movement of heads and phrases only (see Wurmbrand 2006: 294f. for an extensive review of this claim).

The need to distinguish leftward head movement and phrasal movement was argued for in Zwart (1995b) on the basis of the facts in (11.38–39) from West Flemish.

(11.38) a. … da Valère eet wil-len dienen boek kuop-en
C Valery have:3SG want-INF DEM book buy-INF
'… that Valery wanted to buy that book.'

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b. … da Valère zou wil-len dienen boek kuop-en
c Valery MOD:3SG want-INF DEM book buy-INF
'… that Valery would like to buy that book.'

In the Kaan/Zwart analysis (Kaan 1992, Zwart 1993a), *dienen boek* 'that book' is moved to an object position (Spec,AgrOP) located between *willen* 'want' and *kuopen* 'buy.' It follows that the string *willen dienen boek kuopen* 'want to buy that book' is a phrase of some sorts (an AgrOP or, in the analysis of Den Dikken 1996, a full TP). The following facts show that that phrase may be moved to the left of the auxiliary *eet* 'has,' but not to the left of the modal *zou* 'would' (Zwart 1995b: 219f):

(11.39) a. … da Valère wil-len dienen boek kuop-en eet
c Valery want-INF DEM book buy-INF have:3SG
'… that Valery wanted to buy that book.'

b. *… da Valère wil-len dienen boek kuop-en zou
c Valery want-INF DEM book buy-INF MOD:3SG
'… that Valery would like to buy that book.'

From this, Zwart (1995b) concluded that descending orders are derived via phrasal movement when the matrix verb is a temporal auxiliary, and via head movement when the matrix verb is a modal. This is consistent with De Groot's (1949: 128) intuition that clusters headed by temporal and modal auxiliaries are syntactically very different.

Later analyses (Hinterhölzl 1999, Koopman and Szabolcsi 2000, Barbiers 2008) represent an attempt to derive the verb clusters using phrasal movement only. These analyses assume head-initial structure and leftward movement only, including roll-up movement (converting a string *a b c* into *c b a* by first moving *c* across *b* and then the combination of *c* and *b* across *a*) and remnant movement (converting *a b c* into *c b a* by first extracting *b* from the constituent *b c* and then moving *c* across *b* and *a*). We return to the remnant movement analyses below.

Returning to the question of word-order variation in the cluster, Barbiers (2008) proposed to account for the attested patterns by a combination of leftward verb phrase movement ('intraposition') and selective spell-out of the copies of the moved verb phrase (the copies in the positions before and after the movement). This work was based on a complete survey of the word-order variation within the verb cluster in Dutch dialects, carried out in the SAND project (see Barbiers *et al*. 2009).

The survey showed that in three-verb clusters headed by either a temporal or a modal auxiliary, some orders are systematically absent:

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(11.40) *Attested orders in three-verb clusters headed by a temporal auxiliary*

a.	1–2–3	heeft	kunnen	vinden	[has can find]	'was able to find'
b.	1–3–2	heeft	vinden	kunnen		
c.	*2–1–3	kunnen	heeft	vinden		
d.	2–3–1	kunnen	vinden	heeft		
e.	*3–1–2	vinden	heeft	kunnen		
f.	3–2–1	vinden	kunnen	heeft		

(11.41) *Attested orders in three-verb clusters headed by a modal auxiliary*

a.	1–2–3	moet	kunnen	vinden	[must can find]	'has to be able to find'
b.	1–3–2	moet	vinden	kunnen		
c.	*2–1–3	kunnen	moet	vinden		
d.	*2–3–1	kunnen	vinden	moet		
e.	3–1–2	vinden	moet	kunnen		
f.	3–2–1	vinden	kunnen	moet		

The only order that is excluded in both types of clusters is *2–1–3* (11.40/41c). Recall from (11.28) that the *2–1–3* order is found in the 'third construction' (see Zwart 2007 for the distribution of this *2–1–3* type across West Germanic dialects). Zwart (1996a: 243) found the absence of *2–1–3* order in the verb cluster to be reminiscent of the absence of the pattern *2–1–X* in two-verb clusters, where *X* is a dependant of the number *2* verb. This pattern can be illustrated with particles and secondary predicates, as in (11.42–43).

(11.42) *The absent 2–1–X pattern: particles*

a. … dat Tasman de kokosnot-en (in) heeft (in) ge-lad-en
C Tasman DEF.PL coconut-PL in have:3SG in GE-load-N
'… that Tasman loaded the coconuts.'

b. … dat Tasman de kokosnot-en (in) ge-lad-en heeft (*in)
C Tasman DEF.PL coconut-PL in GE-load-N have:3SG in
(same as a.)

(11.43) *The absent 2–1–X pattern: secondary predicates*

a. … dat Tasman Lutjegast (beroemd) heeft (beroemd) ge-maak-t
C Tasman Lutjegast famous have:3SG famous GE-make-D
'… that Tasman made Lutjegast famous.'

b. … dat Tasman Lutjegast (beroemd) ge-maak-t heeft (*beroemd)
C Tasman Lutjegast famous GE-make-D have:3SG famous
(same as a.)

In (11.42), the particle *in* 'in' is (part of) the complement of the verb *laden* 'load,' just like the number *3* verb in the cluster is in the complement domain

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of the number *2* verb; similarly with the secondary predicate *beroemd* 'famous' in (11.43). The facts, then, show that an element that is dependent on a verb in the cluster may not be realized to the right of that verb (Zwart 1996a: 241). This requirement may explain the impossibility of the *2–1–3* clusters in (11.40–41).

Since *1–2–3* orders are allowed, this restriction must not apply to the verbs in ascending clusters (cf. (11.40a,d) and (11.41a)). On the assumption that the verb phrase in Dutch is head-initial, ascending orders do not involve movement, so the distribution of dependants of a verb in a verb cluster is sensitive to movement, suggesting that movement redefines the licensing domain for the moved element's dependants:

(11.44) *The 2–1–3 principle*
When a verb α moves, creating a verb cluster, dependants of α must either be moved along with α or realized to the left of α.

The *2–3–1* order of (11.40d) results when the verb and its dependant (the number *3* verb) are moved together, as in (11.39a)). Apparently, this is not possible when the number *1* verb is a modal auxiliary, given (11.41d) (cf. (11.39b)). The *3–2–1* order results when the verb moves by itself, and (11.44) applies, or, alternatively, it results from a roll-up movement derivation.

An alternative approach to the word-order distribution in (11.40–41) was proposed by Barbiers (2008), assuming (i) head-initial structure, (ii) leftward movement only, (iii) spell-out of either the higher or the lower copy of a moved category, and (iv) a 'no shredding' spell-out condition. On this approach, all three-verb clusters involve the same pattern of leftward roll-up movement, starting from (11.45a) and yielding (11.45c).

(11.45) *Roll-up movement analysis of three-verb clusters*
a. *Starting order*
$[_{VP1}\ V_1\ [_{VP2}\ V_2\ \ [_{VP3}\ V_3\ ]\ ]\ ]$
b. *Intraposition 1*
$[_{VP1}\ V_1\ [_{VP2}\ \mathbf{[_{VP3}\ V_3\ ]}\ V_2\ [_{VP3}\ V_3\ ]\ ]\ ]$
c. *Intraposition 2*
$[_{VP1}\ \mathbf{[_{VP2}\ [_{VP3}\ V_3\ ]\ V_2\ [_{VP3}\ V_3\ ]\ ]}\ V_1\ [_{VP2}\ [_{VP3}\ V_3\ ]\ V_2\ [_{VP3}\ V_3\ ]\ ]\ ]$

The orders in (11.40–41) then result from selective spell-out procedures, as follows:

(11.46) *Spell-out patterns for three-verb clusters*

a. Spell out all verbs in their base positions	>	1–2–3	(11.40a/41a)
b. Spell out the *1* verb in its base position	>	3–2–1	(11.40f/41f)
	>	2–3–1	(11.40d/*41d)
	>	2–1–3	(11.*40c/*41c)

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c. Spell out the *1* and *2* verbs in their base positions > 1–3–2 (11.40b/41b)
> 3–1–2 (11.*40e/41e)

d. Spell out the *1* and *3* verbs in their base positions > 2–1–3 (11.*40c/*41c)

The 'no-shredding' condition (Barbiers 2008: example (40ii)) says that constituents contained within VP_2 are all spelled out on the same side of V_1. This means that if the number *2* verb is spelled out in a derived position, so must the number *3* verb be, barring the *2–1–3* order in (11.46b,d).

The no-shredding condition does allow the *3–2–1/2–3–1* variation in (11.46b), since both constituents of VP_2 are to the left of V_1 in each case. But the *2–3–1* order must be blocked when the number *1* verb is a modal auxiliary (11.41d). Barbiers (2008: 176f) argues that temporal and modal three-verb clusters differ in that the temporal auxiliary is in a selection relation with the number *2* verb (which has the perfective interpretation that the temporal auxiliary selects), while the modal auxiliary is not (as it selects an eventive predicate, and eventivity is a feature of the number *3* verb, not of the number *2* verb). The distribution of *2–3–1* clusters, then, follows if a further condition holds, namely that spell-out of VP_2 in a derived position requires the presence of a (specifier–head) licensing relation between VP_2 and V_1, which we have just seen is present only when V_1 is a temporal auxiliary. (Spell-out of VP_3 in the specifier position of VP_2 endows VP_2 with the relevant features, making a spec–head relation with V_1 possible after all, explaining the possibility of the *3–2–1* order.)

The absence of the *3–1–2* order in temporal three-verb clusters (see (11.40e)) follows from the no-shredding condition. But the *3–1–2* order must be allowed in modal three-verb clusters (see (11.41e)). Since Barbiers has argued that a licensing relation exists between a modal V_1 and the VP_3 (the eventive predicate), he modifies the no-shredding condition such that VP_3 may be realized on the other side of V_1 (yielding *3–1–2*) in case such a licensing relation exists.

It should be noted here that variation in the cluster never affects the prosodic alignment of the elements in the cluster, in the sense that the most deeply embedded element continues to carry the nuclear pitch accent, regardless of word order (e.g. Wagner 2004). This is also true when the most deeply embedded element is a particle or secondary predicate breaking up the cluster (Evers 2003: 63).

Remnant movement analyses

Later analyses assuming head-initial structure for Dutch (Hinterhölzl 1999, 2006, Koopman and Szabolcsi 2000) managed to dispense entirely with head movement in the derivation of the verb clusters. Hinterhölzl (2006) assumes

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that modal verbs select a full CP complement. The verb phrase of the embedded clause moves into the specifier position of the embedded clause CP; since the object has already moved to the embedded clause middle field (see section 9.3), the verb phrase is a *remnant* verb phrase containing just the infinitive. This creates a remnant TP in the embedded clause, with the verb (phrase) moved out of it, and Hinterhölzl assumes that this TP moves into the matrix clause middle field, yielding the restructuring effect. The analysis is summarized in (11.47).

(11.47) *Remnant movement analysis of verb raising (Hinterhölzl 2006: 107f)*

a. *Argument structure*
… dat Tasman [$_{VP}$wil [$_{CP}$ … [$_{VP}$ ontdekken het Zuidland]]]
(that Tasman wants to discover the South Land)

b. *Object shift*
… dat Tasman [$_{VP}$ wil [$_{CP}$ … **het Zuidland** [$_{VP}$ ontdekken **[e]**]]]

c. *Remnant VP movement to Spec,CP*
… dat Tasman [$_{VP}$ wil [$_{CP}$ **[$_{VP}$ ontdekken [e]]** [$_{TP}$ … het Zuidland **[e]**]]

d. *Remnant TP movement into the matrix clause*
… dat Tasman **[$_{TP}$ het Zuidland [e]]** [$_{VP}$ wil [$_{CP}$ [$_{VP}$ ontdekken [e]] **[e]**]

This analysis has the advantage that adverbs (including negation) belonging to the embedded clause are moved into the matrix clause along with the remnant TP, so that no individual movement of these elements needs to be assumed to account for their appearance in the matrix clause middle field.

Koopman and Szabolcsi (2000) assume that the finite verb in Dutch moves to the specifier position of a functional projection AgrP in all types of clauses (see the end of section 10.1), via remnant XP movement. Verb clusters are likewise formed via XP movement, as in Hinterhölzl's analysis, except that the embedded verb moves on into the matrix clause, to a designated projection dominating VP. A simple ascending two-verb cluster, then, involves at least two movements: (i) movement of the infinitive into the matrix clause crossing the finite verb, and (ii) remnant movement of (a constituent containing) the finite verb into Spec,AgrP crossing the infinitive again. In fact, the number of movements is significantly higher, as the sample derivation in Koopman and Szabolcsi (2000: 156–158) bears out, because of the need to remove excess material from the infinitival clause, and because of the assumption that inflected material moves to the functional domain hosting the relevant features, yielding a number of intermediate steps. The steps in (11.48) are a gross simplification, intended to convey the general idea.

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(11.48) *Remnant movement analysis of verb raising (adapted from Koopman and Szabolsci* 2000*: 156f)*

a. *Argument structure*
… dat Tasman [$_{VP}$wil [$_{CP}$ … [$_{VP}$ ontdekken het Zuidland]]]
(that Tasman wants to discover the South Land)

b. *Object shift*
… dat Tasman [$_{VP}$wil [$_{CP}$ … **het Zuidland** [$_{VP}$ ontdekken **[e]**]]]

c. *Infinitive movement to a functional projection for infinitival morphology*
… dat Tasman [$_{VP}$ wil [$_{CP}$ … [$_{INFP}$ [$_{VP}$ ontdekken] het Zuidland **[e]**]]]

d. *Object shift*
…dat Tasman [$_{VP}$ wil [$_{CP}$ … **het Zuidland** [$_{INFP}$ [$_{VP}$ ontdekken]**[e]**]]]

e. *Infinitive phrase movement à la Hinterhölzl*
… dat Tasman [$_{VP}$wil [$_{CP}$ [$_{INFP}$ ontdekken] het Zuidland **[e]**]]

f. *Object shift into the matrix clause*
… dat Tasman **het Zuidland** [$_{VP}$ wil [$_{CP}$ [$_{INFP}$ ontdekken] **[e]**]]

g. *CP-remnant movement into the matrix clause (crossing the finite verb)*
… dat Tasman [[$_{CP}$ ontdekken] het Zuidland [$_{VP}$ wil **[e]**]]

h. *Finite verb remnant movement into AgrP (crossing the infinitive)*
… dat Tasman [$_{AGRP}$ [$_{VP}$ wil] [[$_{CP}$ ontdekken] het Zuidland **[e]**]]

i. *Object shift*
… dat Tasman **het Zuidland** [$_{AGRP}$ [$_{VP}$ wil] [[$_{CP}$ ontdekken] **[e]**]]

For descending orders, Koopman and Szabolcsi (2000: 143) assume that the embedded infinitive phrase does not move along with the CP (step (11.48g)), but moves out of the CP into a designated projection for cluster formation (VP+) dominating the matrix VP.

The Koopman and Szabolcsi (2000) analysis carries out a program initiated by Kayne (1998) to replace covert movements (previously assumed in pre-minimalist analyses) by a system of iterative extractions and remnant movements. The complexity of the analysis, however, is increased by the assumption that inflected material needs to appear in a functional projection hosting the features associated with the inflection. In later versions of minimalist syntax (e.g. Chomsky 2001), this assumption is dropped, and agreement requires not movement but simply c-command (see also Zwart 2003).

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