Not another book on Verb Raising

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Not another book on Verb Raising

Niet nog een boek over 'Verb Raising'

(met een samenvatting in het Nederlands)

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To Vincent
for whom I would have put some dragons in

To my parents
for not giving me a pony

*...and to those bits of magic ***

Contents

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Abbreviations used in this dissertation

A	adjectival
ADJ	adjective
ADV	adverb
AFF	affirmative adverb
ASP	aspectual auxiliary
AUX	perfective auxiliary
DP	demonstrative phrase
EXPL	expletive pronoun
FIN	finite verb
INF	infinitive
IPP	Infinitivus-Pro-Participio
LF	Logical Form
MOD	modal auxiliary
N	noun
NP	noun phrase
OBJ	object
OV	the order object-verb
P	preposition
PERF	perfect auxiliary

PF ..... Phonetic Form

PP ..... prepositional phrase

PREF ..... prefix

PTCL ..... particle

PTCP ..... participle

RC ..... relative clause

REL.PRON ..... relative pronoun

RES ..... resultative phrase

SOV ..... the order subject-object-verb

SVO ..... the order subject-verb-object

SUBJ ..... subject

UG ..... Universal Grammar

V ..... verb

V2 ..... verb second

VCI ..... interruption of the verb cluster by non-verbal material

VO ..... the order verb-object

VP ..... verb phrase

QP ..... quantifier phrase

WH-WORD ..... question word

CHAPTER 1

Preface

1.1 Introduction[1]

All humans have language. It is a part of our biology (Lenneberg 1964). Compared to the language of other animals, human language is much more complex in how meanings are linked to sounds (see Hauser et al. 2002 for discussion). A central aspect of the field of linguistics is to investigate what makes human language special. A first notable property of human language is that it comes in so many different forms. There are many languages, each with its own properties. The word order in Japanese is, for instance, very different from the English word order.

Assuming that language is part of human biology, it is remarkable that languages can vary so much. Particularly striking in this respect is that a healthy child can acquire any language spoken in the world. A partial explanation for this issue might be that the variation observed in human languages, while abundant, is nevertheless finite. Languages can only vary to a certain extent (Chomsky 1995). Such a view makes it easier to account for the relative ease of language acquisition, as it is not the case that *anything goes*.

Indeed, language variation has its limits. Word orders that are logically possible are empirically absent in human languages. These gaps may in some cases be coincidental. In other cases, they might follow from properties of the human cognitive language system (if there is such a thing), or from more general properties of human cognition. In this dissertation, I present two illustrative

[1] A part of this subsection is taken and adapted from the introduction of the forthcoming paper by Barbiers, Bennis, and Dros-Hendriks.

examples of clear limits in variation. I argue that these limits follow from properties of human grammar.

In order to determine the properties of human grammars, it is particularly useful to compare languages that are minimally different from each other (Kayne 2000, 2005; Barbiers 2009, among others). In such a way, the effects of confounding variables can be minimized. Kayne (2005:8-9) phrases this as follows: "[C]omparative work taking, for example, English and Japanese as a starting point might lead almost anywhere, at the risk of making the comparative work not impossibly more difficult, but certainly more difficult. Putting things another way, we might say that microcomparative syntax work provides us with a new kind of microscope with which to look into the workings of syntax." For this reason, this dissertation focusses on languages that are very similar to each other: varieties of Dutch and Frisian. These varieties are related to each other and have many commonalities. As a result, the amount of variation is reduced to a limited number of variables, and it becomes more straightforward to analyze the differences between these languages.

This dissertation will focus on the variation in word order in these variaties, which is a rather infrequent phenomenon, as is clear from the Syntactic Atlas of the Dutch Dialects (SAND I & II, Barbiers et al. (2005, 2008)). Most variation is found in the domain of morphosyntax, and thus relates to variation in form rather than in order. In those cases the form of a particular word varies across varieties. Well-known examples concern subject pronouns, relative pronouns, complementizers and verbal inflection (cf. SAND I). Another issue that has been discussed in the literature quite extensively (cf. Barbiers 2008a for an overview) is the phenomenon of syntactic doubling, often found in situations in which both positions are independently available, as in the case of relative pronoun doubling, for instance in *Dit is de man* ***die*** *ik denk* ***die*** *ze gezien hebben* ('This is the man REL.PRON. I think REL.PRON. they saw'). Generally, there exists a non-doubling variant. In this specific case, the second relative pronoun can be replaced by the complementizer *dat* 'that'. In doubling constructions it is not word order that varies, but the spell-out of (multiple) positions in a movement chain.

Compared to morphosyntactic variation, the word orders observed within the Dutch language area is remarkably constant. For instance, all 267 varieties that are part of the SAND-research show exactly the same pattern for the placement of the finite verb. There is no variation with respect to *verb second*, although the placement of the finite verb is variable cross-linguistically, as is clear from the vast literature on Verb Movement in for instance the Germanic and Romance languages. Similarly, although there is much cross-linguistic variation in the ordering of verbs and objects, all Dutch varieties have the verb following the object in subordinate clauses. Without exception, Dutch varieties have OV-order and move the finite verb to the beginning of the clause in clauses without a complementizer. Similarly, the order in nominal phrases is rather strict. There is for instance no dialectal variation in the position of the

adjective in the nominal phrase. It always precedes the noun and is preceded by the determiner. This is by no means the 'logical order' in nominal phrases, given that other Germanic languages (Scandinavian) and Romance languages (e.g. French) show different orders in the nominal domain. It is thus remarkable that the DP-order is constant across varieties of Dutch.

However, there is one domain in which word order variation is abundant. This concerns the famous verb clustering phenomenon in Dutch (and German), where all verbs cluster together in a clause-final position – with the exception of the finite verb in the main clause. When more than one verb occurs at the end of the clause, for instance a main verb and one or more auxiliary or modal verbs, the order appears to be unstable across varieties. In a subordinate clause in which the main verb is accompanied by two modals, four orders are observed (out of six logically possible orders). This is shown in (1).

(1) a. Ik vind dat iedereen *moet kunnen zwemmen.* V_1-V_2-V_3
I find that everyone must can swim
'I think that everybody should be able to swim.'

b. Ik vind dat iedereen *moet zwemmen kunnen.* V_1-V_3-V_2

c. Ik vind dat iedereen *zwemmen kunnen moet.* V_3-V_2-V_1

d. Ik vind dat iedereen *zwemmen moet kunnen.* V_3-V_1-V_2

While verb clusters display abundant variation, this variation is not without limits (see also Barbiers 2009). The limits of variation are particularly clear in two respects. First, certain orders of verbs cannot be found. While many speakers of Dutch allow both the orders in (2a) and (2b), the order in (2c) is never observed. The reason for this restriction is not immediately apparent. I argue that this is not by chance, but a result of properties of human grammar.

(2) a. ...dat hij de wagen $moet_1$ $hebben_2$ $gemaakt_3$.
...that he the car must have made
'...that he must have repaired the car.'

b. ...dat hij de wagen $gemaakt_3$ $moet_1$ $hebben_2$.
...that he the car made must have

c. * ...dat hij de wagen $hebben_2$ $gemaakt_3$ $moet_1$.
...that he the car have made must

There are no clear semantic or pragmatic differences between these sentences, although there are differences in stylistic preferences (see Coussé 2008, and references cited therein). The different orders found in verb clusters appear to be determined by:

(3) (i) geographical location of the language variety
(ii) type of auxiliaries in the verbal cluster
(iii) hierarchy of auxiliaries in the verbal cluster

Another clear limitation in language variation lies in the elements that can occur inside the verb cluster. In most varieties of Dutch, both orders in (4) are acceptable.

(4) a. Ik vind dat Jan Marie *moet* **op** *bellen.*
I find that Jan Marie must up call
'I think that Jan should call Marie.'

b. Ik vind dat Jan Marie **op** *moet bellen.*
I find that Jan Marie up must call

While some non-verbal items, such as particles, can both precede or interrupt the verb cluster, many non-verbal items can only precede the verb cluster. Sentence (5b) is, for instance, ill-formed in standard Dutch (but acceptable in West-Flemish), and sentence (6b) is ill-formed in both varieties.

(5) a. ...dat hij daarom **zacht** *moet praten.*
...that he therefore quietly must talk
'...that he therefore has to speak quietly.'

b. % ...dat hij daarom *moet* **zacht** *praten*
...that he therefore must quietly talk

(6) a. ...dat Jan morgen **zeker** *moet werken.*
...that he tomorrow definitely must work
'...that he therefore definitely has to work.'

b. * ...dat Jan morgen *moet* **zeker** *werken.*
...that he therefore must definitely work

Where the type of auxiliary plays a role in the order of verbs, no such effect is observed on the acceptability of non-verbal material inside the verb cluster.[2] The acceptability of this construction is solely determined by:

(7) (i) geographical location of the language variety
(ii) type of non-verbal element in the verbal cluster

Most often speakers are not aware of these types of word order differences. Superficially, it appears to be rather arbitrary to select one of these orders. However, while the variation in this domain might seem random, clear patterns emerge once one considers the geographic distribution of the various orders across the language area. No existing theory of verb clusters can account for these patterns, and they would consequently have to be assumed to be a sociolinguistic accident. I demonstrate, however, that these patterns are not random, but systematic. I argue that they largely follow from properties of the human linguistic system.[3] In this way, this dissertation provides a principled account of the properties of verb clusters.

[2] See chapter 5.
[3] This approach is in line with Weinreich (1954).

I am far from the first to write about verb clusters, so I first demonstrate in the next section why this dissertation is very different from all previous work on verb clusters.

1.2 General relevance of this dissertation

This dissertation contains many aspects that set it apart from previous discussions of verb clusters. It has a different starting point; it takes a different standpoint; it builds on ideas from a variety of linguistic frameworks; it uses a different methodology; and it presents a number of newly discovered findings. I briefly discuss all these aspects here.

Note that this dissertation is based on three-verb clusters containing modal and aspectual auxiliaries. I will not discuss verb clusters with so-called 'lexical restructuring verbs', such as *proberen* 'try'. The interested reader is referred to Susi Wurmbrand's work on verb clusters (see for instance Wurmbrand 2001, 2017).[4] I also do not address verb clusters containing the infinitival marker *te*. I refer the reader to work by Cora Pots (e.g. Pots (forthcoming)), who is currently investigating the profuse variation observed in those constructions.

1. The starting point for this dissertation is the geographic distribution of verb cluster orders across verb types. As far as I am aware, no other theory takes these patterns into account – with the exception of Barbiers and Bennis (2010), on which the current approach is based. The most remarkable patterns are listed here.

    - All varieties of Dutch display various orders across verb types, except for many Frisian varieties, where only the 3-2-1 order is observed.
    - The geographic distribution of verb cluster orders depends on the types of verbs involved.
    - The word order variation in these languages contrasts with a rigid ordering in the nominal domain.
    - The 1-3.PTCP-2 order, particle incorporation and verb cluster interruption show similar geographic distributions.
    - The 1-3.INF-2 occurs only in border varieties.
    - In West-Flemish varieties, non-verbal material can occur inside the verb cluster. The acceptability of such constructions decreases geographically in moving from West-Flanders to the north.

    Even though Dutch verb clusters have been a topic of research since at least 1975 – with Arnold Evers' influential dissertation – there still is no consensus on the underlying structure of verb clusters. I argue that the

[4] On the different properties of these constructions amongst the world's languages see Wurmbrand (2014, 2015).

geographic distribution of verb clusters can shed light on the underlying structure of verb clusters.

2. This dissertation takes a different theoretic standpoint: all verb clusters are base-generated. This assumption is not new. However, it is additionally assumed that only purely ascending (1-2-3) and purely descending (3-2-1) orders are three-verb clusters. The remaining orders that are observed in Dutch and Frisian varieties involve non-verbal material. As a result, 'particle incorporation' and the 1-3-2 order can be argued to have a similar syntactic structure (see also Evers 2003, among others).

3. According to current Minimalist theory (Chomsky 2005, 2007, 2008), multiple factors play a role in the shaping of human languages. Such a theory necessitates the need to investigate multiple potential factors that might affect speakers' word order preferences. For this reason, ideas from other frameworks, such as functional approaches, are taken into consideration here. It is demonstrated that those ideas supplement, rather than contradict, the findings in generative approaches. By staying away from the controversial topics in generative research, such as whether or not *Merge* is specific to language, I think this dissertation can appeal to all types of linguists.[5]

   I think it is crucial to mention that Merge by itself is not controversial for most linguists. Although it is associated with Noam Chomsky and Generative Grammar, most linguists outside the generative framework also assume that human cognition contains some type of mechanism that derives the hierarchic structure of language. The existence of a neurophysiological mechanism that combines small linguistic units into larger hierarchic structures has been supported by neuroscientific research (Ding et al. 2016).

4. I made use of a different methodology. In my investigation, I made ample use of grammatical judgements in order to determine what orders are possible in language varieties. But I also made use of an unconventional approach that allowed me to get judgements on varieties that were not used by the informants themselves, namely a comparative ranking task. Informants were asked to rank word orders with respect to each other. This task included (i) word orders of the informant's own variety, (ii) word orders that are observed in language varieties that are different from the informant's own variety, and (iii) word orders that are not observed in any language variety. The informants could only proceed with the questionnaire if they had ranked all sentences in a single order. As a

[5] Merge is a syntactic operation that combines two syntactic units into a new syntactic unit. For instance a verb *walk* and a noun phrase *the people* can be combined into a verb phrase *the people walk*. According to Chomsky, Merge is a fundamental part of the human linguistic system.

consequence, the informants were forced to assess and compare orders that they did not use themselves.

5. This dissertation introduces a number of original ideas and new findings:

   - The geographic distribution of verb orders provides insight in the grammatical structure of verb clusters.
   - Speakers possess knowledge of word orders that can occur in language varieties different from their own. This can be explained by properties of human grammar. Both familiarity and properties of language processing are insufficient in accounting for these results.
   - Verb clusters are base-generated in a low position, within the lexical domain.
   - There is a clear cut-off point for cluster interruption. Only elements that are merged in a syntactic position below this cut-off point are acceptable inside the verb cluster.

1.3 Outline of the chapters

Chapter 2 will discuss problems of previous accounts of verb clusters. While these analyses are well equipped to derive the observed orders of verbs, they all have problems motivating the variation. Additionally, these theories cannot explain the geographic distribution of different orders of verb clusters, which depends on the types of verbs in the cluster. Crucially, I demonstrate in this dissertation that these patterns are systematic. I argue that they follow from properties of human grammar.

Chapter 3 presents my analysis of verb clusters, which is a result of joint work with Sjef Barbiers and Hans Bennis. I show that the merge procedure can derive all observed orders of verbs in a cluster. Unlike in previous approaches, the formation of verb clusters therefore does not require any special movements and operations. Such movements are even required for most existing base-generation approaches, in order to account for the 3-1-2 order.

It will be argued that the variation in the order of verbs is a result of the following three options made available by the language system:

(i) the direction of linearization;

(ii) the categories involved;

(iii) the timing of Merge.

The direction of linearization can lead to either ascending (1-2-3) or descending (3-2-1) verb orders. Remaining orders involve non-verbal material. The timing of Merge can lead to differences between the 1-3-2 and 3-1-2 order, as 3 can be merged before or after merging 1 with 2.

This theory can account for a number of special properties of verb clusters. Most importantly, it provides an account for the observed geographic distribution of verb clusters. For instance, the theory can explain why the 1-3-2 and 3-1-2 orders occur in grammars of Dutch that have ascending (1-2), rather than descending (2-1), verb clusters. In this approach, the 1-3-2 and 3-1-2 orders involve an ascending verb cluster with a non-verbal 3. Additionally, the theory can explain why the 1-3.PTCP-2 order is most common in the region where non-verbal material can interrupt the verb cluster.

Chapter 4 further looks at the source of the variation observed in verb clusters. Assuming that variation is the result of a range of options made available by the language system, the question arises how language users choose between the options available to them. For instance, what determines if a participle is preferred in a position preceding the auxiliary (3.PTCP-1-2), or in a position following the auxiliary (1-3.PTCP-2)? The theory of *Third factor minimalism* (Chomsky 2005) makes the prediction that general principles of computation can drive speakers' preferences. This chapter demonstrates that processing principles play a limited role in the order of verbs in a cluster. No processing model can account for all speakers' preferences. However, a combined model that takes both the grammar and language processing into account comes very close to explaining the results.

Chapter 5 further examines the choice between different orders of Merge by considering interruptions of verb clusters by non-verbal material. Properties of cluster interruption further support the claim that verb clusters are base-generated. The main data on which this is based are:

1. The lack of freezing effects. There are no problems in extracting from DPs that precede the verb cluster, suggesting that these elements are base-generated in their surface position.

2. The position of adverbs. Manner adverbs can occur in three positions in West-Flemish three-verb clusters: (ADV)–V_1-(ADV)–V_2-(ADV)–V_3. It will be demonstrated that all theories of cluster formation that assume movements in syntax, or at PF, have difficulties deriving these possible positions.

3. The types of adverbs that can interrupt the cluster with different types of auxiliaries. While the type of adverb has a clear effect on the acceptability of cluster interruption, no such effect is observed for the type of auxiliary. All types of auxiliaries obligatorily follow all *v*P-external adverbs in all varieties of Dutch. This clearly indicates that all auxiliaries are generated in a low position.

A particularly interesting observation that will be discussed in chapter 5 is that there is a clear cut-off point for cluster interruption in the syntactic structure; only elements that are merged below this point can interrupt the verb cluster.

Chapter 6 concludes the dissertation.

CHAPTER 2

The strengths and weaknesses of previous theories

2.1 Introduction

Chapter 1 briefly mentioned the observed variation of verb clusters in Frisian and Dutch varieties. Looking in detail at this variation, some properties immediately stand out. For instance, in some language varieties, multiple orders of verbs in a cluster can be observed. Which orders are acceptable in a single variety depends on the types of verbs involved. To give an example, speakers of some varieties accept the V_1-V_2 order when V_2 is an infinitive, and the V_2-V_1 order when V_2 is a participle. In this chapter, I discuss a number of such properties. These properties should be captured by any theory that aims at explaining, rather than merely describing, this variation.

(i) Multiple orders of verbs in a cluster can be observed within a single language variety;

(ii) In three-verb clusters, only one order (the 2-1-3 order) does not occur;

(iii) The 2-3-1 order is only attested with certain verb types;

(iv) The distribution of the remaining orders depends on the types of verbs involved;

(v) The different orders are semantically and pragmatically equivalent;

(vi) The word order variation in these languages contrasts with a rigid ordering in the nominal domain.

(vii) The observed orders of verbs exhibit clear geographic co-occurrence patterns

All these properties are discussed in more detail in this chapter. Crucially, these properties suggest that while there is abundant variation in this domain, the variation is not unlimited.

There are many different analyses of verb clusters and there is little consensus on which one is correct. In sections 2.3–2.10, I assess how well the different types of approaches capture each of the verb cluster properties. In order to do this, a brief description of the mechanisms assumed by the previous approaches is provided in the next section.[6] All these approaches are well thought out and able to account for a large number of properties of verb clusters, including at least some of the properties listed above. All approaches are able to derive the different observed orders, and for all approaches it is possible to come up with an explanation for the lack of semantic and pragmatic effects with different orderings. Crucially however, most of the remaining properties pose problems for all of the existing approaches to verb clusters. The reason for this is that most existing theories only focus on the structural properties of verb clusters and ignore their geographic distribution.[7] Conversely, I argue in chapter 3 that the approach taken by Barbiers, Bennis, and Dros-Hendriks (forthcoming) and assumed in this dissertation, can in fact account for many of the properties listed above, making this approach superior to the previous approaches.

2.2 Deriving verb clusters in existing approaches

One of the main issues in deriving verb clusters is the underlying order from which other orders are derived. Koster (1975) argues in favor of an SOV order, mostly on the basis of the position of particles in sentences of Dutch.

(8) a. Hij (*op) gaf de wedstrijd (op).
He up.PTCL gave the competition up.PTCL

b. Hij zei dat hij de wedstrijd (op)-gaf (*op).
He said that he the competition up.PTCL-gave up.PTCL

In these sentences, the particle is assumed to originate in a position adjacent to the verb. As stated by Koster, if the SVO order observed in the root clause were the base-generated order, two separate movement processes would be required: a movement of the particle that applies in all clauses, and a movement of the

[6] I do not provide a detailed discussion of all existing approaches to verb cluster formation, which is not the aim of this chapter. The previous approaches are only discussed to the extent that the problems accounting for these properties become apparent. For a substantive comparison of the existing theories, the reader is referred to Wurmbrand (2017).

[7] To my knowledge, Barbiers and Bennis (2010) – on which the theory presented in chapter 3 is based – is the only approach that aims at explaining the geographic distribution.

verb in embedded clauses only. On the other hand, if the embedded SOV order is assumed to be the underlying order, only one movement has to be assumed, namely a *verb second* movement that moves verbs to the second position of the main clause. Koster concluded that the grammar of Dutch is simpler if one assumes Dutch to be an SOV language with a *verb second* rule that strands the particle in main clauses.

Zwart (1997:12) commented on this issue as follows: "Koster's answer that the main clause order is derived from the embedded clause order was taken to imply that the embedded clause word order is the basic word order, hence that Dutch is an SOV language. [...] this conclusion is not warranted as long as we do not know for certain that the embedded clause word order is not itself derived from the basic word order via movement processes, like object shift."

Zwart (1997) is a proponent for analyzing the Dutch word order as SVO, following Kayne's (1994) *Universal Base Hypothesis*, which states that the structure of sentences and hence the underlying word order is essentially the same in all languages. On the basis of this idea, Kayne states that all well-formed syntactic structures consist of asymmetric c-commanding relations. The *Linear Correspondence Axiom* (LCA) then maps these hierarchic structures to a head-initial linear order. According to Zwart (1997), this theory leads to a simpler theory of the word order variation in Germanic languages. He shows that objects can move independently, as indicated by sentences like (9), where the object precedes the negative marker *niet* 'not'.

(9) Jan heeft *het boek* niet gelezen.
Jan has the book not read
'Jan has not read the book.'

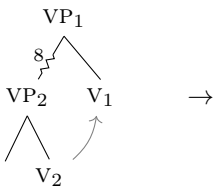
Assuming that movement is not optional, it is likely that the object has also moved when there is no adverb present. Since the position of the object preceding the verb could in principle always be the result of an object shift, there is no need to postulate an OV/VO parameter to account for the OV word order.

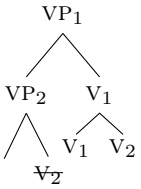
To date, there is no consensus on whether Dutch has an underlying head-initial or head-final word order. All observed word orders can in principle be derived from either underlying order. Wurmbrand (2017) states that assuming a head-initial or head-final order usually depends on the preferred assumptions: while some may consider an underlying head-initial structure advantageous because of the uniformity of structures across human languages, others might consider the assumptions required in those approaches, such as covert movements, a disadvantage.

I demonstrate in chapter 3 that a flexible approach to base-generation can capture most of the verb cluster properties and is hence preferred over an approach that assumes either a rigid head-initial or head-final order. Here, I first discuss the mechanisms involved in deriving verb clusters in existing approaches.

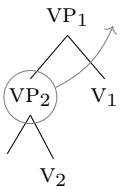
Traditional approaches to verb clusters, such as Evers (1975) and others, take

a head-final SOV order as the basic word order. Consequently, a descending 2-1 order is the base-generated order in these approaches. According to Evers, the non-finite verb can raise rightward and incorporate into the finite verb, hence deriving the 1-2 order. The two verbs subsequently function together as a single complex verb.

(10) a. 

→ b. 

Later head-final analyses argue that verb cluster formation is the result of a raising of the entire verb projection (Den Besten and Edmondson 1983; Coppen and Klein 1992; Den Besten and Broekhuis 1992; Haegeman 1992, among others). According to them, the entire projection of the main verb moves to a position following the finite verb, as in (11). An advantage of this approach is that interruptions of the verb cluster by non-verbal material are more easily accounted for.[9]

(11) 

While the traditional analyses of verb clusters have a head-final base-generated structure, later analyses involve a head-initial structure, in which higher verbs precede lower verbs (Den Dikken 1994, 1995b, 1996; Zwart 1994, 1996; Barbiers 2005, 2008b, among others). Since the analyses by Zwart and Barbiers focus

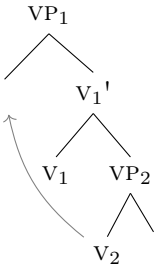
[8] The broken line depicts a simplified structure. Evers (1975) assumed that all infinitival complements originally have a full clausal structure. However, such sentences behave as single clausal domains. Complementizers and complex temporal domains are, for instance, not observed in clauses with verb clusters. Additionally, there are no island effects that are caused by the various clausal levels that are presupposed. It seems as if there is one clausal level with various verbs in it. In order to account for these observations, Evers argues that Verb Raising moves the head (V) out of the embedded clause. This raising, Evers argues, poses a problem since sentences without a V-projection cannot exist. Consequently, other projections are lost as well, leading to a mono-clausal structure. Potential remaining NPs are then binary added to the complex verb projection. Evers dubbed the removal of the complement clause 'Pruning'. Since this mechanism is irrelevant for the current discussion and might be considered outdated, it will not be displayed in the following tree structures. For a more recent approach that assumes a structure removal operation, see Müller (2017).

[9] Verb cluster interruption is discussed further in section 2.10.

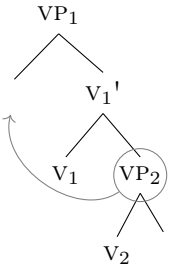
on deriving the various orders of verbs in a verb cluster, these theories will be discussed in this chapter.

Zwart derives the 2-1 order from the base-generated 1-2 order by a movement of the main verb (or the verb projection) to the specifier of a higher projection. Barbiers (2005, 2008b), on the other hand, argues that verb clusters always involve movement of entire the verb projection. The two types of approaches are illustrated in (12).

(12) a.



b.

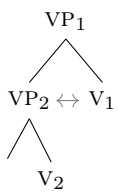


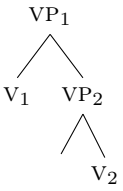
There is a crucial difference between the approach taken by Barbiers 2005 and the approach taken by Barbiers 2008b. In the former, the movement is optional, while in the latter the movement is obligatory, but there is optionality in the copy that is spelled-out. This chapter will mostly consider the most recent approach, but Barbiers 2005 will be discussed in sections where the differences are relevant.[10]

There are also approaches in which the reordering takes place entirely at PF. On the basis of an unpublished approach by Riny Huybregts, Haegeman and Van Riemsdijk (1986) state that the underlying structure of verb cluster constructions can be rebracketed in a different dimension, resulting in a multi-dimensional structure in which the verbs are bound together. This can be followed by a phonological rule that inverts two sister nodes.

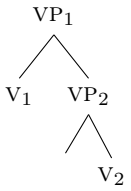
[10] Another head-initial approach to verb clusters is taken by Koopman and Szabolcsi (2000). In this approach, different verb orders are derived through obligatory, leftward VP-movements. This movement is always overt. Differences arise in the projection that is moved along when the VP moves, which can sometimes include a higher projection containing the landing site of a lower VP. This approach can derive all six conceivable verb orders in a three-verb cluster, including the 2-1-3 order, which, as is discussed in section 2.4 below, does not occur. The 2-1-3 order can be derived by a movement of VP_3 to a position above VP_2 and a subsequent movement of VP_2 – excluding the landing site of VP_3 – to a position above VP_1. To prevent this order from occurring, this approach makes use of 'complexity filters'. The problems with such filters are discussed by Barbiers (2002), who states that they make the absence of languages that allow the 2-1-3 order seem coincidental.
This chapter will consider more approaches that can derive all conceivable orders and that therefore require additional filters to prevent over-generation. Since I would like to keep the discussion of previous accounts to a minimum and since Koopman and Szabolcsi's (2000) approach makes the same predictions as other, less complex, approaches discussed in this chapter, I refrain from discussing this approach separately. For a detailed discussion of the problems of this approach, the reader is referred to Barbiers (2002).

Wurmbrand (2006, 2017) presents a slightly modified version of Haegeman and Van Riemsdijk (1986), which reduces the multidimensional structure to a single dimension and does away with rebracketing. The only available mechanism in this adaptation is inversion under sisterhood.[11] Given that this approach is more compatible with current frameworks, this adaptation will be adopted here.

(13) a. 

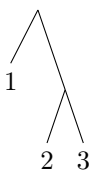
→ b. 

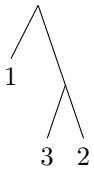
A more recent rebracketing approach by Salzmann (2013) involves rebracketing of linearly adjacent words. Salzmann argues that verbal elements can undergo cluster formation and inversion when they are linearly adjacent:

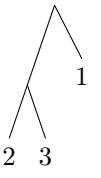
(14) a. syntactic structure: b. PF cluster formation & inversion:


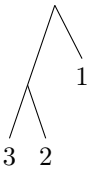
→ / 1 2 / → / 2 + 1 /

The approaches mentioned so far all assumed some fixed direction of projection, either head-initial or head-final. In earlier stages of generative theory, no fixed directionality of branching was assumed. In fact, base-generation would be the simplest way to generate different orders of verbs, as also mentioned by Barbiers (2002, 2005). Keeping the hierarchic relations constant, four different orders can be derived. Cross-linguistic variation in the use of these orders can then arise in the linearization of sister nodes.

(15) a. 

b. 

c. 

d. 

[11] This mechanism is very similar to an approach taken by Wurmbrand (2004). She argues that verb clusters are reordered post-syntactically by a PF linearization operation called *flip* (based on Williams 1999). *Flip* inverts sister nodes in a verb cluster according to language specific rules.

Such an approach incorrectly rules out the 3-1-2 order, which would require a movement.[12] Since Abels (2011, 2016) presents a base-generation approach that allows for some limited types of movements to derive the 3-1-2 order, his approach will be used as an example. A further advantage of Abels' approach is that it is based on similar ordering effects in the noun phrase (Cinque 2005; Abels and Neeleman 2012). This makes it especially relevant to investigate the fact that word order variations in Germanic verb clusters contrast with a rigid ordering in the nominal domain; see section 2.8.[13]

The different types of analyses of verb clusters can thus be grouped in the following way:

1. Syntactic movement approaches from a head-final base
2. Syntactic movement approaches from a head-initial base
3. PF inversion approaches
4. Base-generation approaches

It has already become clear that most analyses of verb clusters do not strictly fall within one of these types; rather combinations of mechanisms are used. For instance, some syntactic movement approaches make use of PF factors and Abels' (2011; 2016) base-generation approach makes use of some limited movement processes.

The next sections assess how these different types of approaches capture the different verb cluster properties mentioned at the beginning of this section. The maps used here come from the SAND project.[14]

2.3 Property (i): *multiple orders of verbs in a cluster can be observed within a single language variety*

Even in clusters with two verbs, there is variation in the word orders observed in the Dutch language area. Take the two sentences in (16) – these are sentences from the SAND –, one in which the auxiliary is a modal verb (16a)

[12] Note that Barbiers (2002) and Wurmbrand (2004), among others, suggest that the 3-1-2 order might result from some sort of focus movement, but see Bader and Schmid (2009) for arguments against this suggestion. I return to the special status of the 3-1-2 order in chapter 3, which will present a remodeled base-generation account.

[13] This chapter will not consider another base-generation approach presented by Bader and Schmid (2009), based on Williams (2003), by which all verb orders can be base-generated, assuming that the order and level of selection is irrelevant. This approach will be discussed in chapter 3.

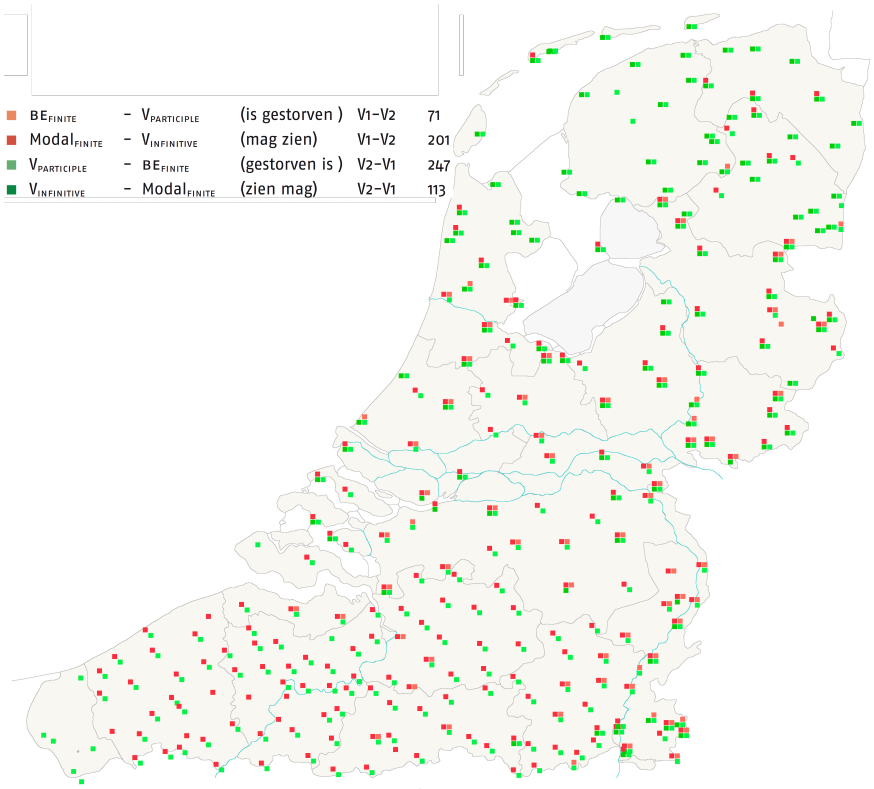
[14] The SAND project (*Syntactische Atlas van de Nederlandse Dialecten* - Syntactic Atlas of the Dutch Dialects) investigated dialect syntax in varieties of Dutch. Two types of maps can be found in this dissertation. Some maps were taken directly from the second volume of the printed atlas (Barbiers et al. 2008) and other maps were made using DynaSAND (Barbiers et al. 2006), which is an online tool that contains the data collected during the SAND project, as well as a search engine and a cartographic component.

and another in which the main verb in the subordinate clause is selected by a perfect auxiliary (16b).

(16) a. ...ik vind dat jij het ook niet *mag zien* / *zien mag.*
...I find that you it also not may see / see may
'...I think that you should not see it either.'

b. Ze weet niet dat Marie gisteren *gestorven is* / *is gestorven.*
She knows not that Marie yesterday died is / is dies
'She does not know that Marie died yesterday.'

Map 2.1 clearly illustrates that both the V_1-V_2 and the V_2-V_1 orders occur in the language area.



Map 2.1: SAND-II map 16

Strikingly, the map illustrates that multiple orders can occur even within one language variety. Most language varieties allow both the V_1-V_2 and the V_2-V_1 orders. Varieties in the north of the language area, however, allow only the V_2-V_1 order.

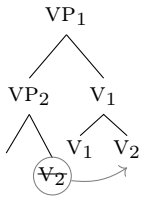
As will become clear in this section, all theories can derive the different verb orders, but have problems explaining why different orders are optionally allowed in most language varieties.

2.3.1 Syntactic movement approaches from a fixed head-final base order

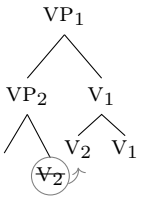
In syntactic movement approaches from a head-final base, it is assumed that ascending orders are derived by a raising of the lower verb to a position following the higher verb. Seeing that multiple word orders occur within one language variety, one might assume that verb raising is an optional movement for these languages. This would not be in line with Chomsky's (1993) theory, which states that movement is always triggered by a requirement of the moved element to be licensed and hence cannot be optional,[15] although it may be covert.

There are some ideas for a possible trigger for verb movement in verb clusters. For instance Bennis and Hoekstra (1989) argue that verb raising occurs to link verbs to tense. If verbs indeed move to be licensed, this movement would have to be obligatory and always present. Otherwise, the licensing requirement would not be fulfilled and the derivation would crash. Accordingly, one could assume that the 1-2 order involves a movement to the right of the selecting verb, while the 2-1 order involves a movement to the left of the selecting verb.

(17) a.

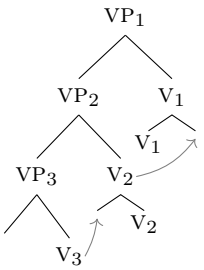


b.



This gets even more complicated for the 1-3-2 order, which would involve a movement of the lowest verb to the left of the middle verb, followed by a movement of the new verbal complex to the right of the highest verb.

(18)



The problem of variation then in some sense becomes a problem of variability in landing position.

2.3.2 Syntactic movement approaches from a fixed head-initial base order

Zwart (1996) assumes a head-initial base-structure and states that all elements

[15] But see Biberauer and Richards (2006), among others.

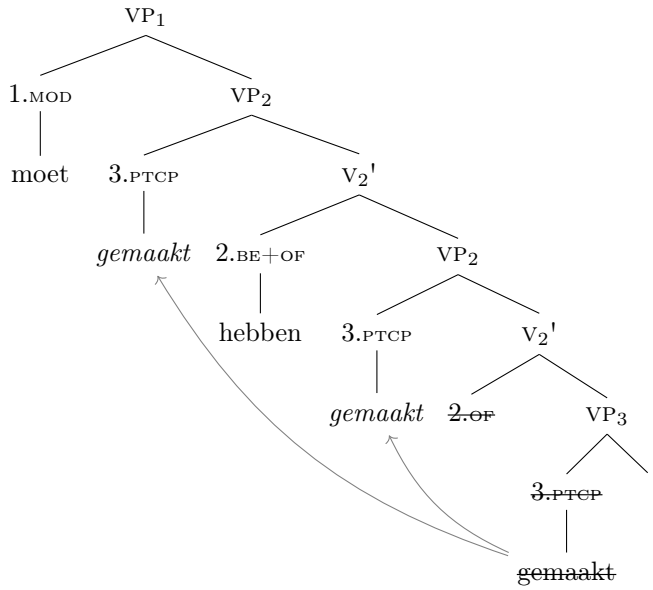
that are generated in a head-complement configuration have to be licensed in a specifier-head structure at some point during the derivation. This view is in line with the idea that movement is always triggered by a licensing requirement. Crucially, this theory allows for various possible licensing positions, hence accounting for the cross-linguistic variation. Here, I demonstrate how his system derives the 1-2-3 and the 1-3-2 orders that are observed with the verb cluster in (19).

(19) a. Ik vind dat Jan de wagen voor drie uur *moet*$_1$ *hebben*$_2$
I find that Jan the car before three hour must have
gemaakt$_3$.
made
'I think that John must have repaired the car before three o'clock.'

b. Ik vind dat Jan de wagen voor drie uur *moet*$_1$ *gemaakt*$_3$
I find that Jan the car before three hour must made
hebben$_2$.
have

Following Kayne (1993), Zwart (1996) assumes that the auxiliary *have* is composed of two projecting heads (BE and OF). The auxiliary *have* is spelled out in the higher position. The participle needs to be licensed. This licensing can occur in either of the two specifier positions of the composed auxiliary, which therefore provides two possible landing sites for the participle. This automatically allows both the 1-3-2 order and the 1-2-3 order: in the 1-3-2 order, the participle is in the higher licensing position, and in the 1-2-3 order, the participle is in the lower licensing position:

(20)

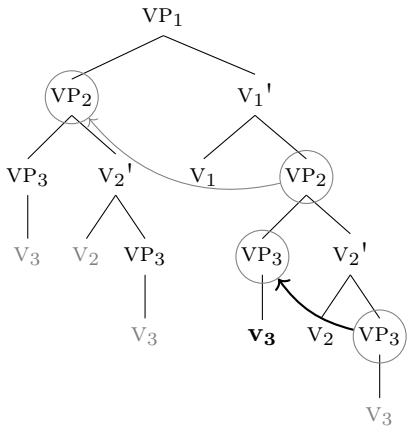


The variation is hence attributed to the various positions in which the participle can be licensed. A problem of such an approach is discussed in Wurmbrand 2017, following Koopman 1984, who states that if the sole purpose of the licensing features is to account for the observed word orders and they are not motivated by syntactic or semantic properties, they may be considered ad hoc.

Barbiers (2008b) has a different method to account for the variation in verb clusters, in which auxiliary and modal phrases can only be licensed in a subject-predicate relation with an eventive predicate, often the main verb. This predication relation is created by an obligatory movement process he dubs 'intraposition', which moves the embedded verbal projection to the specifier of the auxiliary projection. This process leads to two copies of the verb phrase. As languages can make different choices regarding which copy to spell-out, different possible verb combinations can arise.

In (21) it is demonstrated how the 1-3-2 order arises in this approach: VP_2 is spelled-out in its base-generated position, while VP_3 is spelled-out in its landing site. This combination of spell-out positions makes the spell-out choice appear arbitrary.

(21)



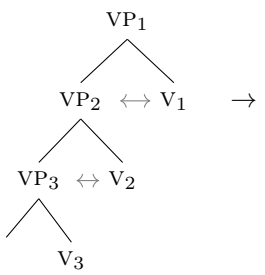
In this approach, the movement always occurs, but is sometimes covert. Variation across languages are argued to arise due to sociolinguistic factors that influence which copy to spell out, rather than to language-specific features. This thus attributes the source of variation in verb clusters to PF.

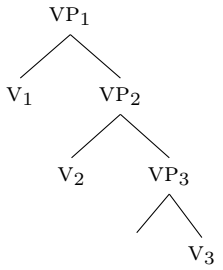
This aspect of Barbiers 2008b is crucially different from Barbiers 2005, where he argues that the movement is always overt, but only optionally occurs. Such an approach allows for optionality in syntax, which goes against Chomsky's (1993) claim that movements are triggered by a licensing feature.

2.3.3 PF inversion approaches

According to Haegeman and Van Riemsdijk (1986), the different word orders

arise as a result of reanalyzing the VP at different levels. For instance in the 1-2-3 order, all levels are reanalyzed and inverted:

(22) a. 

→ b. 

This approach does not explain why multiple verb orders can occur within the language area. The reanalysis is not motivated beyond the fact that some verbs are raising verbs. Haegeman and Van Riemsdijk (1986:420) do say that "the items affected are very often subject to the additional requirement that they be adjacent, such a bond is perhaps more adequately – and possibly equivalently – expressed by means of an additional pair of brackets, a proposal made in Chomsky (1974)." But it remains unclear why these elements would have the requirement to be adjacent, and why only in some cases an inversion takes place.

Similar to Haegeman and Van Riemsdijk's (1986) inversion parameters, Salzmann (2013) accounts for the variation by means of linearization constraints. For instance, some languages might have a constraint that requires participles to precede the auxiliary they depend on. These constraints do not trigger the inversion, but a violation does lead to a crashing derivation. Hence, Salzmann's approach pushes the explanation of the variation to PF as well. The difficulties again lie especially in the fact that some speakers optionally allow inversion. This would make the constraint either a violable constraint or an optionally present constraint.

2.3.4 Base-generation approaches

In a standard base-generation approach to verb clusters, cross-linguistic variation arises when sister nodes are linearized, during the mapping from syntax to PF. The fact that multiple orders can be used within one language variety, hence entails that the linearization direction is optional. On top of that, the movement that is required to derive the 3-1-2 order also has to be assumed to be optional.

As a concluding remark, this section has demonstrated that all approaches are able to derive the different observed orders. However, all theories account for the fact that multiple orders can occur in one language through some type of optionality, be it optionality in landing site, optionality in the copy that is spelled-out, optionality in inverting verbs, or optionality in linearization. A

question that then arises is why all varieties display such optionality, with the exception of the northern varieties, where only descending orders are observed.

In chapter 3, it will be argued that some orders involve different linguistic categories. More specifically, the co-occurring 1-2 and 2-1 orders are not the result of optionality in word order, but of a difference in the categories involved. Similar claims can be made for the co-occurring 1-2-3 and 3-1-2 orders. However, some optionality is still required to account for the co-occurring 1-3-2 and 3-1-2 orders.

2.4 Property (ii): *in three-verb clusters, only one order (the 2-1-3 order) does not occur*

The previous section mostly focussed on the observed variation in two-verb clusters. If one considers three-verb clusters, one might expect all six logically conceivable orders of verbs to be possible. This is crucially not the case. The SAND project included three different sentences that contained a three-verb cluster, with different types of auxiliaries; see (23).

(23) a. Ik vind dat iedereen {*moet kunnen zwemmen*}.
I find that everyone must can swim
'I think that everybody should be able to swim.'

b. Ik vind dat Jan de wagen voor drie uur {*moet hebben gemaakt*}.
I find that Jan the car before three hour must have made
'I think that John must have repaired the car before three o'clock.'

c. Ik weet dat hij {*is gaan zwemmen*}.
I know that he is go swim
'I know that he went swimming.'

Table 2.1 lists the number of varieties where each verb order was accepted. Assuming that the two occurrences of the 2-1-3 order with the AUX-ASP-INF cluster are noise,[16] the results indicate that only this order is absent. A theory of verb cluster formation should explain why this order cannot be derived, without at the same time excluding orders that do occur. In this section, the mechanisms that exclude the 2-1-3 order are compared with the mechanisms that can derive the frequently observed 3-1-2 order. As will become clear, it is often the case that the type of mechanism assumed to exclude the 2-1-3 order, also leads to exclusion of the 3-1-2 order. Additional assumptions are then required to include this order.

[16] The informants that used this order added the infinitival marker *te* 'to' to the cluster: ASP$_2$-AUX$_1$-TE-INF$_3$, which is a different type of construction.

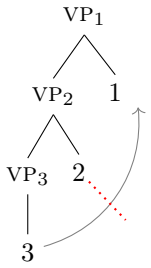
	MOD-MOD-INF	MOD-AUX-PTCP	AUX-ASP-INF
1-2-3	242	91	165
1-3-2	34	163	1
2-1-3	0	0	2
2-3-1	0	0	128
3-1-2	83	186	18
3-2-1	37	48	47

Table 2.1: Frequencies of the different orders of verbs in a cluster grouped by types of verbs

2.4.1 Syntactic movement approaches from a fixed head-final base order

It is possible to exclude the 2-1-3 order in an approach that derives verb clusters by raising the verb from a head-final base structure. This order could then involve movement of the lowest verb across the middle verb to a position to the right of the highest verb. This would violate the Head Movement Constraint (Travis 1984).

(24)



This approach does not have any problems deriving the 3-1-2 order, which can be derived by right-adjoining V_2 only.

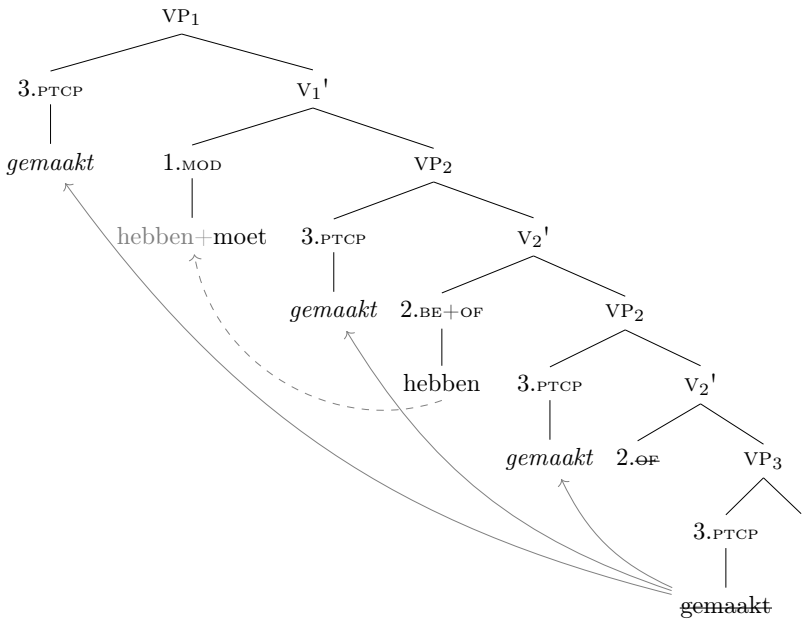
Similarly, in order to exclude the 2-1-3 order in a 'verb projection raising' approach one might assume that the lowest verb projection cannot move to the highest verb projection while skipping the middle verb projection. However, things aren't as straightforward in deriving the 3-1-2 order, since a movement of the middle projection automatically includes the lowest projection. The phrasal movement approach therefore requires additional assumptions to move $V(P)_3$ leftwards before moving the VP_2 remnant to a position following V_1.

2.4.2 Syntactic movement approaches from a fixed head-initial base order

Zwart (1996) can account for the lack of the 2-1-3 order, without excluding

the 3-1-2 order. As was described above, he argues that participles are licensed in the specifier position of the auxiliary. However, according to him, the auxiliary *have* also obligatorily incorporates into the modal verb. This leads to an additional licensing position for the participle in the specifier of the modal verb. Since the incorporation of *have* happens covertly in three-verb clusters in Dutch, the 3-1-2 order is derived. This is illustrated in (25). In languages where this incorporation happens overtly, the 3-2-1 order is derived.

(25)

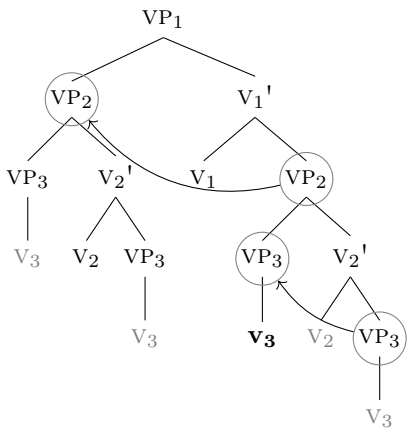


Note that this order crucially depends on an incorporation of the auxiliary, which takes place covertly. This is somewhat speculative, seeing that in two-verb clusters, the infinitive can incorporate both overtly and covertly, leading to both the 1-2 and the 2-1 orders to be possible. To exclude the 2-1-3 order, Zwart states that if the middle verb overtly incorporates in the modal verb, the lower licensing position is no longer available for the participle. Wurmbrand (2006:303) objects to this as "there is no obvious reason why licensing should be subject to [an] overt/ covert constraint [...], it appears that this assumption does no more than restate that the 2-1-3 order is not possible."

Accounting for the lack of the 2-1-3 order is much more straightforward in Barbiers' (2005) approach. Since he assumes that movement always targets specifiers, V(P)_2 can never move without taking VP_3 along.

In Barbiers (2008b), it is assumed that there is an intrinsic shredding condition, which prohibits spelling out parts of a phrase in its landing site and other parts in its base-position, accounting for the unavailability of the 2-1-3 word order.

(26)

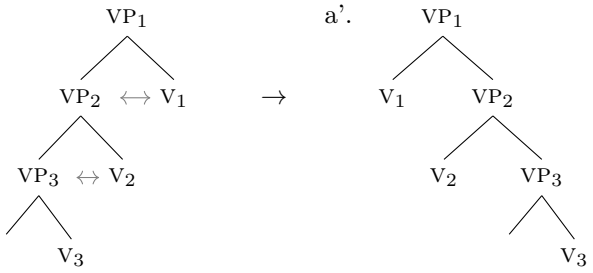


The shredding condition also automatically excludes the 3-1-2 order. Therefore, Barbiers makes an additional assumption. If there is no Spec-Head agreement between the highest two verbs, and a spell-out of V_3 in the higher position makes an agreement relation between V_3 and V_1 visible, V_3 can be spelled out in Spec-VP_1. There seems to be no independent reason for this assumption other than accounting for the word order patterns.

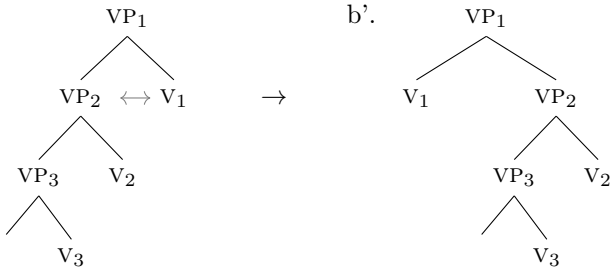
2.4.3 PF inversion approaches

In Wurmbrand's (2006; 2017) depiction of Haegeman and Van Riemsdijk (1986), the 1-2-3, 1-3-2 and 2-3-1 orders can be derived from the basic 3-2-1 order without problems:

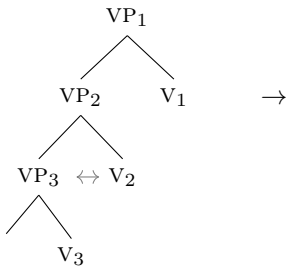
(27) a.



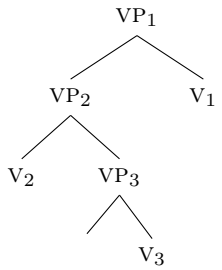
b.



c.

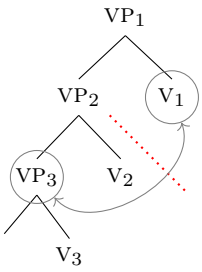


→ c'.



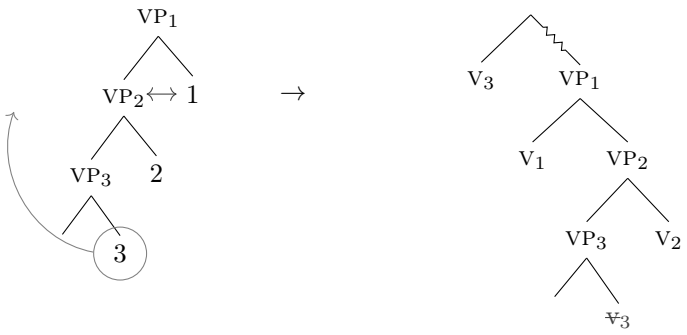
Since the sister node of V_1 is the entire VP_2, inversion of only V_1 and V_3, without V_2, is not possible. Consequently, the 2-1-3 order is automatically excluded.

(28)



This mechanism also excludes the 3-1-2 order, since this order would require an inversion of V_1-V_2, excluding V_3. Since V_1 is not a sister node of V_2, but a sister node of the combination $[V_2$-$V_3]$, the only way to derive the 3-1-2 order would be to stipulate an additional leftward-movement of the lowest verb.

(29)



In Salzmann's (2013) approach, the 2-1-3 order can be derived without problems, by linearly inverting V_1 and V_2. Crucial for his approach is that it is based on the idea that all six logically possible verb orders, including the 2-1-3 order, exist. The 2-1-3 order has been argued to occur in Swiss German in constructions where V_2 is a perception, benefactive or inchoative verb, and V_3 is a bare infinitive.

(30) ...wil er en ghöört$_2$ hät1 chooo$_3$
...because he him hear.PTCP have.FIN come.INF
'...because he heard him come.'
(Lötscher 1978:3, as cited by Salzmann 2013)

This suggests that the 2-1-3 order involves a different construction.[17] If the 2-1-3 order were analyzed as a regular verb cluster, the question remains why this order is only observed in some Swiss German dialects, and within those dialects, only with specific verb types. Salzmann states that "[his] analysis will invariably over-generate for individual dialects, varieties and idiolects since they generally only allow for a (varying) subset of the six orders." (Salzmann 2013:114)

2.4.4 Base-generation approaches

In the base-generation approach, both the 2-1-3 and the 3-1-2 orders cannot be base-generated and would require some sort of movement. According to Abels (2011, 2016), some restricted movements are allowed: movements must move a subtree containing the lowest verbal element. This assumption rules out the 2-1-3 order but allows the 3-1-2 order. This is in line with Abels (2016) assumption that examples of the 2-1-3 order involve a different type of construction. However, this approach crucially requires a motivation for moving the lowest verb in the 3-1-2 order, which Abels does not make explicit. Barbiers (2002) and Wurmbrand (2004), among others suggest that this movement might involve some type of focus movement, but this has been refuted by Bader and Schmid (2009) who did not find this effect for verb clusters. Furthermore, focus movement would not explain why this order is very common with certain verb types. Thus, Abels' (2011; 2016) theory allows for this movement to occur, but the question that remains is why this movement occurs this frequently.

To summarize, most previous theories have no clear account for the lack of the 2-1-3 order in relation with the occurrence of the 3-1-2 order. Two exceptions are traditional head-movement approaches from a head-final base order, and one of the former head-initial approaches proposed by Barbiers (2005).

2.5 Property (iii): *the 2-3-1 order is only attested with certain verb types*

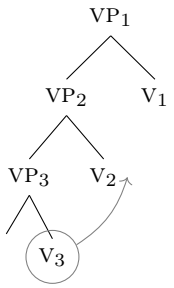
While the 2-1-3 order is completely absent in varieties of Dutch, the 2-3-1 order is only absent with certain specific verb types. A theory that can derive this order should therefore explain why this order is restricted to these verb types. Conversely, a theory that cannot derive this order should explain why this order can nevertheless be observed with certain verb types.

[17] I set the precise syntactic structure of this construction aside here. See Salzmann (to appear) for arguments against analyzing this construction as an instance of the Third Construction. He argues that the 2-1-3 order behaves like a regular verb cluster.

2.5.1 Syntactic movement approaches from a fixed head-initial base order

The lack of the 2-3-1 order with certain verb types does not immediately follow from a verb raising approach, since this order can easily be derived by raising the lowest verb.

(31)



One could argue that certain verb types do not trigger raising of the lowest verb, but this would lead to problems deriving the 1-2-3 order, which also requires moving the lowest verb, and is observed with all cluster types.

2.5.2 Syntactic movement approaches from a fixed head-initial base order

Following Zwart's (1996) approach, the 2-3-1 order can be derived by moving the entire VP_2 to the specifier of a higher functional projection. If one assumes that the other verb clusters do not involve head-movement,[18] this procedure might not differ from those deriving the other verb cluster orders. However, if one assumes that verb clusters usually involve head-movement, this would account for the fact that the 2-3-1 order generally does not occur. One can then stipulate an account for the fact that the entire verb projection can raise only with certain verb types.

Barbiers (2008b) does have an account for the rareness of the 2-3-1 order, but it requires some assumptions. This order involves a spell-out of VP_2 in the specifier of VP_1. Barbiers argues that this spell-out can only occur when there is Spec-Head agreement between VP_2 and V_1, which is the case in (32b), but not in (32a).

(32) a. [$_{\text{VP}_2}$ 2.kunnen$_{u\text{Event}}$ 3.zwemmen$_{i\text{Event}}$] 1.moet$_{u\text{Event}}$.
b. [$_{\text{VP}_2}$ 2.gaan$_{u\text{Event},\boldsymbol{i\text{Perf}}}$ 3.zwemmen$_{i\text{Event}}$] 1.is$_{u\text{Event},\boldsymbol{u\text{Perf}}}$.

However, according to Barbiers, a spell-out of VP_3 in the specifier of VP_2 makes its features visible on VP_2. As a consequence, the 3-2-1 order can occur even when there is no agreement between V_2 and V_1.

[18] See the discussion in Wurmbrand (2017:58-59, fn.27).

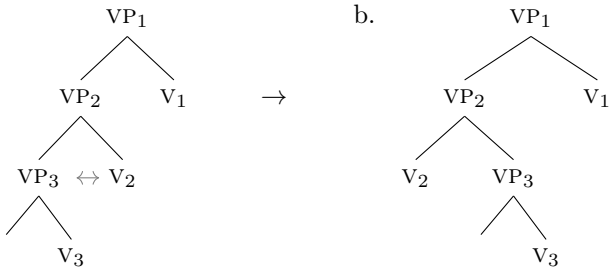
(33) [$_{VP2}$ 3.zwemmen$_{i\text{Event}}$ 2.kunnen$_{u\text{Event}}$] 1.moet$_{u\text{Event}}$.

Consequently Barbiers' (2008b) theory predicts that the 2-3-1 order can always be derived, but cannot always be spelled-out.

2.5.3 PF inversion approaches

Haegeman and Van Riemsdijk's (1986) theory has no problems deriving the 2-3-1 order, which would therefore require further assumptions.

(34) a. b.



As was mentioned in section 2.4, Salzmann's (2013) approach over-generates in that all orders can in principle be derived. The 2-3-1 order involves string-vacuous cluster formation of V_2 and V_3. This string-vacuous rebracketing is then followed by an inverting cluster formation of V_1 with the [V_2-V_3] complex. Hence, this approach cannot immediately account for the fact that the 2-3-1 order is specific to certain verbs.[19]

2.5.4 Base-generation approaches

Since the 2-3-1 order can be base-generated, there is no obvious reason why this order would not occur with most verb types. A base-generation approach

[19] Salzmann (2013) argues that the 2-3-1 order in Swiss-German is derived by first cliticizing the middle verb to the lowest verb and then inverting this complex with the highest verb:

(i) a. [gang$_1$ [go$_2$ [chauffe$_3$]]] (Swiss-German)
go.FIN go.PTCL.INF buy.INF
→ *go* cliticizes onto the infinitive:

b. [gang$_1$ [go$_2$=chauffe$_3$]] → inversion:
go.FIN go.PTCL.INF=buy.INF

c. [[go$_2$=chauffe$_3$]+gang$_1$]
go.PTCL.INF=buy.INF go.FIN

Salzmann argues that the auxiliary verb *go* is a clitic: it is phonetically reduced and cannot be stranded. Accordingly, one could stipulate a restriction on string-vacuous cluster formation to such cliticization contexts. This assumption would entail that non-cliticized verbs either invert, or do not form a unit that can be dislocated. However, if it were the case that these stipulations rule out the 2-3-1 order, the occurrence of this order in varieties of Dutch is problematic. This order is observed with *gaan* (go) in these varieties, which is not clearly a clitic.

hence requires additional assumptions to account for the rareness of the 2-3-1 order. Particularly interesting is that the 3-1-2 order cannot be base-generated, but is nevertheless very common.

In sum, only Barbiers' (2005; 2008b) feature-based types of approaches provides some explanation for the fact that the 2-3-1 order only occurs with certain verb types.

2.6 Property (iv): *the distribution of the remaining orders depends on the types of verbs involved*

As illustrated in table 2.1 on page 24, the observed orders of verbs in a cluster depends on the types of verbs in the verb cluster. For instance, the 1-2-3 order is much more common when V_3 is an infinitive, while the 3-1-2 order is much more common when V_3 is a participle.

The previous sections have demonstrated that all theories of verb cluster formation can derive the possible orders of verbs in a cluster. This section will demonstrate however, that these theories do not immediately predict why these differences depend on the types of verbs in the cluster.

2.6.1 Syntactic movement approaches from a fixed head-final base order

The verb raising approach to verb cluster variation cannot account for the observed variation depending on verb type. Additional assumptions are required to account for either the fact that a specific verb type has a higher chance to raise, or the fact a specific verb type has a different landing site.

2.6.2 Syntactic movement approaches from a fixed head-initial base order

According to Zwart (1996), participles and infinitives undergo a different type of movement. Firstly, infinitives incorporate in a higher modal, while participles move to a specifier position, and secondly, infinitives sometimes undergo covert movement, while participles always move overtly. Even though this asymmetry correctly accounts for the word order differences, there is no independent reason why participles and infinitives would behave in such a different manner.

Since Barbiers (2008b) suggests that different verb types have different selectional requirements, this theory might predict to find different orders with different verb types. However, the MOD-MOD-INF and the MOD-AUX-PTCP verb clusters involve the same Agree relations: in both clusters the highest two verbs agree with the lowest verb. It is therefore not predicted that these verb clusters would have different order effects, without additional assumptions.

2.6.3 PF inversion approaches

Haegeman and Van Riemsdijk (1986) argue that reanalysis is a lexically conditioned process that occurs with certain lexically defined verbs. This is not very explanatory. Since certain verbs undergo reanalysis more frequently than others, no rules can be formulated that invariably force or disallow inversion between certain specific verb types. Consequently, it is not clear why a specific order is more frequently observed with certain verbs.

Salzmann's (2013) approach is based on language-specific linearization constraints that for instance requires infinitives to follow modals, or participles to precede auxiliaries. This does not explain the variation, but places the source of the variation in PF.

2.6.4 Base-generation approaches

Since Abels' (2011; 2016) base-generation approach can generate the different orders, irrespective of the types of verbs involved, the differences between verb types would have to be placed in the linearization component. Again it is not clear why different verb types are linearized differently.

In short, none of the previous theories can account for the observed differences between verb clusters of different types. The reason for this is that most existing approaches are based on deriving the possible orders, rather than explaining their distributions.

2.7 Property (v): *the different orders are semantically and pragmatically equivalent*

As mentioned in the previous sections, in some varieties, multiple verb orders co-occur. Strikingly, these orders do not lead to meaning differences.[20] This seems to be a property of verb cluster languages in general. According to Wurmbrand (2017), all four orders in (35) are observed in Swiss-German and have the same meaning.

(35) a. das er ... wil chöne vorsinge. (Swiss-German)
that he ... wants$_1$ can$_2$ sing$_3$

b. das er ... wil vorsinge chöne.
that he ... wants$_1$ sing$_3$ can$_2$

[20] In chapter 3 it will be argued that some meaning differences do show up with certain verb orders. A participle only has a passive, verbal interpretation in the v_1-v_2 order, but can additionally have a stative interpretation in the v_2-v_1 order. However, since the participle can also get a passive, verbal interpretation in the v_2-v_1 order, a different order does not necessarily involve a different interpretation.

c. das er ... vorsinge wil chöne.
that he ... sing$_3$ wants$_1$ can$_2$

d. das er ... vorsinge chöne wil.
that he ... sing$_3$ can$_2$ wants$_1$

'...that he wants to be able to sing.'
(Schonenberger 1995:382, as cited by Wurmbrand 2017)

2.7.1 Syntactic movement approaches from a fixed head-final base order

Assuming that all movements are triggered by a meaningful licensing feature, following Chomsky (1993), syntactic head-movement is expected to have a semantic effect.[21] This is then problematic for theories that assume that verb raising is an optional process that derives orders that deviate from the 3-2-1 order, since no meaning differences are observed between these orders. The problem can be solved if one assumes that verbs always raise. Differences between ascending and other orders then lie in the landing site, as was discussed in section 2.3.

2.7.2 Syntactic movement approaches from a fixed head-initial base order

A similar approach is taken by Zwart (1996) who argues that movement by participles to their licensing position always occurs but the landing site can differ. This means that the trigger for the movements would be the same in all verb cluster orders, so it correctly predicts there to be no differences in meaning between the different verb orders. As for infinitives, Zwart argues that these also always move to a licensing position, but this movement can be covert. Therefore, regardless of the spelled-out 1-2 or 2-1 order, this theory does not predict any meaning differences.

Similar to Zwart's account of order differences with infinitives, Barbiers (2008b) argues that verbs always move to the same landing site, but differences show up in the copy that is spelled-out. This theory therefore also correctly predicts the lack of meaning differences.

This issue is slightly more complex in Barbiers (2005), since the movement of VPs is optional. However, since he does not attribute this movement to triggered features, semantic differences are not expected to arise in this approach either.

2.7.3 PF inversion approaches

Seeing that inversion is a mechanism argued to take place at PF, both Haegeman and Van Riemsdijk (1986) and Salzmann (2013) make a prediction similar

[21] See Lechner (2007) (among others) for arguments that at least some head-movements have semantic effects.

to Barbiers (2008b) that there should be no meaning differences between the different verb orders.

2.7.4 Base-generation approaches

Abels (2011, 2016) argues that verb clusters can be derived through base-generation. This accounts for the lack of meaning differences between the possible base-generated orders 1-2-3, 3-1-2, 3-2-1 and 2-3-1. However, the 3-1-2 order is derived via movement of the lowest verb to a position preceding the verb cluster, which is a movement this theory allows. As discussed above, the suggestion that this movement is a type of focus movement has been refuted by Bader and Schmid (2009) who did not find this effect. Consequently, this theory cannot account for the lack of meaning differences between the 3-1-2 order and other orders.

In conclusion, most theories have some way to account for the lack of meaning differences in verb clusters.

2.8 Property (vi): *the word order variation in these languages contrasts with a rigid ordering in the nominal domain*

While there is abundant variation in the word orders of verb clusters within the Dutch language area, the word order in other domains, such as the nominal domain, is very strict: a determiner always precedes an adjective, and both of these types of elements always precede the noun.

2.8.1 Syntactic movement approaches from a fixed head-final base order

If verb clusters are derived through an incorporation of a lower verb in the higher verb, as was suggested by Evers (1975), and if ordering variability is a result of variability in the landing site, the question arises why other incorporated elements do not show the same order differences. For instance, in other incorporation constructions, there is no ordering variability.

(36) a. De prijs-uitreiking; * De uitreiking-prijs
the award-ceremony; the ceremony-award

b. stamp-voeten; * voet-stampen
foot-stamping; stamping-foot

c. ...dat Jan mooi kan piano-spelen; * ...dat Jan mooi
...that Jan beautifully can piano-play; ...that Jan beautifully
kan spelen-piano
can play-piano

2.8.2 Syntactic movement approaches from a fixed head-initial base order

According to Zwart (1996), the variation in verb orders is a result of the variability in licensing positions. The prediction this makes for other elements, such as nouns, is unclear.

The question why this variation is not observed with other projections, such as noun phrases, is discussed by Barbiers (2008b). As mentioned, Barbiers argues that predication relations involve a movement of an argument to the specifier position of the predicate. He then goes on to show why adjectives are always in a fixed position with the noun:

(37) a. de drie rode tulpen
the three red tulips

b. * de drie [$_N$ tulpen] rode [$_{\text{N}}$ ~~tulpen~~]
the three tulips red ~~tulips~~
(Barbiers 2008b:14)

As stated by Barbiers, only projections that do not require an argument themselves, i.e. *saturated* projections, can function as arguments. The projection of the noun is assumed by Barbiers to be saturated by the article. Since the noun still needs to be saturated by an article in (37b), it cannot function as an argument of the adjective.

2.8.3 PF inversion approaches

As discussed previously, Haegeman and Van Riemsdijk (1986) do not explain why verbs can invert. Clearly, the same mechanism does not apply to noun phrases. There is no apparent reason why this inversion mechanism would only affect verbs. In the same manner, in Salzmann (2013), it does not become clear why other elements, such as incorporated nouns, cannot locally dislocate.

2.8.4 Base-generation approaches

Abels' (2011; 2016) base-generation approach is crucially based on the idea that the typologically observed order of elements in the verb phrase is very similar to the observed orders of elements in the noun phrase (Cinque 2005). This approach immediately predicts similar order effects to be observed in the noun phrase. Abels (2011, 2016) bases his idea on work by Abels and Neeleman

(2012). They present a number of assumptions that derive the 14 different orders that are cross-linguistically attested in the noun phrase, while excluding the 10 unattested ones. According to them, cross-linguistic variation arises in the direction of linearization of sister nodes, with the only potential movements being leftward to a c-commanding position. Abels (2011, 2016) demonstrates how the same assumptions can be used to derive the different orders of verbs in a verb cluster. This seems to counter the claim that the type of variation observed with verb clusters is limited to the verbal domain. However, within the Dutch and Frisian varieties, there is no optionality in different orders of elements in the noun phrase. Thus, by relating the hierarchy-order relations in the verb cluster and the noun phrase to each other, this approach raises the question why the verb cluster, but not the noun phrase, exhibits different orders within varieties of Dutch. This question remains unanswered, since Abels' approach is based on accounting for typological variation, rather than the order possibilities in individual languages.

In sum, except for Barbiers (2008b), none of the previous theories have a good explanation for why the abundant variation in verb clusters is not observed in the nominal domain.

2.9 Intermediate conclusions

While all approaches have some mechanism to derive the different word orders, most of the verb cluster properties can only be accounted for by some stipulations. Four main properties remain problematic for almost all approaches:

(i) All varieties of Dutch display various orders across verb types;

(iii) The 2-3-1 order is only attested with certain verb types;

(iv) The distribution of the remaining orders depends on the types of verbs involved;

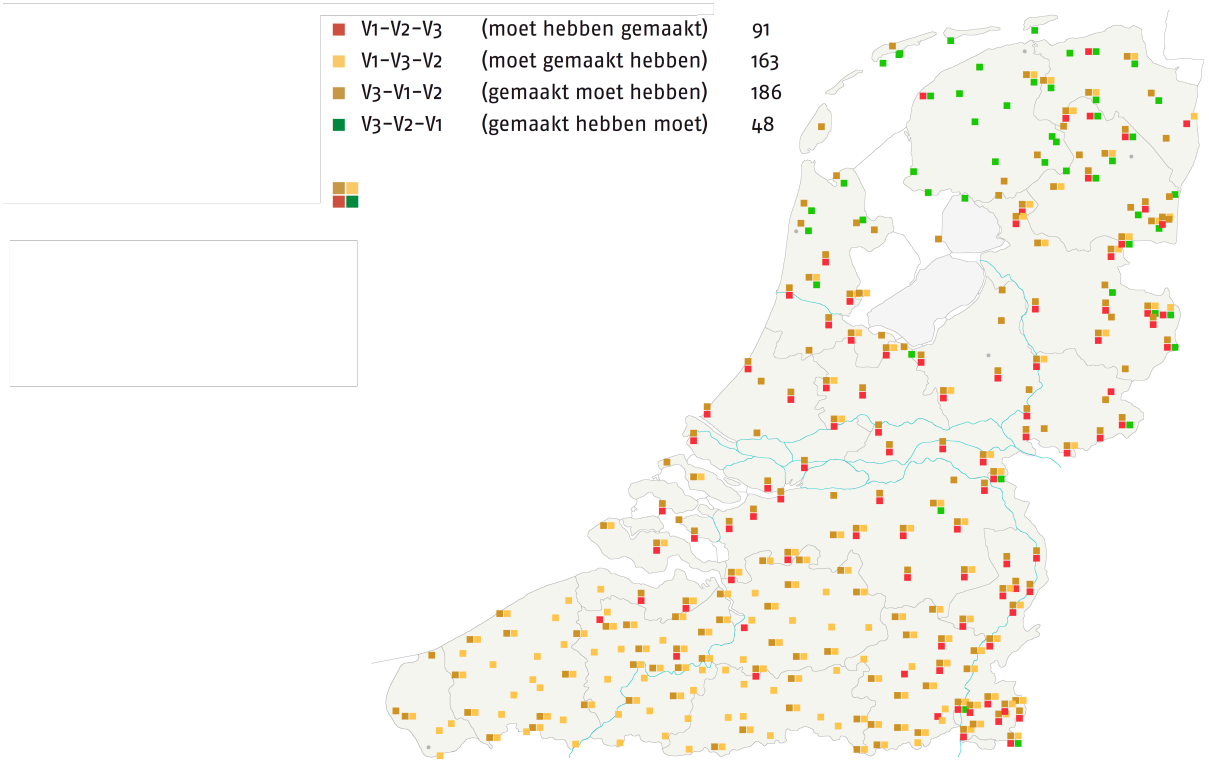
(vi) The word order variation in these languages contrasts with a rigid ordering in the nominal domain.

In fact, only the syntactic movement analysis by Barbiers (2008b) seems to be able to account for the special distribution of the 2-3-1 order and the lack of word order variation in the nominal domain. Still, none of the previous theories could account for the fact that the types of verbs involved have an effect on the distribution of verb orders.

Geographic co-occurrence patterns might help to understand the phenomenon of verb clustering. I argue in chapter 3 that these patterns are not a coincidence, but are the result of similarities in the manner in which different constructions are derived. If this is indeed the case, a theory that aims at explaining the observed variation in verb clusters should take these geographic co-occurence patterns into account.

2.10 Property (vii): *the observed orders of verbs exhibit clear geographic patterns*

The different verb orders occur in clear geographic regions. For instance, the different orders for the verb cluster *moet hebben gemaakt* 'must.FIN have.INF made.PTCP' have a clear geographic distribution: the 1-3-2 order occurs mostly in the south of the language area, the 3-2-1 order occurs mainly in the north of the language area and the 1-2-3 order occurs in the area in between.

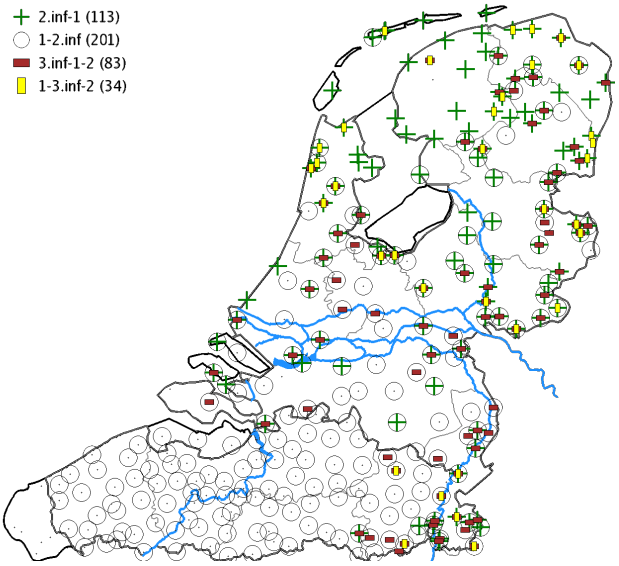


Map 2.2: SAND-II map 17b

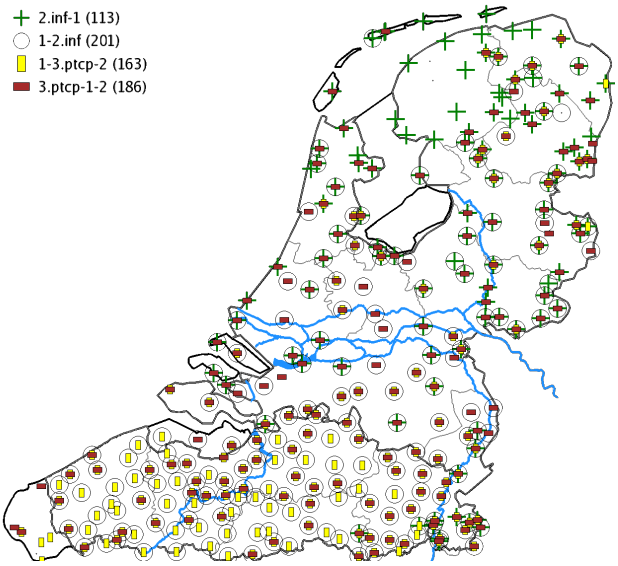
This geographic distribution is not immediately expected if all these possible verb orders are available to everyone. The variation is not free, but depends on the region. This becomes even more apparent in comparing the geographic patterns of different constructions, which show clear geographic co-occurrence patterns. For instance, most of the variation in the order of three-verb clusters is observed in areas that allow the 1-2.INF order. This and other especially striking patterns are mapped and discussed in this section. I demonstrate that the different types of analyses of verb clusters in fact cannot account for these patterns.

2.10.1 The 1-3-2 and the 3-1-2 orders occur in ascending grammars

As discussed in the previous section, there is an area in the north where only descending (V_3-)V_2-V_1 orders are observed. Both maps 2.3 and 2.4 show the locations where the V_1-V_2 and V_2-V_1 orders occur when 2 is an infinitival verb. Map 2.3 additionally depicts the locations where the 3-1-2 and the 1-3-2 orders occur when 3 is an infinitive, while map 2.4 additionally depicts the locations where the 3-1-2 and the 1-3-2 orders occur when 3 is a participle verb. These maps demonstrate that the 1-3-2 and the 3-1-2 orders occur in the regions where the head-initial V_1-$V_{2.INF}$ order is observed.



Map 2.3: 1-3.INF-2 & 3.INF-1-2



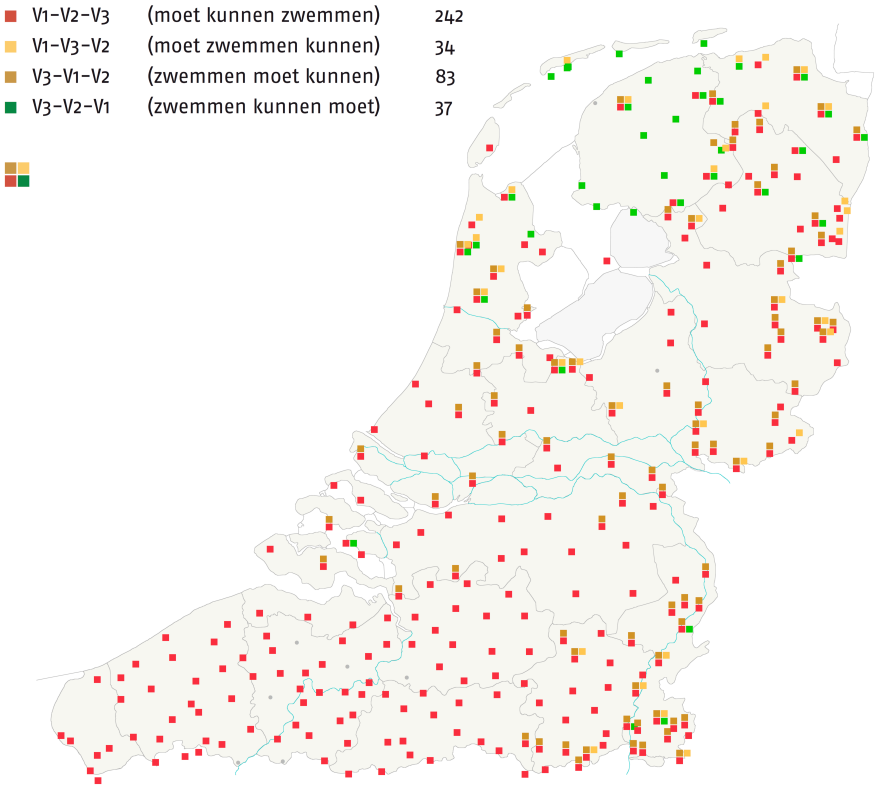
Map 2.4: 1-3.PTCP-2 & 3.PTCP-1-2

Assuming a fixed head-final base-generated order, the 1-2, 1-3-2 and the 3-1-2 orders all involve some type of movement. Therefore, all head-final approaches (Evers 1975; Haegeman and Van Riemsdijk 1986, among others), could account for this co-occurrence pattern by arguing that northern Dutch varieties for some reason do not allow any (overt) procedures that deviate from an underlying 2-1 order. As for approaches that assume an underlying head-initial order (Zwart 1996; Barbiers 2008b; Salzmann 2013, among others), the opposite reasoning could apply: perhaps languages such as Frisian only allow orders in which all possible movements or dislocations have overtly taken place. In base-generation approaches, one might assume that Frisian requires a strict linearization direction.

To sum up, in all these approaches it is unclear what makes some varieties special.

2.10.2 The 1-3.INF-2 occurs only in border varieties as a secondary order

The following map demonstrates that there are many varieties of Dutch in which only the 1-2-3 and the 3-2-1 orders are observed. However, there are no varieties of Dutch where the 3.INF-1-2 or the 1-3.INF-2 order is observed as the only possible order. These orders only seem to occur as secondary orders. In fact, the 1-3.INF-2 order only seems to occur in varieties that border on German and Frisian varieties.

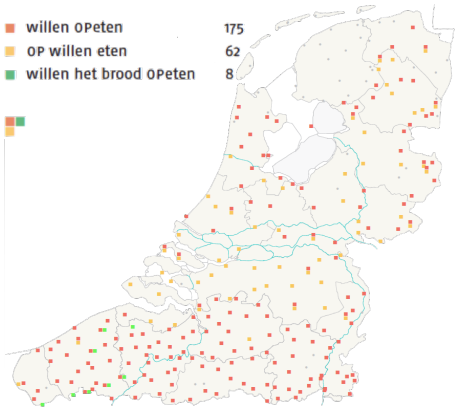


Map 2.5: SAND-II map 17a

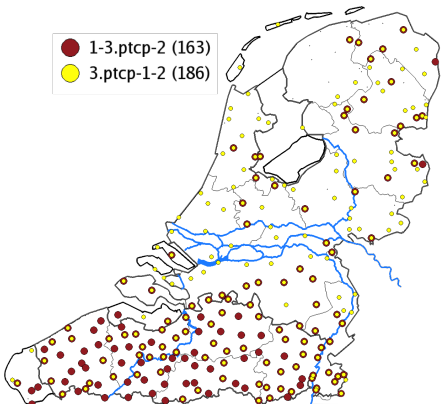
Previous theories of verb clusters have nothing to say about the special nature of the 1-3-2 order with respect to the 3-1-2 and the 1-2-3 orders. Especially if one considers the fact that the 1-3-2 order is very common when V_3 is a participle.

2.10.3 The 1-3.PTCP-2 order, particle incorporation and verb cluster interruption

Zooming in on the occurrences of the 1-3.PTCP-2 order, we observe a clear similarity in the geographic distribution of this order with particle incorporation: both the 1-3.PTCP-2 order and particle incorporation occur most frequently in the south of the language area.

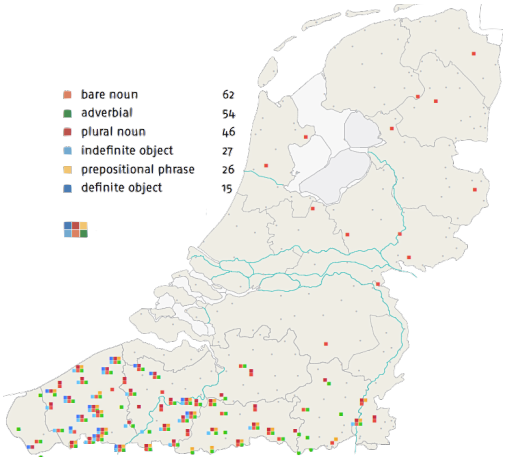


Map 2.6: particle incorporation SAND-II, map 31b



Map 2.7: 1-3.PTCP-2 and 3.PTCP-1-2

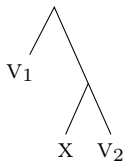
Considering this finding, it might be relevant to discuss another property of verb clusters that occurs in the southern varieties: *verb cluster interruption*, the occurrence of non-verbal material in the verb cluster.



Map 2.8: verb cluster interruption, SAND-II, map 30b

Crucially, it will be argued in chapter 3 that the participle in the 1-3.PTCP-2 order only appears to be a verb, but is actually non-verbal (see also Den Besten and Broekhuis 1989; Evers 2003, 2008; Barbiers and Bennis 2010). Following this idea, the three different constructions discussed in this section – the 1-3.PTCP-2 order, particle incorporation and verb cluster interruption – are all of the same structural form:

(38)



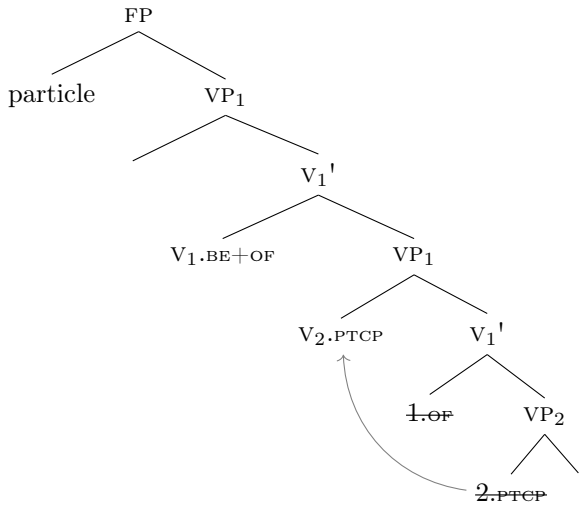
The fact that these three types of constructions then have the same geographic distribution, is no longer surprising, under any type of approach to verb cluster formation.

Note that this analysis is crucially different from Zwart's (1996) proposal, where it is explicitly stated that the participle is licensed in a different position than particles and small clause predicates. Since the specifier position of a verb is used for the licensing of embedded verbs and is hence occupied, a predicate has to be licensed in the specifier position of a different (functional) head. In such a theory it is not immediately clear why particle incorporation patterns like the 1-3-2 order.

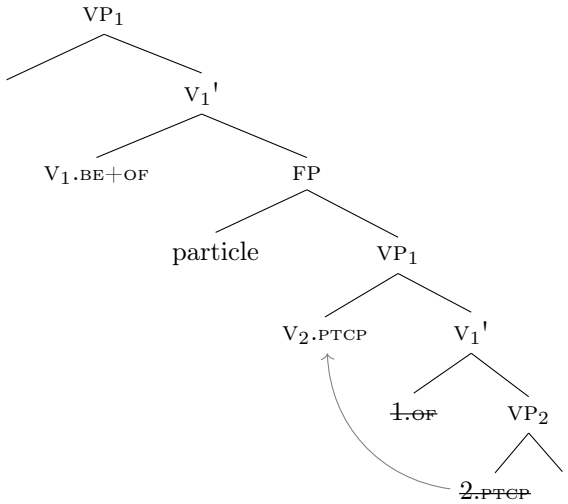
2.10.4 Verb cluster interruption

The acceptability of non-verbal material inside the verb cluster is a West-Flemish phenomenon. Its acceptability decreases geographically in moving from West-Flanders to the north. Interestingly, speakers of West-Flemish allow both interrupted and non-interrupted orders. This is problematic for most movement theories. However, Zwart's (1996) account seems to be able to deal with this issue. Since licensing can be transferred in this theory, it allows for multiple licensing positions. For instance, in order to account for the different positions of particles in the verb cluster, Zwart argues that when the participle moves to one of the auxiliary positions, the capacity to project a phrase that can license the particle is transferred to the auxiliary. This then allows for the particle to be licensed in any position above the auxiliary. This is illustrated in (39).

(39) a.



b.



According to Zwart, the overt position of the verb that originally licenses the particle hence determines the eventual range of licensing positions. This seems to be a speculation that is not motivated beyond the fact that it accounts for the observed word order patterns. This approach might be extended to other phrases, such as objects. Additional factors (related to the size of the complement) might then affect which of these two positions is used.

As for PF inversion approaches, one would need to assume that the properties of the elements involved can influence the level at which inversion occurs. It is unclear why this would be the case.

In chapter 5 of this dissertation, I further discuss the properties of cluster interruption and the problems they pose for previous theories of cluster formation.

The previous section has demonstrated that a number of interesting patterns emerge when one considers the geographic distribution of verb cluster orders. None of the previous theories has a satisfying account for the co-occurrence patterns. It will be argued in chapter 3 that these patterns are not coincidental, but are a direct result of the manner in which verb clusters are derived.

2.11 Conclusion

This chapter has discussed a number of properties that are special to verb clusters. The most remarkable patterns that still require an explanation are listed here.

- All varieties of Dutch display various orders across verb types, except for many Frisian varieties, where only descending orders are observed.
- The distribution of verb cluster orders depends on the types of verbs involved.
- The word order variation in these languages contrasts with a rigid ordering in the nominal domain.
- The 1-3.PTCP-2 order, particle incorporation and verb cluster interruption show similar geographic distributions.
- The 1-3.INF-2 occurs only in border varieties.
- The acceptability of non-verbal material inside the verb cluster is a West-Flemish phenomenon. Its acceptability decreases geographically in moving from West-Flanders to the north.

On the basis of the results in this chapter, one can conclude that many of the existing accounts of verb clusters are not much more than descriptive rule systems that are not deeply motivated. As stated by Wurmbrand (2017:93): "[M]any interesting accounts have been suggested addressing the question of *how* verb clusters are derived. But what still appears to be an open question is the question of *why* the elements of a verb cluster are inverted in certain languages and constructions."

In fact, theories that are aimed at deriving all observed orders have difficulties explaining their distributions. For instance, if the 2-1 and the 3-2-1 orders are derived through a similar type of mechanism, why is the 2-1 order abundant in all varieties of Dutch and Frisian, while the 3-2-1 is limited to Frisian varieties?

The approach that will be laid out in the next chapter can account for a large part of the properties of verb clusters. It will be argued that geographic co-occurrence patterns are not a socio-linguistic coincidence, but can be given a deeper explanation.

CHAPTER 3

Merging verb cluster variation[22,23]

3.1 Introduction

The previous chapter discussed a number of previous approaches to verb clusters. The approach taken here differs from most of the previous literature in at least three respects.

- First of all, this analysis takes dialect geography as a starting point. This chapter will concentrate on the variation observed at different locations to see if there are particular co-occurrence patterns that might help understand the phenomenon of verb clustering. This part of the chapter builds on Barbiers and Bennis (2010).
- Secondly, this chapter presents an analysis without movement operations, such as verb (projection) raising. The structure of verb clusters are analyzed in terms of three properties. (i) Verb clusters represent base-generated (i.e. externally merged) orders. (ii) The linearization within the

[22] This chapter is an adapted version of an article by Barbiers, Bennis, and Dros-Hendriks (forthcoming)

[23] Versions of this chapter have been presented at NWASV2 (Ghent, May 2016), Grote Taaldag (Utrecht, February 2016), Linguistic Variation in the Interaction between Internal and External Syntax (Utrecht, February 2016), Edisyn (Zürich, June 2015) and PLC (Philadelphia, March 2015), Penn Common Ground (Philadelphia, March 2015), MIT syntax square (Cambridge, February 2015), Yale Lunch talks (New Haven, February 2015), UConn Ling Lunch (Connecticut, February 2015), NYU Brown Bag (January 2015), Meertens Instituut T-lezing (Amsterdam, December 2014) and Comparative Syntax (Leiden, December 2014). I would like to thank those audiences for their helpful comments and questions. Furthermore, I am grateful to the reviewers of Linguistic Variation.

VP is unidirectional. As a consequence, only the 1-2-3 and 3-2-1 orders involve three-verb clusters. (iii) The categorial status of the elements involved in the cluster can vary. More specifically: verbs can be reanalyzed as adjectives or nouns. It will be argued that this is the case in the 1-3-2, 3-1-2 and 2-3-1 orders.

- Last but not least, section 3.7 will demonstrate that the intuitions speakers have of the various orders in verbal clusters, even with respect to cluster orders they don't produce themselves, correlate with the patterns observed within the Dutch speaking area. It will be argued that this must be due to their syntactic knowledge and cannot be due to familiarity with the various orders.

3.2 Verb cluster formation

Here, it is assumed that a verbal cluster is built through the operation of Merge. In a two-verb cluster, the projection of the main verb [VP_2] is merged with an auxiliary verb [V_1], thereby creating a verbal cluster [VP_1]. However, Merge is not an operation that forces the auxiliary to be ordered with respect to the main verb. It thus allows both orders [$_{VP_1}$ V_1 VP_2] and [$_{VP_1}$ VP_2 V_1] to be formed. In order to account for the word order variation, one has to find subsidiary principles that determine the order within the verb cluster and that allow variation in word order to occur. In order to be able to determine what the properties of such principles are, the formation of more complex verb clusters should be considered.

Before going into a more detailed study of the data, this base-generation approach will briefly be compared with previous approaches from a more theoretical perspective. As discussed in chapter 2, there are lots of proposals around. Four major types of proposals were distinguished: a movement of the verb (projection) to the right or to the left (VP-intraposition), PF-movement approaches, and base-generation.

First, consider previous base-generation approaches, it was illustrated in chapter 2 that many of those analyses require some sort of mechanism to account for the observed 3-1-2 order, such as movement of V_3. It will be argued in this chapter that only the 1-2-3 and the 3-2-1 orders involve base-generated three-verb clusters. The 1-3-2, 3-1-2 and 2-3-1 orders involve a reanalysis of V_3 or [V_2-V_3] as nominal or adjectival. As a consequence, this approach does not involve any movements that are specific to verb clusters. A further advantage of the approach taken here comes from the 1-3-2 order. By analyzing 3 as non-verbal, it becomes possible to account for the fact that this order is particularly frequent in those areas where non-verbal material can interrupt the verb cluster. This geographic pattern will be the topic of section 3.6.

Another base-generation approach to verb clusters that has not been discussed yet, is presented by Williams (2003) and Bader and Schmid (2009). In

their approach, variation is found in the level and direction of selectional restrictions. For example, as Bader and Schmid demonstrate, the 3-1-2 order in *lesen hat wollen* 'read had want' can be derived by assuming that V_1, a tense auxiliary, selects V_2 to its right, while V_2, a modal auxiliary, selects V_3 to the left. The level of the selectional restrictions of V_2 is the node dominating V_1 and V_2. It is this node that selects V_3 to its left. While this approach hence does not require any unmotivated movements, it can also not account for the geographic co-occurrence patterns in the 1-3-2 order and interrupted verb clusters. Differently from Williams (2003) and Bader and Schmid (2009), I assume that the direction of selection does not differ for each verb type. Rather, it will be argued that the direction of linearization is uniform in the verbal domain.

The base-generation approach taken here is different from the movement approaches in various ways. First of all, the current approach does not require specific movement rules for the formation of verb clusters. In this perspective, movement is not involved in the building of verb clusters. There is no rule of Verb Raising in the sense of Evers (1975), or VP-intraposition in an antisymmetric system, or a rule of inversion that takes place at PF. The relevant structures are generated by the (successive) application of Merge. A recurrent problem for the syntactic movement approaches is the lack of motivation for these movements (cf. a.o. Chomsky (2001)).[24] There appear to be no triggers for movement, neither morphosyntactically nor semantically. Different orders in a cluster vary in the order of verbs only, not in the form or the interpretation of the cluster. There is no effect on pragmatics or scope either. Given that a minimalist approach to movement presupposes a trigger for the movement, often represented as feature checking, this causes a theoretical problem.[25]

A further argument for an account in which the verb cluster is base-generated through Merge is the fact that the whole cluster can be the object of nominalization, as in (40).

(40) het moeten$_1$ kunnen$_2$ eten$_3$ van een koekje
the must can eat of a cookie
'the obligation to be able to eat a cookie'

In a movement approach, the internal structure of a complex nominalization requires that these complex nouns are derived from syntactically derived clusters after movement. In this approach, the generated verb projection is only recategorized as a noun, as is the usual approach to the derivation of nominalizations.

[24] Exceptions are Barbiers (2005) and Barbiers (2008b), as was discussed in chapter 2. Both these papers are based on the set of SAND data also used for the current paper.

[25] Another point is the phenomenon of clause union, as first discussed in Evers (1975), currently known as restructuring. Evers argues that sentences with verb clusters behave as single clausal domains, rather than as a combination of several domains. According to him, there must be a rule like *Pruning*, that destroys the base-generated complex structure after moving the head (V) out of the clause by Verb Raising (see footnote 8 on page 14). In the Merge analysis, there is no complexity to begin with.

To conclude, there are no syntactic, semantic, morphological or pragmatic reasons to consider a verb cluster to be the result of a complex structure that is affected by V(P)-movement, or inversion. The verb cluster is the consequence of merging a verb with a verbal projection. As the verb cluster constitutes a complex verb, arguments of lower verbs can be selected by the entire verb cluster, see section 3.5.2.

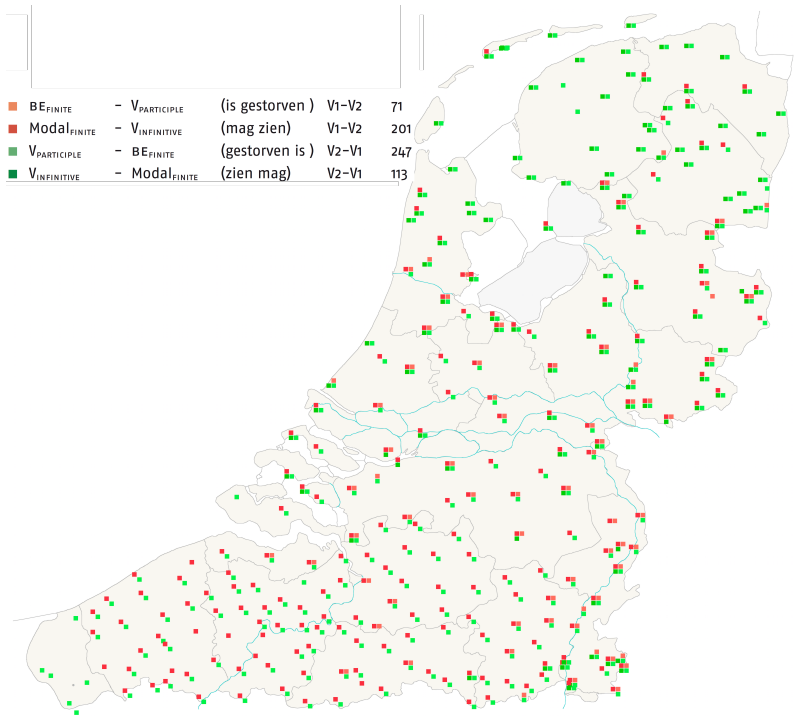
Two-verb clusters thus involve the binary merge of a verb with a verbal projection in narrow syntax. The result of this operation can be merged with another verb to construct a three-verb cluster. This operation does not force any specific ordering of the elements involved. The result of this process is linearized post-syntactically. it will be argued that restrictions on linearization prohibit the occurrence of certain verb orders. More specifically, it will be argued that linearization is unidirectional within a particular domain. As a consequence, only the 1-2-3 and 3-2-1 orders involve three-verb clusters.

3.3 Two-verb clusters

Let's turn to the variation in word order observed in verb clusters in Dutch. As chapter 2 discussed, even in the case of clusters in which the main verb is accompanied by one auxiliary verb, geographical differences are observed. As was indicated on Map 2.1 (repeated here), the main verb may either precede or follow the auxiliary, but there are clear patterns in distribution.

(41) a. ...ik vind dat jij het ook niet *mag zien* / *zien mag*.
...I find that you it also not may see / see may
'...I think that you should not see it either.'

b. Ze weet niet dat Marie gisteren *gestorven is* / *is gestorven*.
She knows not that Marie yesterday died is / is dies
'She does not know that Marie died yesterday.'



Map 2.1 (repeated): SAND-II map 16

In the northern part of the country, the order Main Verb - Auxiliary, or rather V_2-V_1, is predominant. In the southern part, a distinction is observed, which is related to the nature of V_1. If V_1 is a perfect auxiliary verb and the main verb a participle, the order is V_2-V_1, but if V_1 is a modal, the order is V_1-V_2. In the remainder of the language area the situation is somewhat unclear. Both geography and type of the auxiliary thus determine the distribution of word order.

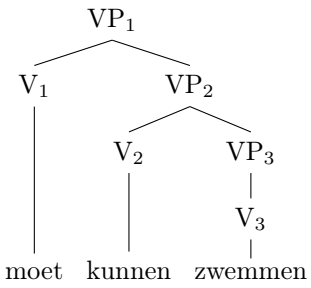
These orders can easily be derived by Merge, assuming that Merge does not imply a specific order within the complex constituent that is created. However, the different order possibilities across varieties of Dutch requires independent argumentation. In order to do so, more complex verb clusters need to be considered. There are SAND-data (SAND-II, Barbiers et al. 2008, chapter 1) for verb clusters with three verbs. These will be discussed in the next section.

3.4 Three-verb clusters

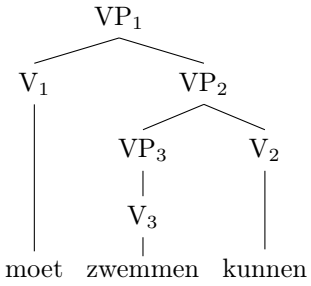
If Merge is taken to be the verb cluster building machine, the prediction arises for three-verb clusters that only four out of the logically possible six orderings can be generated. Let's look at the different possibilities. At first, the projection of the main verb [VP_3] is merged with the auxiliary verb that directly dominates

the main verb [V$_2$], either a modal or a perfect auxiliary. That is basically the situation as was established for verb clusters with two verbs. The [$_{VP_2}$ V$_2$ VP$_3$] and [$_{VP_2}$ VP$_3$ V$_2$] can be built. If one now merges another auxiliary verb, the highest one [V$_1$] – an auxiliary that selects the already built cluster –, four possible orders arise: [$_{VP_1}$ V$_1$ [$_{VP_2}$ V$_2$ VP$_3$]] - [$_{VP_1}$ [$_{VP_2}$ V$_2$ VP$_3$] V$_1$] and [$_{VP_1}$ V$_1$ [$_{VP_2}$ VP$_3$ V$_2$]] - [$_{VP_1}$ [$_{VP_2}$ VP$_3$ V$_2$] V$_1$]. In structure:

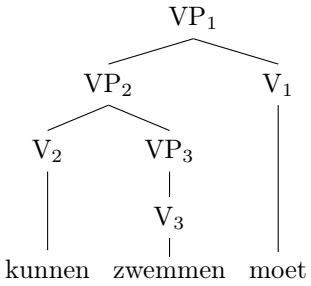
(42) a. = 1-2-3



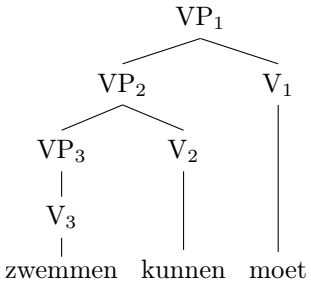
b. = 1-3-2



c. = 2-3-1



d. = 3-2-1



Given common assumptions about the operation of Merge, such as binarity, the

orders V_2-V_1-V_3 and V_3-V_1-V_2 cannot be generated through Merge. A structure in which V_1 breaks up the cluster $[_{VP_2}\ V_2\text{-}V_3]$ or $[_{VP_2}\ V_3\text{-}V_2]$ that was built in the first Merge operation cannot be generated. This leads to the prediction in (43).

(43) In three-verb clusters the orders V_2-V_1-V_3 and V_3-V_1-V_2 are impossible.

Let's now look at the empirical facts of verb clusters with three verbs in varieties of Dutch. Chapter 2 already discussed the geographic distribution of the various verb clusters. Here, these distributions will be discussed in more detail.

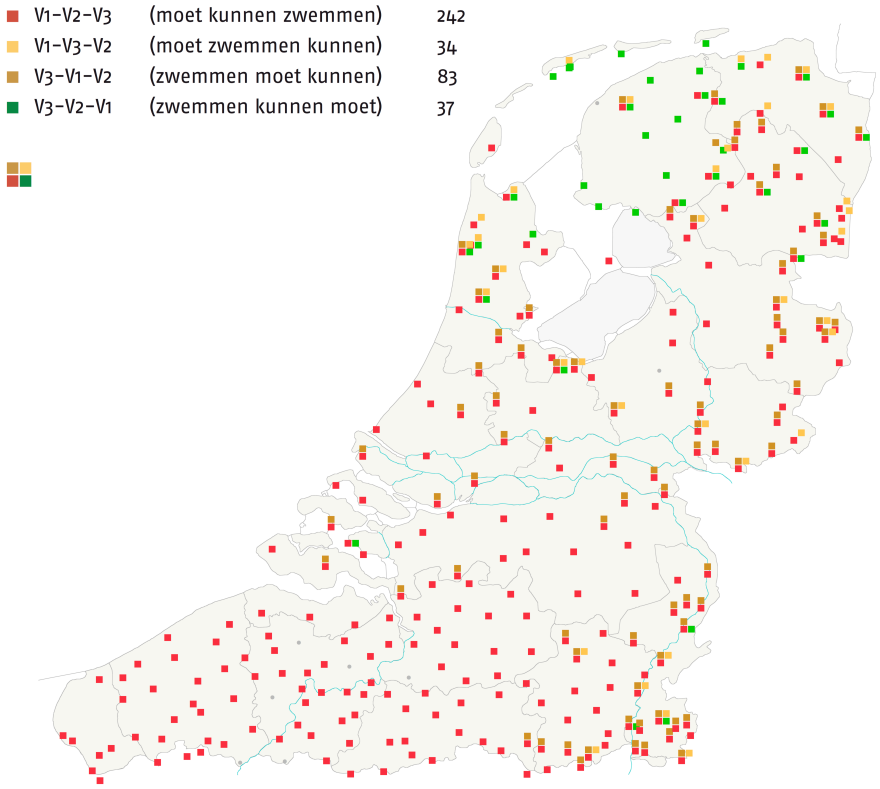
3.4.1 Clusters with two modal auxiliaries

The SAND-atlas contains a sentence with two modals and a main verb in a subordinate clause.

(44) Ik vind dat iedereen *moet*$_1$ *kunnen*$_2$ *zwemmen*$_3$.
I find that everyone must can swim
'I think that everybody should be able to swim.'

The geographical distribution of the orders that were found in the verbal cluster for this sentence were depicted on map 2.5 (repeated below).
The results are given in (45).

(45)
i. V_2-V_1-V_3 is absent;
ii. V_2-V_3-V_1 is absent as well;
iii. V_1-V_2-V_3 is found in the whole language area with the exclusion of Friesland;
iv. V_3-V_2-V_1 is typical for the northern part of the language area and hardly occurs anywhere else;
v. V_3-V_1-V_2 is found throughout the Netherlands part of the language area, but never as the only order that is found in a particular location, almost always as a variant of the much more frequent V_1-V_2-V_3 order. One might call V_3-V_1-V_2 a secondary order;
vi. V_1-V_3-V_2 is the least frequent order that is found mostly along the eastern border. It is never found as the only available order. Most often it occurs in combination with both V_1-V_2-V_3 and V_3-V_1-V_2. One might call this a secondary order as well;
vii. There are many varieties that have 2, 3 and even 4 orders for this type of three-verb cluster.



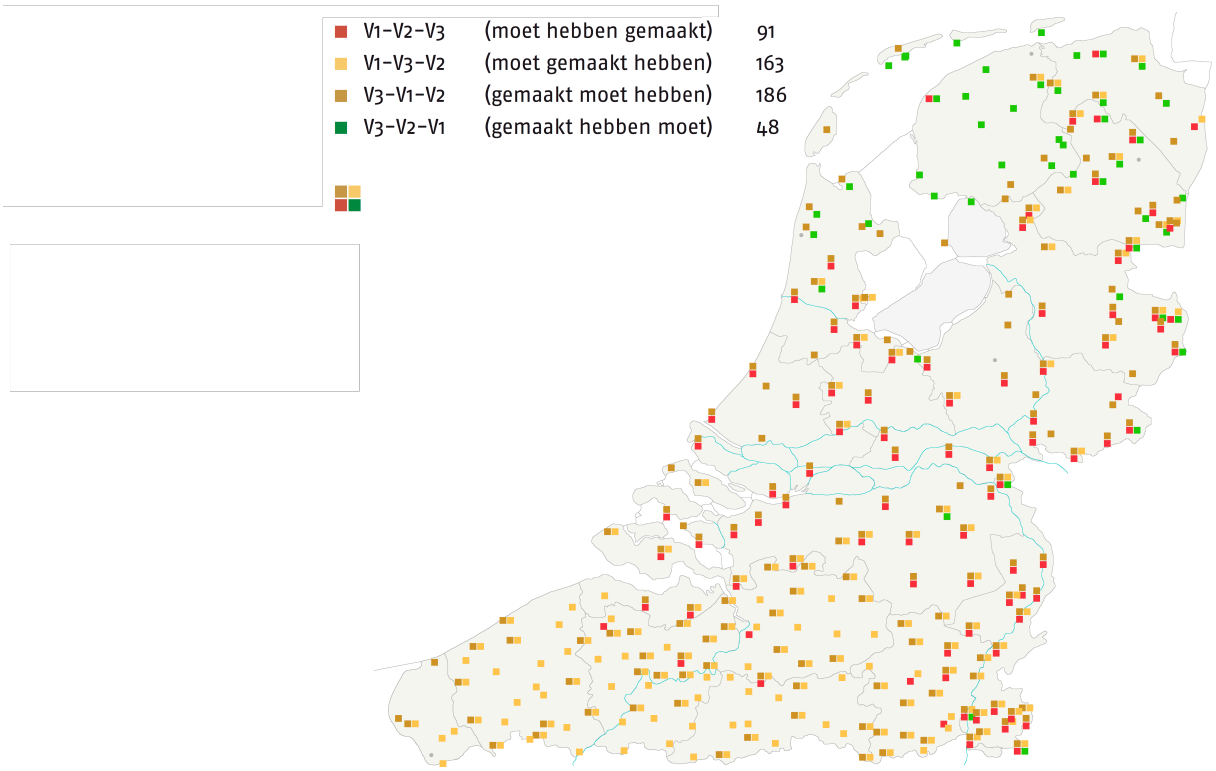
Map 2.5 (repeated): SAND-II map 17a

3.4.2 Clusters with a modal auxiliary and a perfect auxiliary

The sentence with a modal and a perfect auxiliary used as a test sentence in the SAND-project is given in (46).

(46) Ik vind dat Jan de wagen voor drie uur *moet*$_1$ *hebben*$_2$ *gemaakt*$_3$.
I find that Jan the car before three hour must have made
'I think that John must have repaired the car before three o'clock.'

The distribution of the orders in the verb cluster in (46) is given on map 2.2.



Map 2.2 (repeated): SAND-II map 17b

The distribution of verbs within the cluster with a modal verb that selects a perfect auxiliary and a main verb shows the properties in (47).

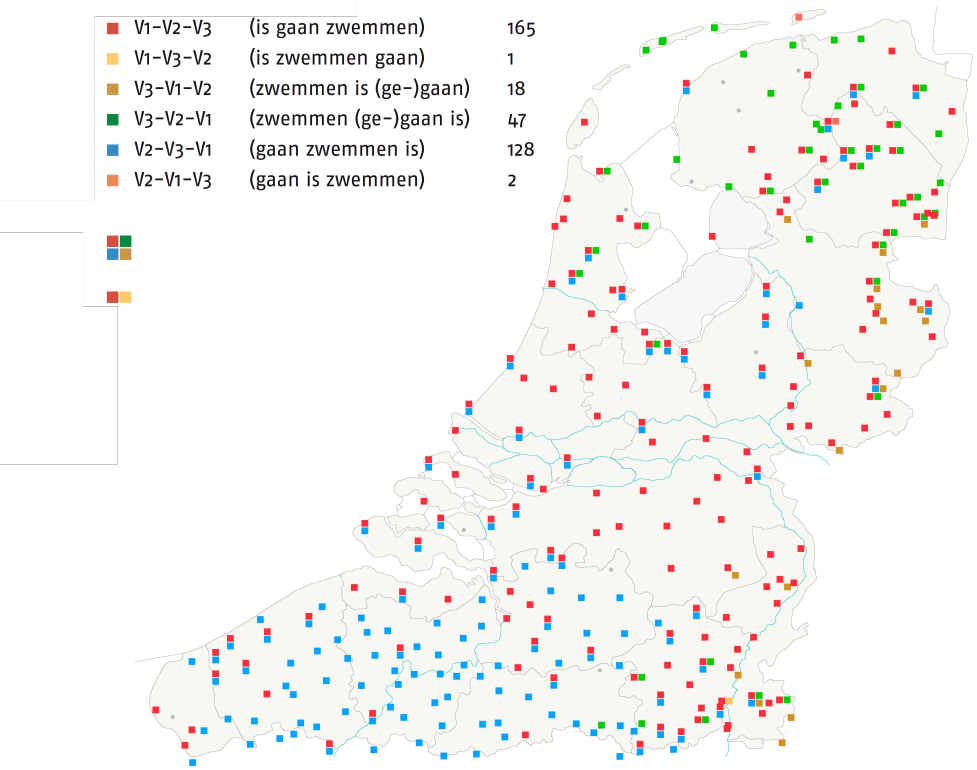
(47)
i. V_2-V_1-V_3 is absent;
ii. V_2-V_3-V_1 is absent as well;
iii. V_1-V_3-V_2 is the dominant order in the Belgian part of the language area;
iv. V_3-V_2-V_1 is the typical order in the northern part of the language area;
v. V_1-V_2-V_3 is restricted to the Netherlands part of the language area. It is never the only order in a particular location;
vi. V_3-V_1-V_2 is found in the whole language area except Friesland. It is the most frequent order and often occurs as the only order in specific varieties.

3.4.3 Clusters with a perfect auxiliary and an aspectual auxiliary

Section 3.4.2 presented the distribution of a cluster in which the modal verb selects a perfect auxiliary. Here the order is reversed, the perfect auxiliary selects a modal/aspectual auxiliary *gaan* 'go'. In the SAND-project, the sentence in (48) was used as a test sentence for this type of construction.[26]

(48) Ik weet dat hij is_1 $gaan_2$ $zwemmen_3$.
I know that he is go swim
'I know that he went swimming.'

The distribution of the orders in the verb cluster in (48) is given on map 3.1.



Map 3.1: SAND-II map 18a

The distribution of verbs within the cluster that consist out of a perfect auxiliary selecting an aspectual auxiliary and a main verb shows the properties in (49).

[26] As is well known, in this type of construction, Dutch has the infinitive *gaan* 'go' instead of the participle *gegaan* 'went', the so-called 'Infinitivus-Pro-Participio' effect, see section 3.5.3 for discussion.

(49) i. V_2-V_1-V_3 is absent;[27]
ii. V_3-V_1-V_2 occurs in 18 locations in the eastern part of the language area.[28]
iii. V_1-V_3-V_2 is absent as well;[29]
iv. V_1-V_2-V_3 is the most frequent order, in particular in the Netherlands part of the language area;
v. V_2-V_3-V_1 is an order that is found in the Belgian part of the language area in particular;
vi. V_3-V_2-V_1 is the dominant order in the northern part of the language area.

3.4.4 A comparison of the three types of 3-verb clusters

There are several conclusions that can be drawn from a comparison of the data in sections 3.4.1-3.4.3:

(50) i. V_2-V_1-V_3 does not occur;[30]
ii. V_1-V_2-V_3 occurs frequently in all three constructions, especially in the Netherlands area;
iii. V_3-V_2-V_1 is basically confined to the northern part of the language area. In that area it occurs in all three constructions;
iv. V_2-V_3-V_1 only appears in ASP_2-V_3-AUX_1 (section 3.4.3). It is excluded in the other two;
v. V_1-V_3-V_2 is frequent in MOD_1-V_3-AUX_2 (section 3.4.2), infrequent in MOD_1-V_3-MOD_2 (section 3.4.1), and absent in AUX_1-V_3-ASP_2 (section 3.4.3);
vi. V_3-V_1-V_2 is frequent inV_3-MOD_1-AUX_2 (section 3.4.2), occurs regularly in V_3-MOD_1-MOD_2 (section 3.4.1), and sporadically in V_3-AUX_1-ASP_2 (section 3.4.3).

3.5 The analysis of the order in the verb cluster

Below, an analysis will be presented of the empirical generalizations outlined above. It will be argued that these generalizations follow from properties of Merge in combination with parameters related to linearization, the categorial status of participles, and the categorial status of infinitives.

[27] As discussed in footnote 16 on page 23, the two occurrences on map 3.1 are interpreted as noise.
[28] Section 3.5.2 will come back to these occurrences.
[29] The single occurrence on map 3.1 is taken to be noise as well.
[30] As discussed in chapter 2, Salzmann (2013) discusses some instances of this order in Zürich German, but it is restricted to specific classes of verbs, namely perception verbs, benefactives and causatives. This suggests that these involve a different construction. These verbs were not tested in the SAND project, so this issue will not be discussed any further here.

3.5.1 The order 2-1-3 does not exist (50i)

The fact that the order V_2-V_1-V_3 does not occur in any of the constructions discussed above can be explained by the fact that this order cannot be derived, as was discussed in chapter 2. The fact that this order is impossible has been observed in the literature (Zwart 1996, a.o.). As discussed in section 2.4, most previous accounts of verb clusters are able to account for this.

3.5.2 The order 3-1-2 does not exist (50vi)

The current proposal excludes the order V_3-V_1-V_2. The reason that this order is impossible is similar to the exclusion of V_2-V_1-V_3: if one derives cluster orders through Merge, V_2 and V_3 have to be adjacent. The V-raising analysis predicts that this order exists if V_2 can move to V_1 without moving V_3. This is not an instance of a minimality violation. In the other approach, V_3-V_1-V_2 can be derived simply by moving VP_3 across V_2 and V_1.

Section 3.4 illustrated that the order V_3-V_1-V_2 indeed does occur in the three constructions discussed above, and quite frequently in two of these. This seems to be a serious problem. Either the base-generation approach adopted here needs to be abandoned, or these counterexamples need an explanation. It will be shown in this section that indeed the order V_3-V_1-V_2 does not exist and that apparent counterexamples should be analyzed as instances of different structures.

The order V_3-V_1-V_2 frequently occurs in the construction in which the main verb is a participle (section 3.4.2). With the exception of the northern provinces, this order can be found in the whole language area. It is well known that participles are ambiguous with respect to their categorial status. They show up in verbal or adjectival contexts. Participles appear in attributive position in noun phrases, in contrast to infinitival verbs. The noun phrase *de verslagen.*PTCP *vijand* 'the beaten enemy' is perfectly fine, but the noun phrase *de verslaan.*INF *vijand* 'the beat enemy' is ungrammatical.[31] In some cases there is an interpretative difference between adjectival and verbal participles (a.o. Kraak and Klooster 1968:149-159). A participle such as *geopend* can be interpreted as 'open' or 'has been opened'. In a verb cluster as in (51a, [V_2-V_1]), the participle indeed allows both meanings of *geopend*. However, in the other order (51b, [V_1-V_2]) the participle can only be interpreted as verbal, with the interpretation 'has been opened'.

[31] Similarly, participles do appear in adverbial position, as in *de vijand zat verslagen op de grond* 'the enemy sat beaten on the ground', but infinitives do not. As opposed to bare infinitives, *to*-infinitives do occur in attributive positions in Dutch, as in *de te bellen kandidaten* 'lit. the to call candidates, the candidates that need to/can be called' showing that the presence of the infinitival marker *te* 'to' may correspond to a categorial difference (cf. Van Riemsdijk 1982; Bennis 1990).

(51) a. Hij zag dat de deur *geopend*$_2$ *is*$_1$.
He saw that the door opened is
'He saw that the door has been opened / is open.'

b. Hij zag dat de deur *is*$_1$ *geopend*$_2$.
'He saw that the door has been opened / *is open.'

c. de geopende deur
'the open door / the door that has been opened'

Participles in attributive position within nominal phrases allow both interpretations, as is demonstrated in (51c). Apparently an adjectival position of the participle allows a verbal, passive interpretation ('has been opened') and an adjectival, stative ('open') interpretation.[32] The fact that only the passive interpretation is available in (51b) can be accounted for by assuming that the participle in (51b) is verbal rather than adjectival, thereby excluding the stative interpretation ('open'). Given that both interpretations are available in (51a) one can conclude that the participle in cluster-initial position can be adjectival or verbal, just as in (51c). The difference in interpretation between (51a) and (51b) is thus related to a categorial difference. In (51a) the participle is or may be adjectival, whereas it has to be verbal in (51b). This is supported by restrictions on modification, e.g. the durative adverbial *de hele dag* 'the whole day' is possible with the adjectival variant of (51a) but not easily with the verbal variant in (15b).[33]

The adjectival properties of participles have also been observed for present participles by Bennis and Wehrmann (1990) and for past participles by Evers (2003); Koeneman et al. (2011) and others. Similarly to this proposal, Koeneman et al. (2011) argue that participles can be adjectival. They demonstrate that the participle *gestolen* 'stolen' in so-called *perfect doubling* constructions has to precede the other verbs, indicating that this participle has to be adjectival in such constructions.

(52) a. ...dat ik zijn fiets gestolen$_{3.\text{PCP}}$ gehad.$_{2\text{PCP}}$ heb$_1$. (South-
...that I his bike stolen had have
Eastern Dutch)

b. ...dat ik zijn fiets gestolen$_{3.\text{PCP}}$ heb$_1$ gehad$_{2.\text{PCP}}$.
...that I his bike stolen have had
'that I had stolen his bike.'

c. * ...dat ik zijn fiets heb$_1$ gehad$_{2.\text{PCP}}$ gestolen$_{3.\text{PCP}}$.
...that I his bike have had stolen

Koeneman et al. adopt the idea that participles can become adjectival through merger with an abstract adjectival head (cf. Lieber (1980); Bresnan (1982);

[32] This stative interpretation is known in the literature as a target state. Cf. Koeneman, Lekakou, and Barbiers 2011 for recent discussion, diagnostics and references.

[33] More precisely, there is coercion such that *de hele dag* in (51b) has a repetitive, not a durative interpretation, as expected.

Grimshaw (1990); Pesetsky (1995); Anagnostopoulou (2003), among others). Crucially, the participle has not lost its verbal properties.[34] If adjectival participles indeed retain their verbal properties, this can explain why they introduce an additional aspectual layer, different from regular adjectives:

(53) a. ...dat de wagen (*gisteren) [AP klaar] is.
...that the car (yesterday) done is

b. ...dat de wagen (gisteren) [AP [VP gemaakt$_2$]] is$_1$.
...that the car (yesterday) made is

The combination of the past adverb *gisteren* 'yesterday' and the present auxiliary *is* is ungrammatical. However, when the participle *gemaakt* 'made' is used, this combination becomes grammatical. This might be the result of the participle introducing its own aspectual layer. If adjectival participles have a verbal core, they are expected to exhibit both adjectival and verbal properties. On the other hand, the truly verbal participle in the 1-2 order is not predicted to exhibit purely adjectival properties.[35] Modification of the adjectival affix *on-*, which is a typical adjectival property, is indeed only acceptable in the order in which the participle precedes the other verb:

(54) het artikel mag worden geretourneerd mits de verpakking
the article may be returned if the package
<(on)geopend> is <(*on)geopend>.
<(un)opened> is <(*un)opened>

If participles are analyzed as being able to have an adjectival categorial status, an answer can be provided to the problem that V_3-V_1-V_2 is theoretically predicted not to occur. Non-verbal elements generally appear to the left of the verb in Dutch clauses since Dutch shows an OV-order. Participles that show up as initial elements in a verb cluster may then be taken to have an adjectival status. In section 3.3, two-verb clusters were discussed. It was demonstrated that the participle in front of the auxiliary verb is possible in the whole language area. Apparently, adjectival status of the participle is a common phenomenon in Dutch varieties. This would then lead one to expect that the order *participle*-V_1-V_2 will show up in the whole language area as well. This is indeed the case with the exception of the northern part of the language area. The north is

[34] An analysis in which participles can be adjectival implies that the verb *hebben* 'have' should also be able to take an adjectival complement. This is correct, as illustrated in (i). See Koeneman et al. 2011 for geographic and grammatical restrictions on this construction.

(i) ...dat Jan de hele dag het raam open had.
...that Jan the whole day the window open had
'...that Jan had the window open the whole day.'

[35] There is extensive literature on the verbal and adjectival properties of participles (Baker et al. 1989; Embick 2004; Kratzer 1994, 2000; Reinhart and Siloni 2005, among others). Since these involve different constructions, the diagnostics provided in those articles cannot automatically be applied to the cases at hand.

predicted to have the order *participle*-V_2-V_1 given that it strongly prefers V_2-V_1 to V_1-V_2. Moreover, it can be observed on map 2.2 that the order V_1-V_2-V_3 is accompanied by a participle-initial order in all locations.[36] In order to have both interpretive possibilities for the participle, the initial position must be available. The verbal status reduces the interpretive possibilities of the participle. Consequently, clusters with a participle in a cluster-final, verbal position are expected to constitute a subset of clusters with participles in a non-verbal position.

The V_3-V_1-V_2 order in this construction (section 3.4.2) is thus analyzed as an instance of the *participle.*A-V_1-V_2 order, and this order is consequently no longer a problem for the theory. If the verb is not adjectival but verbal, it will show up in the V_1-V_2-V_3 order as the rightmost element.[37]

There exists a strong preference for an adjectival status of the participle in the Belgian part of the language area, whereas the Dutch part shows an ambiguity in categorial status. For the northern area it is difficult to determine what the status of the participle is. In the order *participle*-V_2-V_1 the participle can be adjectival, as is the case in the rest of the language area, but it may also be a verb since the northern part of the language area has a general strategy in which the main verb is the initial element in the cluster. In all the constructions discussed above, the northern area shows a strong preference for V_3-V_2-V_1. Since there appears to be nothing wrong with generating the V_3-V_2-V_1 order through Merge, this is unproblematic (but see below).

In section 3.4.1 it was shown that the order V_3-V_1-V_2 is also highly frequent when the cluster contains two modal auxiliaries, as in *zwemmen moet kunnen* 'swim must can'. With respect to this construction, a similar logic as with the participles of section 3.4.2 is followed. This order can be attributed to the fact that the main verb does not show up as a verb but that it may optionally appear in a nominalized form. This leads to a structure of the type: [*nominalized VP*]-V_1-V_2.

An indication that such an analysis is on the right track is provided by the fact that the V_3-V_1-V_2 order is, as illustrated in section 3.4.1, a secondary order. The verb might but does not have to be reanalyzed as a nominal. If the construction *nominalization*-V_1-V_2 is found in a particular location, the order V_1-V_2-V_3 is available as well. Clusters with nominalized forms constitute a subset of clusters with verbal main verbs. Nouns appear to the left of verbs and, in most varieties of Dutch, main verbs appear to the right of the auxiliaries. It should be noted that the nominalization possibilities in three-verb clusters are geographically restricted. This possibility is found in the middle and eastern parts of the language area, but not in Belgium and Dutch Brabant. This issue

[36] V_3-V_2-V_1 in the north, V_3-V_1-V_2 in the rest of the language area, and V_1-V_3-V_2 in the Belgian part. The first two can be analyzed as adjectival participles. It will be demonstrated below that the same holds for the V_1-V_3-V_2 order.

[37] In many Highest Alemannic varieties, participles can receive adjectival inflection when they are not cluster-final (Brandner et al. 2015). As Brandner et al note, no definite conclusions can be drawn for the adjectival status of V_3 in 3-1-2 and 1-3-2 verb clusters.

will be discussed below (section 3.6.2).

An argument in favor of this analysis comes from the fact that in a sentence such as (44), the verb can be replaced by a pronoun. The sentence *Ik vind dat iedereen* ***dat*** *goed moet kunnen*, in which *zwemmen* 'swim' is replaced by the pronoun *dat* 'that', is fine. Such an analysis has been discussed in the literature before (cf. Den Besten and Broekhuis 1989; Evers 2008; Barbiers 2008b). If this is correct, it follows that the order V_3-V_1-V_2 is not a counterexample to this theory of verb clusters. Such an approach is supported by the facts in (55).

(55) a. Ik vind dat ik Jan moet$_1$ laten$_2$ slagen$_3$.
I think that I Jan must let succeed
'I think that I have to let Jan succeed.'

b. * Ik vind dat ik Jan slagen$_3$ moet$_1$ laten$_2$.[38]
I think that I Jan succeed must let

c. * Ik vind dat ik Jan dat moet$_1$ laten$_2$.[39]
I think that I Jan that must let

The sentence in (55a) is of the type discussed in section 3.4.1. However, the order V_3-V_1-V_2 is not available in this case, as shown in (55b). This can be accounted for by the fact that the causative verb *let* does not allow a (pro)nominal complement, as is shown in (55c). The causative auxiliary *laten* 'let' selects a verbal complement, which forces the infinitive *slagen* to appear as a verb to the right of *laten* (V_1-V_2-V_3). V_3-V_1-V_2 is unacceptable in this case because the infinitive shows up as a nominalization and thus violates the selection requirements of *laten*.

Section 3.4.3 has shown that the order V_3-V_1-V_2 also occurs with the cluster type *zwemmen is gegaan* 'swim is gone' (56a), be it sporadically (only 18 times

[38] Unfortunately, this sentence was not tested in the SAND project, so the unacceptability of this sentence is based on our judgements.

[39] Note that non-causative *laten* 'let' does allow a pronoun in this position:

(i) a. Laat dat.
Let that
'Do not do that.'

b. Ik vind dat ik dat moet laten.
I think that I that must let
'I think that I should not do that.'

c. Ik laat dat aan jou.
I let that to you
'I leave it up to you.'

In these examples, *let* is transitive, and does not have a causative interpretation. Since non-causative laten selects a nominal, rather than a verbal, complement, it is acceptable with the 3-1-2, not with the 1-2-3 order:

(ii) a. Ik vind dat Jan voortaan zwemmen$_3$ moet$_1$ laten$_2$.
I think that Jan henceforth swim must let
'I think that Jan henceforth must give up swimming.'

b. * Ik vind dat Jan voortaan moet$_1$ laten$_2$ zwemmen$_3$.
I think that Jan henceforth must let swim

in the east of the language area). This cluster type has a perfect auxiliary as the highest verb. The low frequency of V_3-V_1-V_2 here might be due to the aspectual auxiliary *gaan* 'go'. Like *laten* 'let' discussed above, *gaan* 'go' does not easily allow its verbal complement to be nominalized (56b), and therefore (56a) is highly marked and only seems to occur in transitional zones (see section 3.6.2).

(56) a. Ik denk dat Jan zwemmen$_3$ is$_1$ gegaan$_2$.
I think that Jan swim.INF is gone

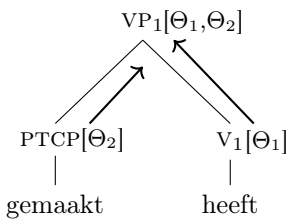
b. * Ik denk dat Jan dat is$_1$ gegaan$_2$.
I think that Jan that is gone

If aspectual *gaan* 'go' does not allow nominalization of its complement and if, as is the current claim, V_3-V_1-V_2 does not exist when V_3 is verbal, the order V_3-V_1-V_2 *zwemmen is gegaan* 'swim is gone' is expected to be completely impossible, but, as illustrated above, it occurs in 18 locations in the east of the language area. This seems to be a distinct construction, however, given that in many of these 18 locations the directional particle *heen* 'towards' occurs before the main verb (cf. SAND II, map 18b). This makes the construction similar to the standard Dutch construction *uit zwemmen is gegaan* 'lit. out swim.INF is gone', for which no alternative orderings are possible. In these constructions – *[heen zwemmen] is gegaan* and *[uit zwemmen] is gegaan* – *gaan* 'go' takes a PP-complement, which is the regular type of complement for the verb *gaan*.

It was demonstrated above that the two orders that cannot be generated through Merge do not occur in the varieties of Dutch: V_2-V_1-V_3 and V_3-V_1-V_2. In apparent cases of V_3-V_1-V_2, V_3 should be analyzed as adjectival when V_3 is a participle and as nominal when V_3 is an infinitive.

This analysis has important consequences for the selection of arguments in the sentence. I follow Neeleman and Weerman (1993) who argue that the theta-grid of a verb cluster is derived from the theta-grids of its parts, via percolation.[40] This means that in a 2.PCP-1 verb cluster, both V_1 and the participle can assign thematic roles. This is illustrated in (57), which is based on Neeleman and Weerman's example (34), p. 451.

(57)



Following the analysis presented here, DPs that precede the verb clusters are base-generated in that position. I will get back to this in chapter 5.

[40] This is also the standard analysis in HPSG-type approaches, see e.g. Augustinus (2015) and references cited therein.

3.5.3 The order 2-3-1 does not exist (50iv)

There is another obvious candidate to remove from the set of possible orders in the verb cluster. It concerns the order V_2-V_3-V_1. This order could have been generated through Merge by merging the verb projection VP_3 with V_2 in a cluster [$_{VP2}$ V_2-VP_3] and then linearize this cluster to the left of V_1: [$_{VP1}$ [$_{VP2}$ V_2-VP_3] V_1]. However, the order only occurs in one of the three constructions under discussion, as in (58). It shows up in 128 locations throughout the language area, predominantly in the Belgian provinces East-Flanders and Antwerp. This order is absent in the other two constructions under discussion, as is demonstrated in (59).

(58) Ik weet dat hij gaan$_2$ zwemmen$_3$ is$_1$.
I know that he go swim is
'I know that he went for a swim.'

(59) a. * Ik vind dat iedereen kunnen$_2$ zwemmen$_3$ moet$_1$.
I think that everyone can swim must

b. * Jan weet dat hij voor drie uur de wagen hebben$_2$
Jan knows that he before three o' clock the car
gemaakt$_3$ moet$_1$.
have made must

The systematic absence of V_2-V_3-V_1 in the constructions in (59) might be taken to be non-structural. However, it seems plausible to take the perspective that the absence of this order in (59) is not a fact to be explained from a sociolinguistic perspective exclusively. The absence of this order can be given a structural explanation. There are three possibilities. One may consider clusters with a perfect auxiliary V_1 to have a structural property that allows the order V_2-V_3-V_1 to be generated only in this case. One may take V_2-V_3-V_1 to be generally possible and look for structural reasons why it must be absent in the two constructions in (59). Or one may find a reason why this order in the sentence in (58) is only superficially an instance of V_2-V_3-V_1. Here, the last approach will be taken. It will be argued that the sentence in (58) does not really count as an instance of V_2-V_3-V_1.

The construction is different from the other two in that the highest verb (V_1) is a perfect auxiliary. This auxiliary selects a participle. However, there is no verbal element that is morphologically recognizable as a participle. One might have expected ***gegaan*** *zwemmen is*, in which case V_2 morphologically shows up as a participle. The fact that an expected participle shows up as an infinitive is a well-studied phenomenon in the literature on verb clusters (cf. Wurmbrand 2006, 2017 for an overview). It is called the Infinitivus-Pro-Participio or IPP-effect. It is not the current aim to explain the IPP-effect, hence the exact formulation of the IPP-effect is not at issue. It seems that V_2 is no longer available for V_1 to govern the assignment of participial morphology after

V_2 has been merged with V_3. Not V_2 (*gaan*) is the participle, but the cluster [*gaan zwemmen*]. One might then take the IPP-effect to be caused by the fact that there is no possibility to assign participial morphology to a syntactically complex cluster.

Whatever the precise formulation of the IPP-effect, V_2-V_3 in the V_2-V_3-V_1 construction is taken here to constitute a participle. It was illustrated above (section 3.5.2) that participles are ambiguous in their categorial status. They can have an adjectival status in all varieties of Dutch and be verbal in a substantial number of varieties. The categorial status has consequences for the position of the participle, to the right of the perfective auxiliary if the participle is verbal, to the left if it is adjectival. The V_2-V_3-V_1 order may thus be taken to be an instance of a complex adjectival participle followed by the verb *be*, as in [[V_2-V_3]$_{ADJ}$ V_1]. The cluster V_2-V_3 is generated by Merge in the usual way and is categorized as an adjectival complex, in a way similar to the formation of adjectival participles in general. As a consequence, the adjectival complex occupies a position to the left of *be*.[41]

The participle does not necessarily have an adjectival status, it may also appear as verbal. If the complex participle in this construction is verbal, the complex is expected to be linearized to the right of the governing perfect auxiliary. This leads to the verb cluster V_1-V_2-V_3, which is indeed an alternative option in most of the language area.

Importantly, if this analysis of V_2-V_3-V_1 is correct, the expectation arises that there is a geographic correlation with other constructions involving participles. Earlier (maps 2.1 and 2.2) it was demonstrated that the orders V_1-$V_{2.PTCP}$ and V_1-$V_{2.AUX}$-$V_{3.PTCP}$ show up in the whole language area except the northern part, and predominantly in the Netherlands part of the language area. This is precisely the geographic distribution observed in the construction $V_{1.AUX}$-V_2-V_3 (*is gaan zwemmen*). Apparently the southern varieties have a preference for adjectival participles, and this preference clearly shows up in three constructions under discussion here: V_2-V_1, V_2-V_3-V_1 with $V_{1.AUX}$, and V_3-V_1-V_2 with $V_{2.AUX}$ (see section 3.6.1 for an analysis of V_1-V_3-V_2). The northern part has a different preference. The decreasing V_2-V_1 and V_3-V_2-V_1 order is preferred in all constructions there. In those cases the adjectival / verbal status of the participle is not relevant with respect to its linear position. In both cases the participle will appear to the left of the selecting verb.

The next fact to be explained is the lack of the V_2-V_3-V_1 order (with the hierarchical structure [[V_2 [V_3]] V_1]) in clusters with two modals (cf. 23a). The 2-3-1 order cannot arise if V_2 and V_3 are verbal, as merging V_1 to V_2-V_3 will be necessarily followed by uniform linearization yielding V_1-V_2-V_3. This means that in the order 2-3-1 the element 2, the element 3, or both 2 and 3 would have to be nominal. V_2-N_3-V_1 is impossible, however, as non-verbal elements in Dutch may not follow the verb that they are selected by (see also Zwart 1996). This

[41] See also (Hinterhölzl 2006:85), who similarly argues that IPP complements in the 2-3-1 order are participle phrases that have moved into the specifier of the selecting auxiliary.

makes the V_2-non-verbal element-V_1 order ill-formed for the same reason as for instance the order *bellen op moet* 'call up must'. N_2-V_3-V_1 is impossible too, as nouns cannot select verb phrases in Dutch. Finally, N_2-N_3-V_1 is impossible because nouns cannot select other noun phrases either.[42] A similar reasoning holds for (59b), with 3=participle. Element 3 cannot be verbal or adjectival when element 2 is nominal, as nouns do not select adjectives or verbs as their complements. [43]

3.5.4 The orders 1-2-3 and 3-2-1

In addition to the 'impossible orders' V_2-V_1-V_3 and V_3-V_1-V_2, the preceding section demonstrated that the order V_2-V_3-V_1 is not a possible verb cluster either. Three 3-verb orders still require an account. The different maps illustrate that the V_1-V_2-V_3 and V_3-V_2-V_1 orders do occur in all constructions, whereas the V_1-V_3-V_2 is only found on maps 2.5 and 2.2. The sentences in (60) provide relevant examples of V_1-V_3-V_2.

[42] Pseudopartitives such as *een emmer kersen* 'a bucket (of) cherries' at first sight seem to contradict this generalization. Apparently a noun may select a noun phrase, but only in the case in which the first noun can be interpreted as an indication of quantity (measure phrase) with respect to its nominal complement (Bennis 1979, among others). Bennis demonstrates that nouns that are not quantificational by themselves are interpreted as quantificational in that position:

(i) a. een zee Amerikanen
a sea Americans
'many Americans'

b. een regen protesten
a rain protests
'many protests'

Such a quantifying interpretation seems impossible with auxiliary verbs, which makes an N-N-V construction impossible. Crucially, there are no other cases in the grammar of Dutch in which a noun can directly select a noun phrase, cf. *een boek *(van) Jan* 'a book of Jan'.

[43] A reviewer mentioned that there is nothing that rules out building a complex VP, then adding a nominalizer or adjectival head and finally V_1, yielding the 2-3-1 order. Indeed, this should in principle be allowed when V_1 is a modal, considering the fact that modal verbs allow nominal complements in Dutch, as in (i).

(i) a. ...dat Jan een koekje moet.
...that Jan een cookie must

b. ...dat Jan dat moet.
...that Jan that must

It is not entirely clear why a nominal [V_2-V_3] complex would not be possible in the case of *kunnen zwemmen moet* 'can swim must'. As for *hebben gemaakt moet* 'have made must', the participial morphology might affect the possibility of analyzing [V_2-V_3] as nominal.

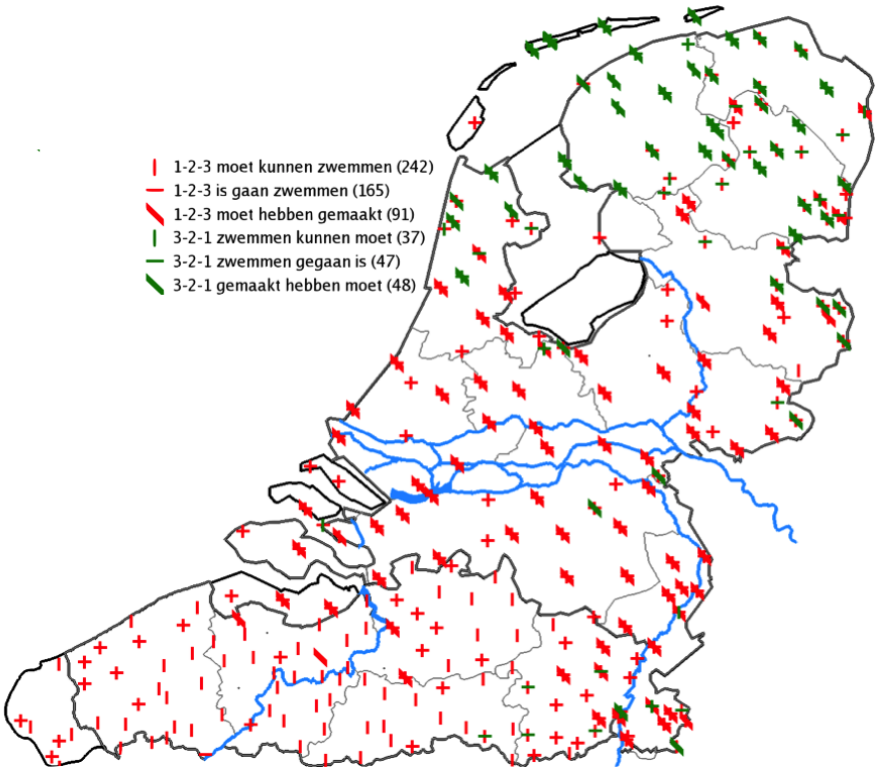
(60) a. Ik vind dat iedereen *moet*$_1$ *zwemmen*$_3$ *kunnen*$_2$.
I think that everyone must swim can

b. Jan weet dat hij voor drie uur de wagen *moet*$_1$ *gemaakt*$_3$ *hebben*$_2$.
Jan knows that he before three o'clock the car must made have

c. * Ik weet dat hij *is*$_1$ *zwemmen*$_3$ *gaan*$_2$.
I know that he is swim go

In section 3.6, it will be argued that the order V_1-V_3-V_2 does not exist and that (60a) and (60b) have to be analyzed as instances of V_1 – non-verbal material – V_2. If it can be shown that this is the correct analysis for the V_1-V_3-V_2 orders in (60a) and (60b), a simple picture arises. Only the strict ascending order V_1-V_2-V_3 and the descending order V_3-V_2-V_1 can be base-generated. Moreover, there is no optionality in the process since the two orders are in complementary distribution geographically. This is shown on map 3.2, in which the two orders are compared. On this map, the distribution of the two remaining orders in the three constructions are compared together.[44]

[44] In Pauwels' (1953) study on two-verb clusters, the descending order was marked green and the ascending one red. Since then, the descending order is called 'the green order' and the ascending one 'the red order' in the literature on Dutch verb clusters.



Map 3.2: 1-2-3 vs. 3-2-1

I would like to argue that there are two different grammars for the formation of verb clusters: a northern, descending grammar that gives rise to V_3-V_2-V_1 and an ascending grammar V_1-V_2-V_3 for the rest of the language area. There is some overlap in the transition zone between the two areas and along the border with the German language area but that is to be expected. The remaining order variation is explained by independent principles, which are related to the categorial status of elements in the cluster: the adjectival/verbal status of participles (in combination with the IPP-effect) and the verbal/nominal status of the infinitival main verb.

A question that remains is how to account for the difference between the two grammars. It seems to be the case that the linearization of a merged structure is unidirectional in a particular domain in a particular language.[45] This gives rise to uniform ascending or descending orders within the verbal domain. It was argued above that Merge itself does not involve direction. It just consists of the combination of two, potentially complex, nodes. A way to approach this difference is then to posit a principle of the type in (61). This principle applies

[45] Williams (2003) and Bader and Schmid (2009) also argue that languages can differ in the direction in which verbs can take their complements. Differently from us, they argue that each verb type can have a different direction of selection.

post-syntactically. If the syntactic module is variation free, a central hypothesis in the Minimalist Program, then the principle should apply at the level of spell-out, PF (which includes the level of Morphology). It makes sense to keep this operation outside syntax proper.[46]

(61) A grammar shows unidirectional linearization in a particular grammatical domain.

In the V-domain, Dutch varieties and Northern Dutch varieties differ in that Dutch varieties have leftward-linearization (the auxiliary (V_1) is linearized to the left of the projection of the main verb (VP_2), which leads to the main verb final order V_1-V_2) and Northern Dutch has rightward-linearization (the auxiliary is linearized to the right of the main verb: V_2-V_1). However, Dutch and Northern Dutch are SOV languages. This implies that in these languages/varieties the object is linearized to the left of the verb (OV). This implies that within the VP domain Northern Dutch is exactly the opposite of English, in which the object is linearized to the right of the verb (VO) and the auxiliary to the left of the main verb (AUX-V). This is shown in (62).

(62) a. Ik denk dat Jan gisteren$_6$ met een roos$_5$ zijn vrouw$_4$ verrassen$_3$ willen$_2$ heeft$_1$ [northern Dutch]
b. I think that Jan has$_1$ wanted$_2$ to surprise$_3$ his wife$_4$ with a rose$_5$ yesterday$_6$.

Dutch is in between Northern Dutch and English in this respect. The linearization of object and verb shows the Northern Dutch order and the linearization of auxiliary and verb shows the English order. The consecutive domains each may have their own direction of linearization. This may lead to different directions in different domains, as appears to be the case in Northern Dutch and English, but not in Dutch which has leftward-linearization in both domains. In all cases, linearization is unidirectional within a domain. In the next section, it will be demonstrated that the Dutch situation with uniform leftward-linearization leads to interesting consequences.

3.6 The order 1-3-2

3.6.1 Participles

In section 3.5.2, participles in Dutch were argued to be ambiguous in having a verbal or adjectival categorial status. It was argued that a verbal categorial status gives rise to the order V_1-V_2-*participle*$_{V3}$ in (63a), whereas an adjectival participle is ordered to the left of the verbs, and thus leads to the order *participle*$_A$-V_1-V_2 as in (63b). The northern order is *participle*-V_2-V_1 in (63c).

[46] Approaches in which verb cluster variation is assumed to be solely a PF phenomenon were discussed in chapter 2.

However, the order V$_1$-*participle*-V$_2$ (63d) occurs quite often as well, especially in the southern part of the language area (see map 2.2).

(63) a. ...dat hij de wagen voor drie uur *moet*$_1$ *hebben*$_2$ *gemaakt*$_3$
[V$_1$-V$_2$-PTCP] (verbal participle)
b. ...dat hij de wagen voor drie uur *gemaakt*$_3$ *moet*$_1$ *hebben*$_2$
[PTCP-V$_1$-V$_2$] (adjectival participle)
c. ...dat hij de wagen voor drie uur *gemaakt*$_3$ *hebben*$_2$ *moet*$_1$
[PTCP-V$_2$-V$_1$] (verbal or adjectival participle in northern varieties)
d. ...dat hij de wagen voor drie uur *moet*$_1$ *gemaakt*$_3$ *hebben*$_2$
[V$_1$-PTCP-V$_2$]
...that he the car before three o'clock {must have made}

Given the fact that the participle can be adjectival or verbal, there are two ways to explain the occurrence of the order V$_1$-*participle*-V$_2$ in (63d). Either this order is a problem for the approach taken here, since the order V$_1$-V$_3$-V$_2$ is predicted not to occur since it involves non-uniform linearization, in violation of the parameter in (61). Or adjectival participles need to be able to be merged in between the two verbs. The latter approach is preferable since it is directly supported by the behavior of other non-verbal material within the verb cluster, such as particles, as will be shown below.

The fact that verb clusters can be interrupted by particles has received a lot of attention in the literature. Varieties of Dutch differ with respect to the amount and the nature of the material they allow to appear within a verb cluster. Most varieties allow verb particles to appear in the cluster, as is shown in (64). These particles may be prepositional, adjectival or adverbial in nature.

(64) a. Ik vind dat Jan Marie *moet*$_1$ **op** *bellen*$_2$. [PTCL=P]
I find that Jan Marie must up call
'I think that Jan should call Marie.'
b. Ik vind dat Jan die mug *moet*$_1$ **dood** *meppen*$_2$. [PTCL=ADJ]
I find that Jan that mosquito must dead beat
'I think that Jan should kill that mosquito.'
c. Ik vind dat Jan die valse hond *moet*$_1$ **weg** *jagen*$_2$. [PTCL=ADV]
I find that Jan that mean dog must away chase
'I think that Jan should chase away that mean dog.'

The elements in boldface are generally called *verb particles*. This label is just a way to describe a class of elements that together with the main verb forms a complex verbal predicate. There is no evidence for a syntactic category of the type Particle. There is no compelling evidence to consider particles as verbal prefixes either. Particles can be separated from the main verb in verb-cluster constructions and must be separated in clauses with Verb Second. Moreover, they appear outside verbal inflection, as in the case of participles in which the particle shows up in front of the inflectional prefix *ge-*. For sentence (64a) this is shown in (65).

(65) a. Jan belt Marie **op**. – *Jan **op**belt Marie
Jan calls Marie up *Jan up-calls Mary

b. Ik vind dat Jan Marie **op** *moet*$_1$ *bellen*$_2$.
I find that Jan Marie up must call

c. Ik vind dat Jan Marie *moet*$_1$ *hebben*$_2$ **op**-*gebeld*$_3$/ *ge**op**beld*.
I find that Jan Marie must have up-called *PREF-up-called

Often these particles are closely connected to the verb interpretatively. There are even particle-verb combinations that do not exist without a particle, such as *op-juinen* 'encourage', *op-peppen* 'encourage', *op-ruien* 'provoke' *op-hitsen* 'provoke' etc. *Juinen, peppen, ruien* and *hitsen* do not exist as verbs in present day Dutch. The close relationship between verbs and particles has led various linguists to analyze particles as part of the verbs. They are often called 'separable compound verbs'.

A problem for this perspective is that lexical items that are less clearly selected by the verb can also behave as particles. Examples are given in (66).

(66) a. Ik vind dat Jan de hele dag *moet*$_1$ **door** *werken*$_2$.
I find that Jan the whole day must on work
'I think that Jan must work on the whole day through.'

b. Ik vind dat Jan de mug *moet*$_1$ **dood** *meppen*$_2$.
I find that Jan the mosquito must dead beat
'I think that Jan should kill the mosquito.'

It is not evident that *door-werken* and *dood-meppen* should be considered as complex verbs in the lexicon. *Door* in (66a) is an aspectual adverb, which can generally be added to action verbs, *dood* in (66b) is a secondary predicate with a resultative interpretation.

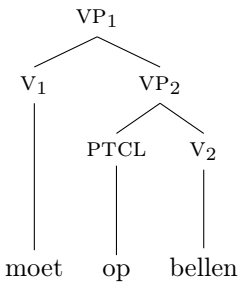
The literature on Dutch particles is vast. The analyses can roughly be divided into lexical approaches in which verb and particle are part of a lexical verb (a.o. Neeleman and Weerman 1993; Neeleman 1994), syntactic approaches in which particles are generated as separate items in the VP (a.o. Hoekstra et al. 1987; Bennis 1991; Den Dikken 1995a), and hybrid proposals in which the particle-verb combination constitutes a syntactically complex word (Booij 2002; Blom 2005). All three approaches have theoretical and empirical problems. Particles will not be discussed in detail in this chapter. It will just be established that these items may easily be incorporated in a verb cluster in all Dutch varieties. This is also evident from the SAND (SAND II, maps 31a/b). Chapter 5 returns to this construction.

The analysis of particle incorporation is straightforward in this framework. A verb projection may take (an) auxiliary verb(s) to create a cluster that is interpreted as a complex predicate. The verb (projection) may also select a particle to build a complex predicate. The particle may be a lexical item that belongs to the representation in the lexicon, and then cause semantic intransparency and idiomaticity of the particle-verb combination, but it may

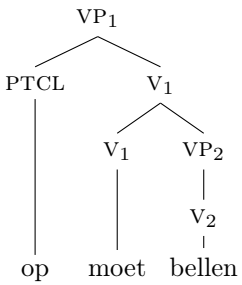
also be non-idiomatic and transparent, as long as the particle participates in the formation of the predicate. Consequently, situations arise in which an auxiliary verb and a particle are both available for Merge with the main verb. The fact that Dutch shows leftward-linearization (AUX-V and OV) for verbal as well as non-verbal material leads to different order possibilities. Either one first merges the particle and then the auxiliary, or one does it the other way around. In the first case, a complex predicate of the type *moet op bellen* 'must up call' is built, and in the second case, a complex predicate of the type *op moet bellen* 'up must call' is built. No movement is involved. No incorporation of the particle – the syntactic particle perspective – and no excorporation of the particle in a lexical approach.

The current syntactic analysis predicts indeterminacy, and that is what we find. There are no semantic consequences, there are no triggers for movement, the two structures in (67) are simply merged.

(67) a.



b.



The fact that these two structures only differ in the order in which the particle and the auxiliary are merged to the left of the main verb correlates with the fact that these structures are syntactically and semantically fully equivalent. Just as was argued for the different orders of verbs in verb clusters, the position of the particle within the verbal cluster does not seem to matter interpretatively.

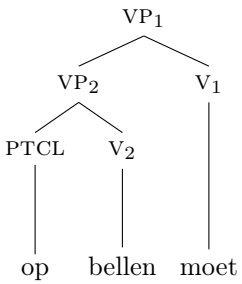
This approach is similar to Bader et al. (2009) (based on Bader and Schmid 2009), who argue that particles may freely appear in any position in a verb cluster as long as it complies with the direction of selection.[47] See also Bennis

[47] But see section 3.2 for some differences with this approach.

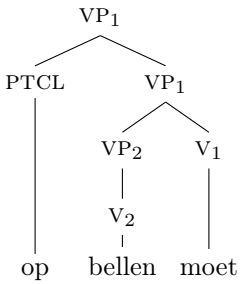
(1992), who argues that as long as particles are left-adjoined, they can occur anywhere in the cluster.

In northern varieties the auxiliaries are linearized to the right of the main verb (V-AUX) and non-verbal material is linearized to the left (OV). Particles are thus expected not to be observed within the verb cluster and that is indeed the case. The word order in those varieties is *op bellen moet* and the two orders of Merge give rise to the same surface order. This is demonstrated in (68).

(68) a.



b.



In light of this discussion, reconsider the verb cluster order V_1-V_3-V_2. Particles and adjectival participles are both non-verbal elements in the predicate and they are expected to behave in the same way. Nothing specific for participles in medial position is needed. The derivation of (63d) is similar to the derivation of particle interruption in (67a). This is shown in the structure in (69b). The structures in (69) correspond to the sentences in (63), from the beginning of this section, repeated here for convenience.

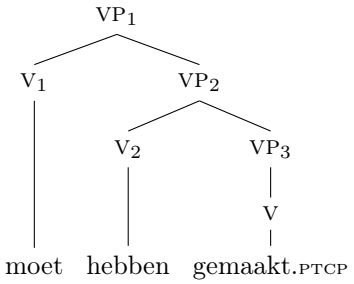
(63) a. ...dat hij de wagen voor drie uur *moet*$_1$ *hebben*$_2$ *gemaakt*$_3$
[V_1-V_2-PTCP] (verbal participle)

b. ...dat hij de wagen voor drie uur *gemaakt*$_3$ *moet*$_1$ *hebben*$_2$
[PTCP-V_1-V_2] (adjectival participle)

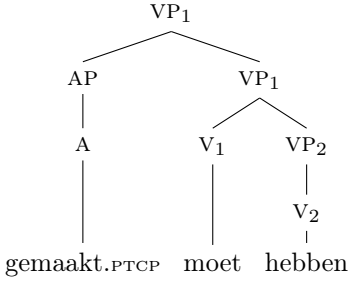
c. ...dat hij de wagen voor drie uur *gemaakt*$_3$ *hebben*$_2$ *moet*$_1$
[PTCP-V_2-V_1] (verbal or adjectival participle in northern varieties)

d. ...dat hij de wagen voor drie uur *moet*$_1$ *gemaakt*$_3$ *hebben*$_2$
[V_1-PTCP-V_2]
'...that he the car before three o'clock {must have made}'

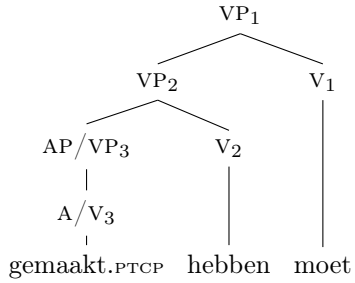
(69) a. = 1-2-3



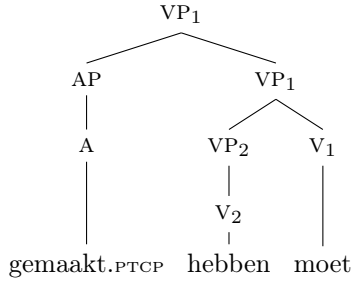
b. = 3-1-2

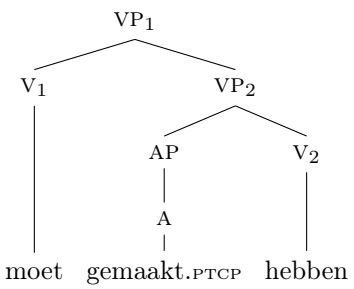


c1. = 3-2-1



c2. = 3-2-1



d. 

= 1-3-2

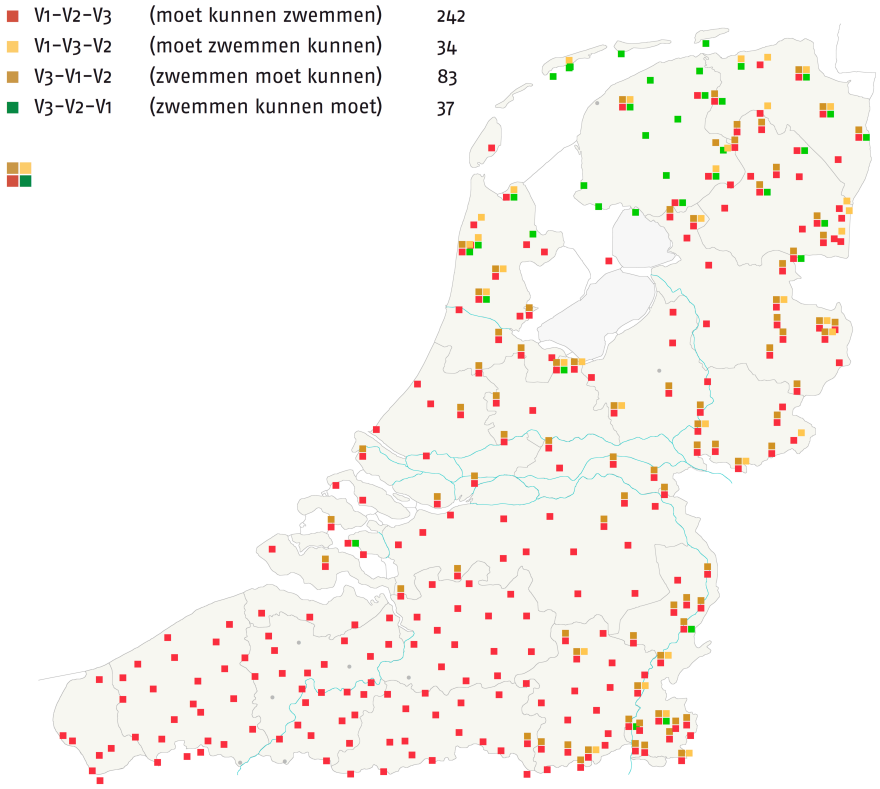
An analysis that assumes the participle to be non-verbal in the 1-3.PTCP-2 order can account for the fact that this order is most common in the southern part of the language area. This is the area where non-verbal material, such as full noun phrases, are acceptable within the verb cluster (SAND-II, map 2.3.1.7).[48]

Map 2.2 (see section 3.4.2) illustrates that the Belgian part of the language area behaves special with respect to participles. There are hardly any instances of V_1-V_2-V_3 (63a). As demonstrated in section 3.5.3, this follows from the fact that these varieties have a strong preference to take participles as non-verbal, adjectival elements, either in cluster initial position (63b) or, preferably, in cluster medial position (63d). The remainder of the language area has verbal participles in addition to non-verbal participles, with a preference for cluster-initial participles.

3.6.2 Nominalization

In section 3.5.4, it was argued that V_1-V_3-V_2 is not a possible order. There were two apparent instances of this order. The first one concerns sentences in which V_3 shows up as a participle. As discussed above, there is ample evidence that a participial V_3 can have an adjectival status, and as such, may occur within the verb cluster (cf. section 3.6.1), in particular in the southern part of the language area. This leaves the explanation of the case in which the V_3 shows up as an infinitival. The relevant map (map 2.5) is repeated below for convenience.

[48] Cluster interruption will be discussed further in chapter 5.



Map 2.5 (repeated): SAND-II map 17a

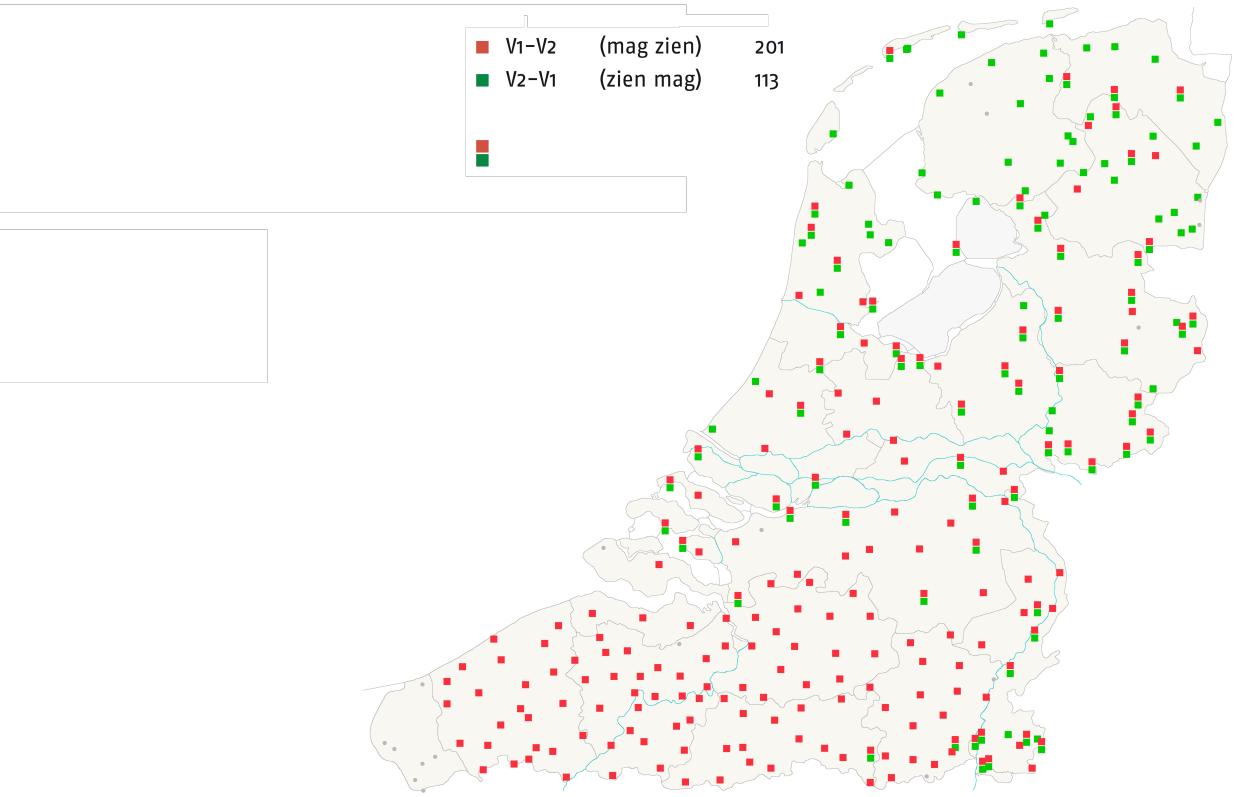
The V$_3$-V$_2$-V$_1$ order in the north and the most frequent V$_1$-V$_2$-V$_3$ order in the rest of the language area are as predicted by this theory. For the other two orders, this cluster type V$_1$-V$_3$-V$_2$ (n=34) appears in an almost perfect subset of V$_3$-V$_1$-V$_2$ varieties (n=83), which again is a subset of V$_1$-V$_2$-V$_3$ (n=242). The V$_3$-V$_1$-V$_2$ and V$_1$-V$_3$-V$_2$ orders show up in the eastern/middle part of the language area and in the border area between the northern V$_3$-V$_2$-V$_1$-varieties and the V$_1$-V$_2$-V$_3$-varieties. It was argued in section 3.5.2 that there is evidence that infinitives may acquire a nominal categorial status. If that is correct, these nominalized infinitives appear to the left of the verbs in the V$_3$-V$_1$-V$_2$ order, which is the usual position of nominal phrases (OV-order).

However, the V$_3$-V$_1$-V$_2$ order does not occur in Flanders and Brabant. Apparently, Flemish and Brabantish varieties do not easily allow nominalized verbs in these syntactic contexts. They resist the optional process of recategorization. The rest of the varieties allows nominal infinitives, and some of these varieties appear with the infinitive in cluster medial position. It thus seem that recategorization of infinitives as bare nominal phrases is possible in principle, but restricted geographically.

This analysis immediately predicts the distribution of orders in two-verb

clusters with a modal and an infinitive. In section 3.2, it was illustrated that two-verb clusters with a modal and an infinitive have geographically determined order possibilities. The sentence that has been tested in the SAND is the sentence in (70). The results are on map 3.3.

(70) Niemand mag het zien, dus ik vind dat jij het ook niet [*mag zien*]
nobody may see it, so I find that you it also not may see
/ [*zien mag*].
/ see may
'Nobody is allowed to see it, so I think you are not allowed either.'



Map 3.3: SAND II-15b

The northern varieties are V_2-V_1-varieties, as predicted by their direction of linearization. The southern varieties spoken in Flanders and Brabant are V_1-V_2 uniformly and the varieties in the east and the middle have two possibilities, either V_1-V_2 or V_2-V_1. This can be explained by arguing that all the varieties except the northern ones organize their two-verb clusters as V_1-V_2, and that Flemish and Brabantish varieties resist recategorization of V_2 as a nominal infinitive. The eastern and middle varieties have two available orders, whereas the

north and the south have only one, V_2-V_1 and V_1-V_2 respectively. The V_2-V_1 order is predicted to be marked with respect to the V_1-V_2 order in the varieties that allow the two variants. This indeed appears to be the case. First of all, in non-northern varieties the order V_1-V_2 is attested in almost every dialect, suggesting that the possibility of nominalization is a secondary option. Moreover, the sentences in (55) illustrated that some auxiliary verbs (e.g. *laten* 'let') do not easily allow nominal complements. The order V_2-V_1 is thus predicted to be marked in non-northern varieties if V_1 is *laten*. This is indeed the case, as is demonstrated in (71b).

(71) a. Ik denk dat ik Jan [*laat*$_1$ *zingen*$_2$]
I think that I Jan let sing

b. ?? Ik denk dat ik Jan [*zingen*$_2$ *laat*$_1$]
I think that I Jan sing let

Although there are no dialect data bearing on this construction available in the SAND, it appears to be the case that (71b) is unacceptable in Standard Dutch.

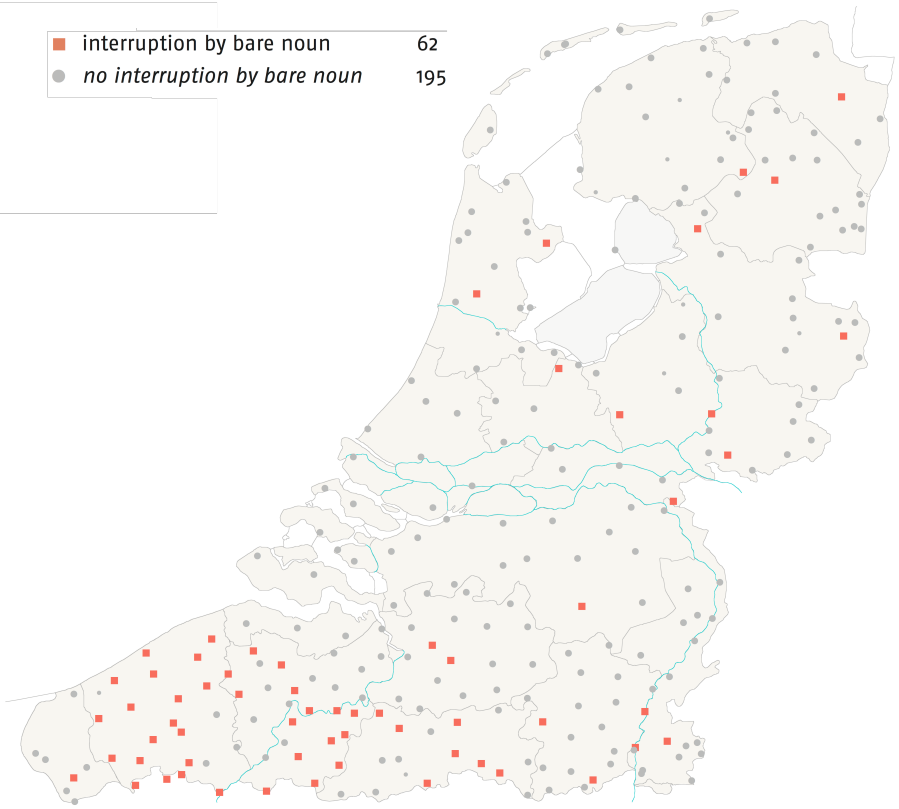
Given the argumentation here, one may expect these nominalized infinitives to appear as non-verbal cluster interrupters as well, just as participles (or particles etc.), giving rise to the order: V_1-*nominal infinitive*-V_2, as in (72a).

(72) a. Ik vind dat iedereen *moet*$_1$ *zwemmen*$_3$ *kunnen*$_2$.
I think that everyone must swim can

b. Jan weet dat hij voor drie uur de wagen *moet*$_1$ *gemaakt*$_3$ *hebben*$_2$.
Jan knows that he before three o' clock the car must made have

c. * Ik weet dat hij *is*$_1$ *zwemmen*$_3$ *gaan*$_2$.
I know that he is swim go

However, in the construction V_1-X-V_2 the X can be a particle in 175 varieties (SAND II 31b), a participle in 163 varieties (SAND II-17b / map 2.2), but a nominal infinitive only 35 times. This can be attributed to two causes. First, as argued above, infinitives cannot show up as bare nominal phrases in this type of context in Brabantish and Flemish varieties. Consequently, the 1-3.INF-2 is not expected to occur in those varieties that allow cluster interruption most easily. Secondly, nouns usually do not interrupt the verb cluster in non-Flemish Dutch varieties, as illustrated in map 3.4. As a result, the occurrence of 1-3.INF-2 is also expected to be rare in these varieties of Dutch.



Map 3.4: SAND-II map 28a

The 1-3.INF-2 order is thus expected to be almost absent in varieties of Dutch, which is not the case. As map 2.5 illustrates, this order occurs in 34 locations at the border areas between the northern V_3-V_2-V_1-varieties and the V_1-V_2-V_3-varieties and at the border between the Dutch and the German varieties. This will be assumed here to be a transitional phenomenon. This can explain the fact that this order is not restricted to a certain dialect group, such as Limburgish Dutch, but can be found across different dialect groups, and within those groups only in border varieties. If such an approach is correct, the question arises how the grammars of varieties in these transitional areas can be characterized. A first possibility would be that transitional varieties allow both orders of the neighboring dialect areas, e.g. if the latter allow V_1-V_2-V_3 and V_3-V_2-V_1 respectively, both V_1-V_2-V_3 and V_3-V_2-V_1 should occur in the transitional varieties. This would be a case of what Chambers and Trudgill (1998) call mixed dialect varieties. However, this cannot be the explanation for the occurrence of V_1-V_3-V_2 (with V_3 = infinitive) in transitional areas between V_1-V_2-V_3 and V_3-V_2-V_1 areas. The V_1-V_3-V_2 order is expected only to show up in transitional areas if the neighboring areas would also have V_1-V_3-V_2. Map 2.5 shows that this is not the case for the transition zone in North-Holland between Frisian (V_3-V_2-

V_1) and Hollandic (V_1-V_2-V_3) and for the transition zone between Frisian and Low-Saxon (V_1-V_2-V_3) in the north east. For the transition zone between the Dutch and German language area there is less data, as detailed information about the word orders that are possible in the western varieties of the German language area is currently missing, although the V_1-V_3-V_2 order appears to be possible in at least some German varieties. Restricting the discussion to Standard German, the situation is the same as in the Netherlandic transition areas just mentioned: the neighboring areas have V_1-V_2-V_3 and V_3-V_2-V_1 respectively, while the transitional varieties have one or both of these orders, and in addition the V_1-V_3-V_2 order.

These facts suggest that the V_1-V_3-V_2 with V_3 an infinitive is restricted to transitional varieties, and these varieties could be called fudged varieties, following Chambers and Trudgill (1998), in that they combine two grammatical properties of the neighboring areas into a distinct, transition-specific construction. They appear to combine leftward and rightward linearization in the verb cluster domain.[49]

3.6.3 Summary of 1-3-2

It was argued that cluster interruption interferes with verb cluster building in those varieties of Dutch that linearize verb clusters and VPs in the same direction. In non-northern varieties linearization takes place to the left in both instances (AUX-V and OV). Non-verbal predicative elements may be merged before or after merging an auxiliary. This process provides the structures and the orders that are attested in varieties of Dutch. It creates a verb cluster through Merge. This is all narrow syntax has to say about verb clusters and cluster interruption.

For cluster interruption by non-verbal material, it was argued that there are three interrelated issues that determine the different patterns of cluster interruption in varieties of Dutch:

[49] More research is needed for verb clusters in German varieties. The syntactic approach presented in this chapter does not immediately predict the 1-3-2 order to occur in German varieties, since German has a descending 3-2-1 order. The same applies to the 3-1-2 order, which can also be found in some varieties of German according to Schmid and Vogel (2004) and Wurmbrand (2015). There are a few possible ways to account for these data.
One possibility is that these varieties have a different direction of linearization. Bader and Schmid (2009) argue that modal verbs in these varieties have a different direction of selection in these varieties, leading to 1-3-2.MOD and 3-1-2.MOD. This would contradict the claim that linearization is uniform in a single domain. Another possibility is that a verb movement has taken place in those languages. This hence requires further investigation.
Note, however, that the Flemish and Dutch data clearly indicate that co-occurrence patterns are not coincidental and require an account. It should be clear, therefore, that data from German varieties should not entail a dismissal of the approach taken here, but rather a further extension of the analysis. As far as I am aware, there is currently no approach that accounts for the co-occurrence patterns in all Germanic varieties. Such an approach minimally requires a systematic overview of the variation in the order of verbs across the entire language area. This issue will not be discussed further, since it is not the current aim to provide an analysis of the variation in verb clusters across all Germanic varieties.

i. Participles have an ambiguous categorial status: verbal or adjectival. In Belgian Dutch the adjectival status is strongly preferred;

ii. Infinitives may be nominalized, except in Flemish and Brabantish varieties;

iii. Cluster interruption is most frequent in the southwest of the language area.

It follows that the Belgian Dutch and the northern varieties show a rather clear picture. In the northern varieties there are strict V_3-V_2-V_1 / V_2-V_1 orders in verb clusters and rare cluster interruption (V_1-V_3-V_2). In the south, participles are adjectival (V_3-V_1-V_2 / V_2-V_1) and infinitives verbal (V_1-V_2-V_3 / V_1-V_2), and these varieties often have the possibility of cluster interruption (V_1-V_3-V_2). The picture for the rest of the language area is more complicated due to the optionality with respect to the categorial status of participles (adjectival/verbal) and infinitives (verbal/nominal).

The variation in the order of verbs are thus described with the following three parameters.

(73) Three parameters for variation in Dutch verb clusters[50]

I. A dialect is uniformly {descending/ascending} in the linearization of verbs.

II. A dialect {does/does not} have verbal participles.

III. A dialect {does/does not} have nominalized infinitives in verb cluster constructions.

3.7 Verb cluster intuitions

Support for the grammatical approach comes from a recent experiment, where I tested the intuitions of native speakers of different varieties of Dutch in order to see whether they have systematic judgements about the acceptability of different verb cluster orders, including the orders that do not occur in their own language variety. The goal of this experiment is to test the structural approach to the order in verb clusters developed above.

Theoretically, there are three ways for speakers to judge orders in verb clusters. First, it might be the case that the preferred ordering in a specific language area fully determines the grammaticality judgements. Speakers are

[50] In recent work, Van Craenenbroeck (2017) provides a quantitative-statistical analysis of the two- and three-verb clusters of Dutch varieties found in the SAND-data. He investigates which of many conceivable parameters can best explain the observed variation. Although his approach is different from the approach taken here in several respects, the results of his parameter system come close to the analysis developed so far.

confronted systematically with a particular order in their dialect and thus take this order to be the norm. The rest of the orders are all unacceptable given that they do not belong to the input of these speakers.

Second, speakers are aware that other varieties allow different orders. Their judgement is not only determined by the order they are confronted with in their own dialect, but is also related to the orders they are confronted with in neighboring varieties. These varieties will then be judged to be acceptable as well. I will thus observe geographic patterns in the results.

Third, speakers maintain knowledge of the grammatical system. The speaker is equipped with the linearization parameter, which forces him/her to make a choice based on positive evidence. The same is true for the other two parameters in (73). In the case of verb clusters, this perspective leads to the expectation that speakers will be able to distinguish between possible orders, i.e. orders that can be generated by the grammatical system, and impossible ones.[51] They thus would judge possible orders, even those that do not occur in their dialect, neighboring varieties, or the standard language, to be systematically better than impossible orders. This implies for instance that a speaker of northern Dutch would judge V_1-V_3-V_2 (the southern order of the construction discussed in 3.6.1: *moet gemaakt hebben*) to be systematically better than the impossible order V_2-V_1-V_3 (*hebben moet gemaakt*), although both orders do not occur in the northern part of the language area.

The preceding sections demonstrated that there are compelling arguments to take verb clusters to be structurally restricted from a theoretical-linguistic perspective. In this section, I construct another argument for a structural approach to verb clusters: the intuition of the native speaker.

3.7.1 Method

The research in this part of the chapter deviates from the research in the SAND-project methodologically. I am not so much interested in the judgements of native speakers on the grammaticality of their own language variety, but rather in their judgements of non-native orders. For three-verb clusters, this implies that the judgements for the six logically possible orders were tested. The speakers were provided with these six orders in a written questionnaire, using standard Dutch. More importantly, speakers were not asked to provide absolute judgements with yes/no-answers, but to rank the six possible orders with respect to their relative acceptability. In this approach, I avoided judgements which reflect their own dialect order only. The crucial question is whether the ranking of the six orders would reflect the underlying system or something else.

The experiment consisted of two rounds. The sentences presented were similar to sentences that were tested in the SAND-research: *Ik vind dat iedereen* ***moet kunnen zwemmen*** ('I think that everyone should be able to swim'; cf. (44))

[51] Cf. Barbiers (2005).

and *Jan weet dat hij voor drie uur de wagen* ***moet hebben gemaakt*** ('Jan knows that he must have repaired the car before three o'clock'; cf. (46)). In each round the informants were presented with six sentences that differed in the order of verbs in the verb cluster only. They had to rank these sentences in relation to each other. The informants were told that the sentences presented should not receive special emphasis or focus. They were asked to rank the sentences in a ranking from 1 to 6, even if they considered sentences to be fully unacceptable. Ties were not allowed. Each completed item on a questionnaire received a score: 1 for the sentence with the highest ranking and 6 for the lowest ranking. On the basis of these scores it was possible to calculate the mean score for each item by aggregating the scores provided by the respondents.

The test was sent to the Meertens Panel on the internet. The Meertens Panel consists of a group of voluntary respondents of the Meertens Institute. They regularly participate in research by answering digital questionnaires. The respondents are at least 16 years old and live across the entire Dutch language area. 1629 respondents participated in the verb-cluster experiment. Seven respondents were excluded because they were not living in Flanders or the Netherlands at the time of the test. Related to the fact that the Meertens Institute is a Dutch research institute, the respondents were mainly from the Netherlands part of the language area. Among the respondents there were speakers of a large number of different varieties.

3.7.2 Scores for verb cluster orders

Figure 3.1 depicts the results of the experiment introduced above in section 3.7.1 for the cluster types *moet kunnen zwemmen* and *moet hebben gemaakt*.

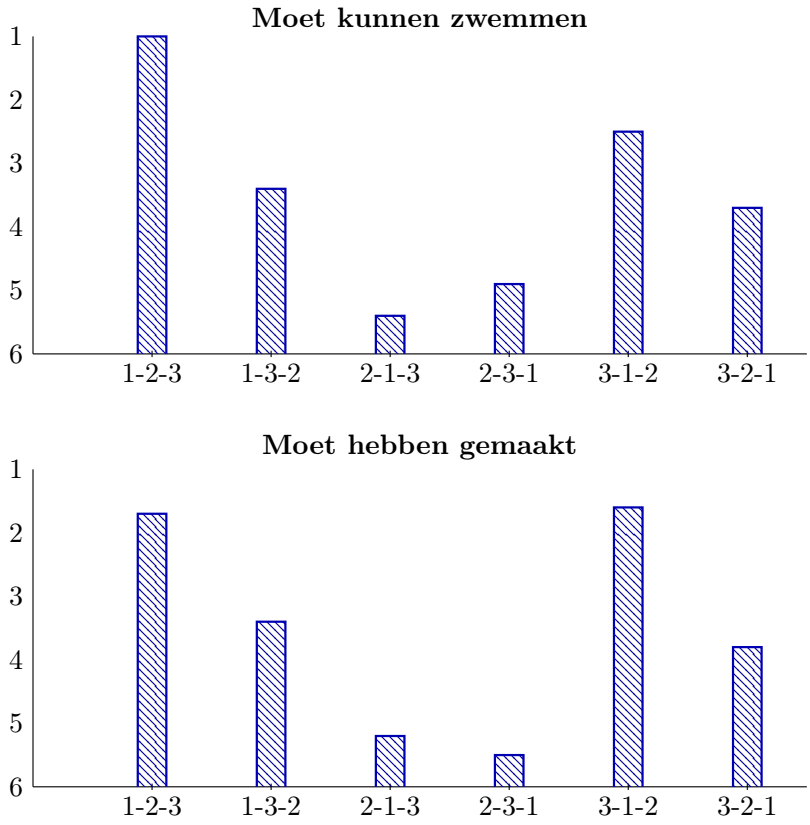


Figure 3.1: Meertens Panel results

How can the rankings in figure 3.1 be explained? For the cluster type *moet kunnen zwemmen* 'must can swim' the ranking indicates that almost all speakers of Dutch accept the order V_1-V_2-V_3 as the most acceptable one. As was illustrated on Map 2.5 in section 3.4.1, this order is available in the whole language area, with the exception of the northern varieties. The non-occurring orders V_2-V_1-V_3 and V_2-V_3-V_1 are judged to be the worst orders in the ranking (between 5 and 6). The northern Dutch V_3-V_2-V_1 order is ranked in the middle. Although the verbs can be uniformly linearized in this order, it is not the order of linearization that is found in most of the language area. The V_3-V_1-V_2 order requires nominalization of the lowest verb. The high ranking of V_3-V_1-V_2 (ranked 2nd) can be explained if one assumes that the respondents are aware of this possibility without necessarily using this order in their language.[52]

[52] The order observed in the rankings is strikingly similar to the order of frequency that is found in the language area on Map 2.5. This chapter will not discuss the relationship between the rankings discussed in this section and the frequency in which a particular order is found in the language area (as indicated on the maps in the SAND). This issue is left for further research.

The cluster type *moet hebben gemaakt* 'must have made' (Map 2.2 in section 3.4.2) shows a slightly different ranking. In this case the orders V_1-V_2-V_3 and V_3-V_1-V_2 compete for the first position. Given that all varieties allow participles to have an adjectival status (see section 3.5.2), the relatively high ranking of V_3-V_1-V_2 is as expected. It is interesting to observe that the order V_3-V_1-V_2 has a higher score in the participial construction (between 1 and 2) than in the nominalization construction (between 2 and 3). This may follow from the fact that nominalization of the lowest verb (V_3) is marked compared with the unmarked categorization of participles as adjectival. Again, the non-occurring orders V_2-V_1-V_3 and V_2-V_3-V_1 are ranked lowest, between 5 and 6.

In the next subsections it will be argued that the ranking patterns are best understood as reflecting the grammatical knowledge of the Meertens Panel respondents (section 3.7.4). This explanation is superior to alternative explanations which are based on familiarity with word orders that occur in the Dutch language area (section 3.7.3).

3.7.3 Familiarity

Suppose that the grammar did not impose restrictions on the possible orders within a verb cluster, such that all six orders would be equally well-formed grammatically. The rankings shown in figure 3.1 could then be due to familiarity. Let's first look at the cluster type *moet kunnen zwemmen*. One might formulate the hypothesis in (74).

(74) Familiarity hypothesis (to be rejected)
The more frequent a cluster occurs in the linguistic environment of a speaker, the higher it will be ranked.

The hypothesis in (74) predicts that the rankings should relate to the frequency of occurrence of the various orders in language use. It leads one to expect that the linguistic environment of an individual informant of the Meertens Panel will influence his/her ranking, e.g. informants living in the northern part of the language area, where they often hear V_3-V_2-V_1, should rank this order higher than informants from the southern part where this order is very uncommon. Figure 3.2 shows that this expectation is wrong.

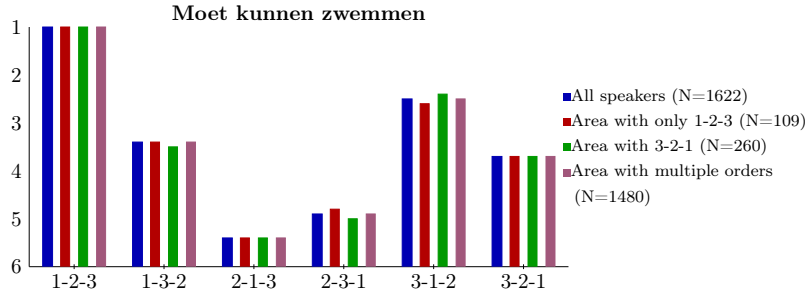


Figure 3.2: Influence of linguistic environment on rankings *moet kunnen zwemmen*

The Meertens Panel includes both dialect speakers and non-dialect speakers, a state of affairs that could have blurred the picture. However, removing the dialect speakers from the analysis does not make any difference, as figure 3 shows.[53]

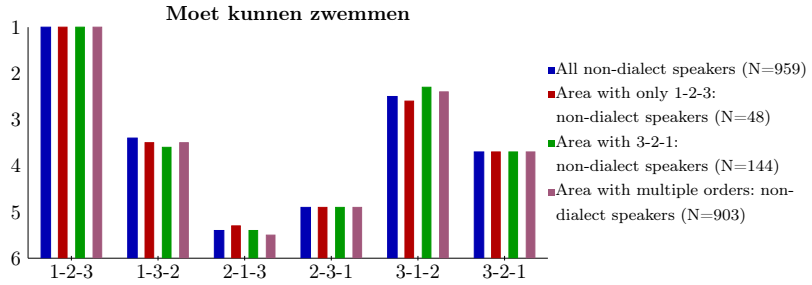


Figure 3.3: Influence of linguistic environment on rankings non-dialect speakers *moet kunnen zwemmen*

An alternative hypothesis, related to the issue of familiarity, would be that figure 3.3 simply reflects Standard Dutch judgements. This would explain the high rankings of the two orders that occur in Standard Dutch: V_1-V_2-V_3 and V_3-V_1-V_2. The fact that the non-occurring orders (V_2-V_1-V_3 and V_2-V_3-V_1) are judged to be significantly worse than the orders V_3-V_2-V_1 (northern Dutch) and V_1-V_3-V_2 (eastern varieties) remains unexplained under this view.

The situation with the other cluster type, *moet hebben gemaakt*, is very similar. Here the linguistic environment does not have a substantial influence on the rankings either, as figures 3.4 and 3.5 show, again supporting the conclusion that familiarity is not able to explain the observed rankings.

[53] The diagram only showing the ranking patterns of the dialect speakers (not given here), is very similar to figure 3.3. This requires further analysis, however, as this set of respondents is heterogeneous (different varieties) and the proportions of speakers of the various varieties should be taken into account.

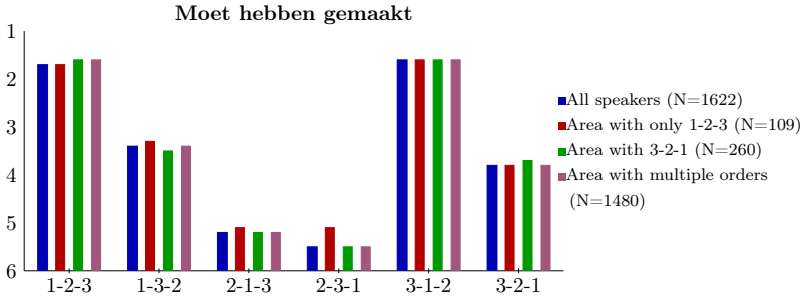


Figure 3.4: Influence of linguistic environment on rankings *moet hebben gemaakt*

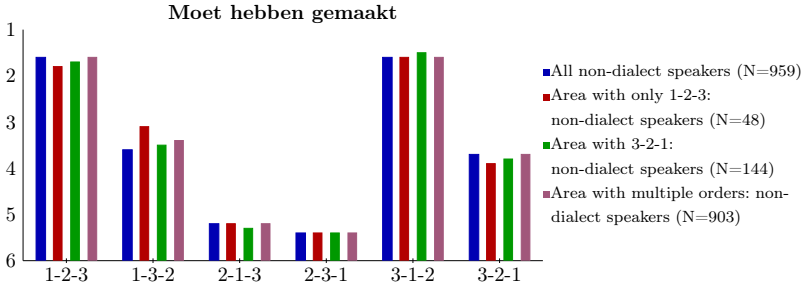


Figure 3.5: Influence of linguistic environment on rankings non-dialect speakers *moet hebben gemaakt*

I conclude that an explanation that is solely based on the linguistic environment of the speaker (familiarity) does not provide a satisfactory account of the rankings provided by the Meertens Panel (figures 3.1-3.5). The hypothesis in (74) turns out to be wrong. These rankings should receive a different explanation.

3.7.4 Grammar

As was argued at the beginning of this section, the grammaticality-judgement rankings are expected to dissociate impossible from possible orders if the ranking order was based on implicit knowledge of the grammatical system. In particular with respect to orders the respondents do not use themselves, their judgements are expected to be based on their grammatical knowledge.

3.7.5 2-3-1 and 2-1-3

As illustrated in section 3.7.2, the non-occurring orders V_2-V_3-V_1 and V_2-V_1-V_3 are judged to be worst in the ranking experiment. They both receive an average ranking between 5 and 6. This ranking is only possible if respondents take these sentences to be bad consistently. In the current system these orders cannot be derived through Merge since it was argued that Merge is binary and

the linearization is unidirectional within the V-domain. They also cannot be derived by changing the categorial status of the participle or the infinitive. Due to the OV-nature of Dutch, those changes would give rise to orders in which V_3 is the leftmost element in the cluster.[54] Language users are expected to have tacit knowledge of these grammatical conditions. They use binary Merge and they know that the verb cluster must be linearized unidirectionally. These two orders are thus expected to receive the lowest rankings. As is clear from Figures 3.2 and 3.4, there is a substantial distance between the two impossible orders and the orders that are found in the verb clusters under discussion. This appears to imply that the judgements of native speakers confirm the theory for this part of the experiment. They provide their ranking on the basis of their grammar.

3.7.6 1-2-3 and 3-2-1

The current approach predicts that the orders V_1-V_2-V_3 and V_3-V_2-V_1 are fully grammatical. This corresponds with the ranking for V_1-V_2-V_3, but the ranking of V_3-V_2-V_1 is considerably lower than the ranking of V_1-V_2-V_3 (cf. fig. 1). The choice between these two orders is determined by a grammatical parameter: unidirectionality in the V-domain can be leftward or rightward. The Meertens Panel respondents (in particular the non-dialect speakers) all accept the rightward setting of this parameter. They rank V_1-V_2-V_3 as the best order. If one assumes that the parameter is part of the tacit grammatical knowledge of speakers of Dutch, the respondents should also know that V_3-V_2-V_1 is an option, be it in most cases not a realized option in their own language variety. The lower ranking of V_3-V_2-V_1 can be attributed to the difference between [possible, realized] for V_1-V_2-V_3 and, in most cases, [possible, non-realized] for V_3-V_2-V_1, i.e. the respondents know that only V_1-V_2-V_3 is part of the standard language. The choice between the two might thus be based on the interference of the standard language. On the other hand, the substantial difference between V_1-V_2-V_3/V_3-V_2-V_1 [possible] on the one hand and V_2-V_1-V_3/V_2-V_3-V_1 [impossible] on the other is solely due to grammaticality.

3.7.7 3-1-2 and 1-3-2

In this approach, the order V_3-V_1-V_2 involves nominalization of the main verb in the case of *zwemmen moet kunnen* (ranking 2.5 in figure 3.1; cf. also figures 3.2 and 3.3) and an adjectival participle in the case of *gemaakt moet hebben* (ranking 1.6 in figure 3.1, cf. also figures 3.4 and 3.5). Both categorial processes involve grammatical parameters (cf. 23 II, III), so these orders are correctly predicted to be ranked higher than the impossible V_2-V_3-V_1 and V_2-V_1-V_3. The fact that the order V_3-V_1-V_2 with *moet kunnen zwemmen* is ranked considerably lower than the V_1-V_2-V_3 order suggests that the parameter [±nominalization]

[54] The order V_1-V_3-V_2 will be discussed below.

cuts right across varieties of Dutch including standard varieties. Map 2.5 seems to support this idea. The somewhat lower ranking of the V_1-V_3-V_2 order with these verbs is also expected, as this order is impossible in the standard language and only occurs in transitional areas. The fact that this order is ranked higher than the truly ungrammatical 2-1-3 and 2-3-1 orders seems to indicate that speakers know that this order can in principle be derived.

The ranking of the order V_3-V_1-V_2 with *moet hebben gemaakt* is about as high as the ranking of V_1-V_2-V_3 (1.6 and 1.7 respectively). This is consistent with the observation that all varieties of Dutch can have adjectival participles (cf. map 2.2). So again, the rankings are based on grammatical availability [possible] together with being part of the standard language [realized]. The intermediate ranking of V_1-V_3-V_2 – rank 3.4 for this cluster type (figure 3.1) – indicates that interruption by a participle is less acceptable than the order in which this element precedes the verb cluster. This might again follow from interference of the standard language, as this order is not a part of the standard language.

3.8 Summary & conclusion

3.8.1 Summary

This chapter has shown that the word order variation in verb clusters in the Dutch language area as found in SAND Volume II can be reduced to two truly verbal orders: V_1-V_2-V_3 and V_3-V_2-V_1. In the V_3-V_1-V_2 and the V_1-V_3-V_2 cluster, the main verb (V_3) is not verbal but adjectival (in the case of a participle) or nominal (in the case of an infinitive). This approach can account for the geographic distribution of these orders.

Support for the adjectival status of participles in the 3-1-2 order came from the interpretation of these sentences. Support for the adjectival status of participles in the 1-3-2 order came from the geographic co-occurrence patterns with interruptions by other non-verbal material. Support for the nominal status of infinitives in the 3-1-2 order came inter alia from the order of verb clusters with the causative verb *let*. This verb does not allow nominal complements and the 3.INF-1-2 order is indeed unacceptable with this verb cluster.

The order V_2-V_3-V_1 is exceptional in that it is only possible if V_2 and V_3 form a non-verbal cluster. The order V_2-V_1-V_3 is unattested. Table 3.1 summarizes the analysis for each ordering.

Order	**Ascending linearization**	**Descending linearization**	**3 = non-verbal**	**[V2-V3] is a morphological unit**	**3 = non-verbal and interrupts the cluster**
1-2-3	+	-	-	-	-
3-2-1	-	+	(+)	-	-
3-1-2	+	-	+	-	-
1-3-2	+	-	+	-	+
2-3-1	+	-	-	+	-
2-1-3	-	-	-	-	-

Table 3.1: Summary of the analysis

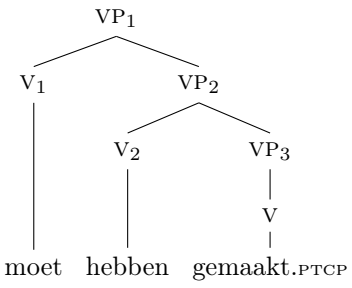
The order 1-3-2 with 3=participle arises in varieties that allow interruption of the cluster, primarily Flemish varieties. If 3=infinitive in the 1-3-2 order, this does not involve cluster interruption, as Flemish varieties do not allow nominalization of infinitives in this syntactic environment, and the Dutch varieties that allow 1-3.INF-2 do not allow cluster interruption by nouns. The 1-3.INF-2 order was argued to be a transitional phenomenon. The order 2-1-3 cannot be generated by Merge at all. The order 2-3-1 is only possible for 2.MOD-3.V-1.AUX because in that case 2 and 3 form a unit showing morphological agreement (IPP). In the order 3-1-2, 3=adjectival if it is a participle and 3=nominal if it is an infinitive.

This theory provides an account for many of the properties of verb clusters that were discussed in chapter 2. These will be discussed here.

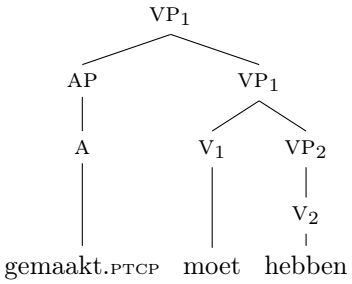
- All varieties of Dutch display various orders across verb types, except for many northern varieties, where only the 3-2-1 order is observed.

  This can be attributed to the fact that in northern variaties, the direction of linearization of verbal and non-verbal material is the same, while in Dutch, non-verbal items are linearized before their selecting verb, while verbal items are linearized after their selecting verb. This leads to three possible orders in Dutch varieties (see (75)), but only one in northern varieties (see (76)).

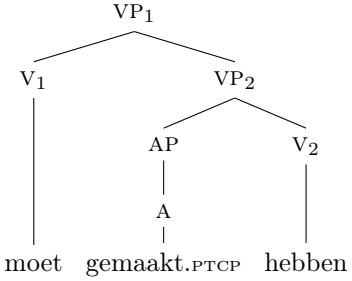
(75) a. = 1-2-3



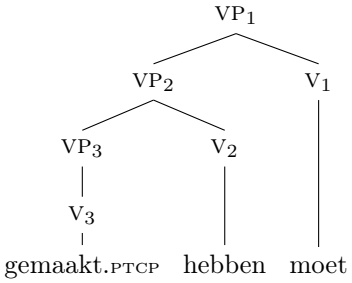
b. = 3-1-2



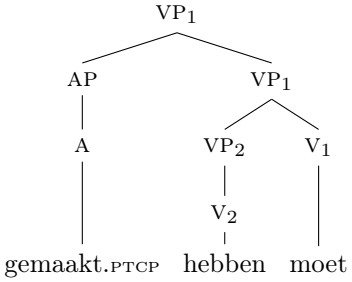
c. = 1-3-2

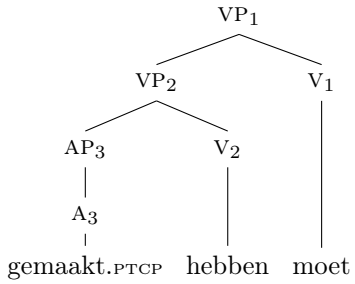


(76) a. = 3-2-1



b. = 3-2-1



c. 

= 3-2-1

- The distribution of verb cluster orders depends on the types of verbs involved. The 1-3-2 order is, for instance, very common when V_3 is a participle (especially in Flanders), but rare when V_3 is an infinitive.

  The 1-3-2 order is argued to involve a non-verbal 3. As a consequence this order can only be derived if V_3 can be reanalyzed as adjectival or nominal, and if these items can interrupt the verb cluster. In Flemish varieties, it seems that participles are only adjectival in verb clusters (as supported by the rarity of the 1-2 order when 2 is a participle). In other Dutch varieties, participles can be both adjectival and verbal. Additionally, the interruption possibilities of adjectival participles seems similar to the interruption possibilities of particles. This can account for the fact that the 1-3-2 order is common (especially in Flanders).

  As for infinitives, it seems that these cannot be nominalized within verb clusters in Flemish varieties (as supported by the lack of the 2-1 order when 2 is an infinitive). As a consequence, neither the 1-3-2, nor the 3-1-2 order is expected to occur in these varieties when 3 is an infinitive. In most remaining Dutch varieties, however, nominal elements cannot interrupt the verb cluster. The 1-3-2 order is thus expected to be rare in the entire language area. This can account for the fact that the 1-3.INF-2 occurs only in border varieties as a secondary order. It was argued in this chapter that the occurrence of this order might be a transitional phenomenon.

  Another example of the fact that the observed orders are dependent on the types of verbs involved is that the 2-3-1 order can only be found when V_1 is a perfect auxiliary. This order was argued to involve a [VP_2-VP_3] complex that is reanalyzed as a participle. This thus requires a perfective V_1, which selects a participle. This can account for the fact that this order is only observed when V_1 is a perfective auxiliary. However, the question that remains is why other auxiliaries do not force such a reanalyzed cluster. This issue was raised in footnote 43 on page 64.

- The 1-3.PTCP-2 order, particle incorporation and verb cluster interruption show similar geographic distributions. This fact almost becomes trivial in this analysis, since all these orders involve a non-verbal, interrupting item.

Two properties remain. First, the fact that the word order variation in these languages contrast with a rigid ordering in the nominal domain can only partly be solved. Since infinitives and participles are categorially ambiguous, this automatically leads to order variation, as non-verbal items have a different position in the clausal structure than verbs. However, this theory cannot explain why both 1-3-2 and 3-1-2 orders can co-occur. Chapters 4 and 5 return to this issue.

Chapter 5 also returns to the fact that the acceptability of non-verbal material inside the verb cluster is a West-Flemish phenomenon. Its acceptability decreases geographically in moving from West-Flanders to the north.

3.8.2 Conclusion

With the help of the geographic distribution of the various orders, it was argued in this chapter that an explanation of variation in verb clusters is best captured in terms of an analysis that takes Merge to be the operation that builds verbal clusters. In contrast to most other analyses, no movement operations are involved. The three, partly independently motivated, parameters below are responsible for the superficially huge variation in the Dutch language area.

I. A dialect is uniformly {descending/ascending} in the linearization of verbs.

II. A dialect {does/does not} have verbal participles.

III. A dialect {does/does not} have nominalized infinitives in "verb" clusters.

This analysis is supported by geographical correlations between cluster orderings and the occurrence of particles inside a cluster. For example, in the Dutch varieties in Belgium the cluster order V_1-PTCP$_3$-V_2 is quite frequent, which follows from the strong preference in that area for participles to be adjectival and the fact that most of these varieties allow cluster interruption by particles. This analysis does not require movement operations to derive such constructions.

The fact that both verb cluster formation and interruption by particles can be seen as instances of the same process corroborates the theory presented here. The only syntactic rule involved is Merge; no construction-specific rules or conditions are required. The fact that the order of the verbs and the particles in the cluster does not appear to give rise to different semantic or pragmatic interpretations strengthens this approach. For the cluster types under discussion here, *verb raising* and *verb projection raising* can be removed from the syntax of Dutch without having to introduce new rules or conditions. The only thing that is needed is the assumption that linearization within a domain is unidirectional. The crucial step involves the possibility for Merge to create verb clusters.

To support this analysis, the geographic SAND data was compared to the results of a ranking experiment in which respondents from the whole Dutch

language area had to provide a relative ranking of the six logically possible word orders in three-verb clusters. The most important feature of this experiment was that the respondents had to give judgements on word orders that do not always occur in their own language varieties. Strikingly, the rankings of the respondents shows a strong convergence, independent from the dialect area they live in, and thus independent of the dominant cluster order corresponding to that region. This makes it strongly unlikely that their judgements have to do with familiarity. Hence, the rankings cannot be exclusively explained in terms of familiarity or frequency of use.

The next chapter will discuss the hypothesis that the speakers' rankings are a result of general properties of information processing. It will become clear that such properties cannot account for the ranking without taking grammar into account. This further supports the syntactic account proposed in this chapter.

CHAPTER 4

Factoring verb clusters

4.1 Introduction[55]

The previous chapter discussed the results of a comparative judgement task, in which speakers judged grammatical, unrealized orders as more acceptable than ungrammatical orders. It was argued that speakers' knowledge of the grammatical system gives them the ability to distinguish orders that are not realized, but can be generated by Merge, from orders that cannot be generated by Merge. While this explanation accounts for a substantial portion of the results of the comparative judgement task, some results are left unexplained. For instance, there is no clear reason why speakers have ranked the 3-1-2 order much higher than the 1-3-2 order. These two orders co-occur in many Dutch varieties. The question that arises is what drives the choice between these two orders.

According to Chomsky (2005, 2007, 2008), three factors play a role in the development of human language.

I. First factor: genetic endowment, i.e. Universal Grammar (UG).

II. Second factor: experience, i.e. intake from the environment.

III. Third factor: principles not specific to the language system, which include principles of data analysis and principles of efficient computation.

Chomsky and his cohorts assume that Universal Grammar constitutes minimally (and perhaps only) the operation Merge (Chomsky 2000; Hauser et al.

[55] I would like to thank Markus Bader for his comments on an earlier version of this chapter.

2002). In the previous chapter many of the results of the comparative judgement task were linked to this First factor. The Second factor, experience, was demonstrated to play a limited role. While speakers ranked orders that were realized in their own language variety the highest, their experience with other language varieties did not affect their judgements. The chapter did not discuss a potential effect of Third Factor principles. In some approaches, grammars are assumed to be shaped completely by principles that Chomsky would describe as Second and Third Factor principles. Proponents of such an approach explain the acceptability of a construction functionally, by referring to general properties of language use, human behavior, and human cognition (see for instance Comrie 1989; Hawkins 1994; Croft 2003; Haspelmath 2008, among others). For instance, Hawkins (1994) argues that many word order preferences follow entirely from general properties of language processing. This makes language processing a potential source of the speakers' preferences in verb cluster orders. For this reason, this chapter explores whether the speakers' preferences are entirely or partially driven by processing preferences.

There are two ways to investigate the effect of properties of language processing on speakers' judgements. First, one could empirically measure processing difficulty by conducting a psycholinguistic experiment, such as measuring reading times. Orders that are less acceptable are then predicted to be associated with slower reading times. A problem with such an approach is that the precise cause of a potential change in reading times would remain unclear. As a consequence, such an experiment would not enlighten us on the precise factors that are causing a slowdown or speedup in reading times. Another possibility is to apply an established theoretical model of processing preferences and see what predictions that model makes for the acceptability of the different verb cluster orders. This is the approach taken here. Unfortunately, this is not without problems. There are very diverse models of language processing and some models downright contradict each other. Furthermore, most models are not worked out in enough detail to be straightforwardly applied to new data. In fact, many key properties are not made explicit by the designers of the models. This makes it very difficult, if not impossible, to make reliable predictions. In order to demonstrate these problems, the next section provides an evaluation of various established processing models.

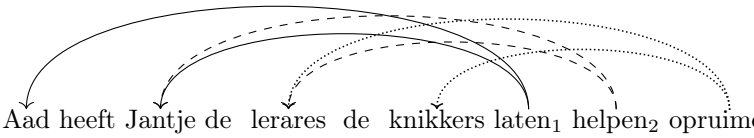
It will become evident during this chapter that none of the processing models can account for the results of the comparative judgement task by themselves. However, a combined model that takes both the grammar and language processing into account provides a better explanation for the results.

4.2 The diverse ideas on language processing

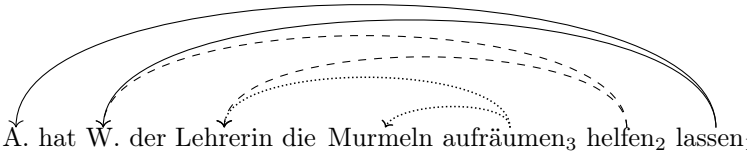
4.2.1 Intervening material makes processing harder

Crossed and nested dependencies

Bach et al. (1986) were among the first to discuss the difficulties involved in processing verb clusters. They focussed on the relation between arguments and verbs. An argument can sometimes have a dependency relation with more than one verb. For instance, in the sentence *Alfred helped the teacher collect the marbles*, the teacher is the one being helped, as well as the collector of the marbles. In languages with sentence-final verb clusters, new dependency relations can arise before others are closed off. In the Dutch head-initial order, this leads to multiple crossed relations of dependency, as illustrated in (77). In the German head-final order, this leads to multiple nested relations in, as illustrated in (78). According to Bach et al., such constructions are costly, because they require multiple arguments to be kept in memory before they are assigned to their respective verbs.



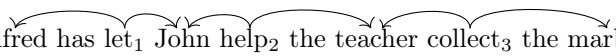
(77) Aad heeft Jantje de lerares de knikkers laten$_1$ helpen$_2$ opruimen$_3$.
Aad has Jan the teacher the marbles let help up.collect
'Aad let Jan help the teacher collect the marbles.'



(78) A. hat W. der Lehrerin die Murmeln aufräumen$_3$ helfen$_2$ lassen$_1$.
A. has W. the teacher the marbles up.collect help let

Bach et al. (1986) demonstrated that speakers of German have more difficulty comprehending sentences with multiple dependencies than speakers of Dutch. They concluded that nested orders are more difficult to process than crossed dependencies (see also Joshi (1990) and Rambow and Joshi (1994)). A crossed dependency is easier to parse, they argue, because it allows the language user to immediately integrate the verbs into the structure. In nested dependencies, on the other hand, the higher structure into which the lower verbs need to be integrated has not yet been encountered.

In English sentences, the arguments are all adjacent to the verb they belong to. This is illustrated in (79). Bach et al. argue that this explains why the English order is easier to comprehend and is found more acceptable.



(79) Alfred has let$_1$ John help$_2$ the teacher collect$_3$ the marbles.

However, it is generally assumed that the projection of the lower verb functions as the complement of the higher verb. There is hence a dependency relation between the verbs as well. It is not clear why Bach et al. (1986) do not take the relation between the verbs in this clause into account. In fact, those relations make differences in complexity between languages much less apparent. As illustrated in (80) and (81), in English, there are six relations that are nested within another dependency relation. In Dutch there are five relations that are nested, but some of these are nested within multiple other relations. As a consequence, it is no longer so obvious that the English order has fewer nested dependencies than the Dutch order.

(80) Alfred has let$_1$ John help$_2$ the teacher collect$_3$ the marbles.

(81) Aad heeft Jantje de lerares de knikkers laten$_1$ helpen$_2$ opruimen$_3$.
Aad has Jan the teacher the marbles let help up.collect
'Aad let Jan help the teacher collect the marbles.'

There are a number of assumptions one could make to ensure that the English order falls out as the easier order. But it is clear that this requires a more sophisticated calculation metric, with well-defined and supported variables, which is not provided by Bach et al. (1986). As will become clear below, this is a problematic issue for more recent theories of language processing as well.

The number of intervening words

Bach et al. (1986) established that the Dutch and German sentence-final verb clusters become increasingly more difficult to process when there are more dependency relations in the sentence. This finding is in line with a broader claim, according to which structures that have longer phrases embedded within them are generally harder to process (Hawkins 1994). Hawkins discusses the observation that in English, center-embeddings are ungrammatical when the embedded material is clausal, but not when the embedded material is an NP. This is illustrated in (82).

(82) a. ∗[Did [$_{S}$ that John failed his exam] [surprise Mary]]?
b. [Did [$_{NP}$ this fact] [surprise Mary]]?

According to Hawkins (1994), language processing occurs more rapidly and efficiently when constituents that belong together are closer to each other. Structures that contain complex center-embedded structures are more difficult

to process because they make it harder to recognize and produce phrase structure groupings. Since noun phrases are typically smaller than clauses, they can center-embed more easily.[56]

The preference to reduce the number of words required to recognize phrasal combinations is an instantiation of a more general processing principle proposed by Hawkins, which he dubs 'Minimize Domains.' According to this principle, the efficiency and complexity of a sentence is affected by the number of words that intervene between (syntactically and semantically) related items (Hawkins 2004, 2014).

Hawkins' theory can explain a number of cross-linguistic word order patterns. Consider for instance the difference between the two sentences in (83). While both sentences are fully grammatical, Hawkins states that sentence (83b) is easier to process than (83a), due to the fewer number of words that are minimally required to recognize and combine the subject with its predicate.

(83) a. [$_{S}$ [that their time should not be wasted] [$_{VP}$ is important.]]
S: 1 2 3 4 5 6 7 8
VP: 1 2

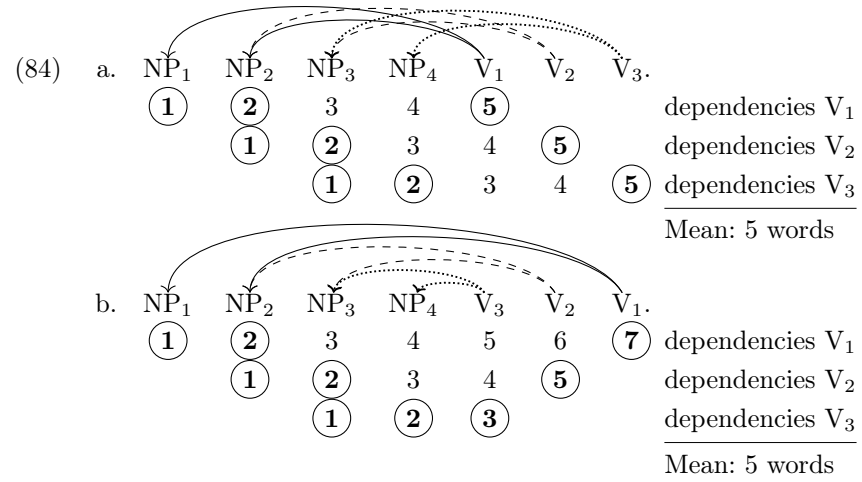
b. [$_{S}$ it [$_{VP}$ is important [that their time should not be wasted.]]]
S: 1 2
VP: 1 2 3

Hawkins argues that, in line with the Minimize Domains principle, sentences such as (83b) are indeed preferred over (83a), as evidenced by frequency patterns in corpora.

There are a few problems with Hawkins' approach, that become clear as soon as one attempts to apply his theory to new data. A single sentence contains many words that are, syntactically or semantically, related to each other. Theoretically, all of these relations might be subject to the Minimize Domains principle. It is unclear whether all these relations are relevant and, if so, how the processor deals with multiple preferences. Consider for instance the differences between the Dutch and German verb cluster orders in (77) and (78), that were observed by Bach et al. (1986). To be able to investigate whether these differences can be explained by Hawkins' model, it is very important to know which relations play a role. There are many relations that might affect the preferred order of verbs. The NP has a relation with one, maybe two verbs, and the verbs are also related to each other. Unfortunately, Hawkins (1994, 2004, 2014) is inexplicit on the question whether all these relations are as important for the processor. As a consequence, there are many ways in which one could apply his theory to these data. One way to go forward is to follow Bach et al.'s

[56] The word *typical* is crucial here. According to Hawkins, the functional disfavor for longer embeddings and the average length of sentential phrases has led to a "grammatical response that differentiates between [nominal and sentential embeddings] by blocking the structure that is regularly worse." (Hawkins 1994:24) This assumption is required to account for the fact that nominal embeddings are grammatical even when they are longer than sentential embeddings.

(1986) methodology and consider all and only the relations between the nouns and the verbs. This, however, does not lead to any differences between crossed and nested dependencies. The mean distances are identical between the two orders. This is illustrated in (84).[57]



This implementation of Hawkins' theory hence cannot account for Bach et al.'s finding that crossed dependencies are easier to process than nested dependencies, as such structures do not differ in overall dependency lengths. There are a few ways to deal with this result. First, one might conclude that this particular implementation of Hawkins' model is incorrect. Another possibility is that this implementation of the model is correct, and the factors that make crossed dependencies easier to process follow from processing properties that are independent of the preference to minimize domains. Such an approach is discussed in section 4.3.1. A final possibility is that the model is incorrect. Potentially, the language users' preferences that were observed by Hawkins follow from different properties of language processing. One might then consider a different processing model, such as the model presented by Gibson (1998, 2000), which is discussed in the next subsection.

The number of intervening discourse-referring items

Gibson's (1998; 2000) view on language processing is comparable to that of Hawkins' in that language processing is affected by the distance between related items. However, he argues that intervening discourse referents in particular lead to additional processing costs; each discourse-referring element that intervenes between two related items increases the processing cost. This model

[57] In fact, if one applies Hawkins' calculation metrics, the overall costs even make the wrong prediction that nested dependencies are easier to process than crossed dependencies. This is not illustrated here, for reasons of simplicity.

can explain differences between the difficulty of nested structures with a first person pronoun, as in (85a), and nested structures with a definite noun phrase as in (85b), or a full noun phrase as in (85c).

(85) a. The reporter [who the senator [who **I** met] attacked] disliked the editor].
b. The reporter [who the senator [who **the professor** met] attacked] disliked the editor].
c. The reporter [who the senator [who **John** met] attacked] disliked the editor].

Warren and Gibson (1999) conducted an experiment that revealed that participants find the sentence with the intervening pronoun much easier to understand than the other two sentences. Hawkins' locality theory is unable to account for the contrast between (85a) and (85c), as these sentences show no differences in the number of words. Gibson (2000) argues that elements that are more accessible in the discourse are easier to process. According to him, substantial processing costs are associated with the processing of the head noun of an NP that refers to a new discourse object and the head verb of a VP that refers to a new discourse event. Pronouns typically refer to entities or individuals that are focussed and highly accessible in the discourse, which makes them easier to process.[58] A nice aspect of Gibson's model is that it can account for many of the locality effects observed by Hawkins (1994, 2004, 2014), such as the differences between the sentences in (83).

Crucially, Gibson mentions that it is not only discourse-referring nouns and verbs that can cause processing cost increments. In fact, Gibson mentions that adjectives and contentful prepositions in particular, but perhaps all types of words, can cause (some) processing cost increments. This assumption causes problems in the implementation of this theory, as it it unclear how such different costs should be weighed. This is discussed further in section 4.3.

Both Hawkins' (1994; 2004; 2014) and Gibson's (1998; 2000) models are based on the assumption that an increased distance between related elements is associated with processing difficulties. This assumption has been challenged by a number of experiments that have revealed *anti*locality effects, in which intervening material facilitated, rather than hindered, processing. This is discussed

[58] There are other conceivable explanations for the contrast in (85). For instance, the fact that pronouns in English are specified for case might make it easier to determine the structure of the clause. This might make interruptions by pronouns less complex. One way to investigate this option is by considering interruption by a third person pronoun. If case is the distinguishing variable, intervention of this pronoun should be as acceptable as interruption by a first person pronoun. Gibson (1998) reports an experiment performed by Gibson and Warren (1998) that demonstrated that doubly nested relative clauses are easier to process when a first or a second person pronoun is in the subject position of the most embedded clause, than similar structures in which a third person pronoun is in the subject position. This seems to suggest that discourse indeed affects language processing.

in the next section. It will become apparent that there are various incompatible ideas on the precise factors that influence language processing.

4.2.2 Intervening material can make processing easier

Consider the differences between the two sentences in (86). In these sentences, the relative clause has a relation with the head noun, and the verb has a relation with the object. The overall distances between these related items are larger in sentence (86a), in which the relative clause precedes the main verb, than in sentence (86b), in which a relative clause is extraposed. Locality-based processing models thus make the prediction that sentence (86b) will be easier to process than sentence (86a).

(86) a. Er hat die Rose, [$_{RC}$ die wunderschön war], hingelegt.
He has the rose, that beautiful was, laid.down.
'He has laid down the rose that was beautiful.'

b. Er hat die Rose hingelegt, [$_{RC}$ die wunderschön war].
He has the rose laid.down, that beautiful was.
'He has laid down the rose that was beautiful.'

Indeed, this prediction is borne out in a corpus study by Uszkoreit et al. (1998). However, other studies have revealed conflicting results. Konieczny (2000) reports on a reading experiment in which the matrix verb was consistently read faster in sentences with an interrupting relative clause, compared with sentences with an extraposed relative clause, even when locality-based principles predict an extraposed relative clause to be easier. This finding is further underlined by an experiment involving acceptability judgements. Sentences with an intervening relative clause were judged systematically better than sentences with an extraposed relative clause. On the basis of these results, Konieczny hypothesizes that intervening relative clauses can facilitate processing, because they provide more time to anticipate the upcoming matrix verb. He claims that processing of a word becomes easier when it is preceded by other material, in disagreement with locality-based theories.

However, the results of the acceptability judgements were not as clear-cut as one might expect on the basis of Konieczny's theory. While the acceptability judgements indeed revealed that intervening relative clauses are generally more acceptable, the interruption of a relative clause became somewhat less acceptable when the relative clause was longer. This result is more in line with locality-based models. The three types of experiments thus show contradicting results:

- The corpus data support locality-based theories.

- The reading times support antilocality theories. Intervening relative clauses lead to shorter reading times, even when locality-based theories predict extraposition to be better.
- The acceptability judgements support both theories. Relative clauses are generally preferred to show up in an intervening position, even when locality-based theories predict extraposition to be better. However, the degree of the acceptability is affected by the size of the elements involved.

These results suggest that the nature of processing complexity is different for distinct modalities. This is very curious and this makes it very difficult to make predictions for different types of experiments. This hence requires a solid explanation.

There are a number of factors that have been proposed in the literature that might affect (anti)locality, namely: the difference in perception or production; the difference between local and global costs; the effect of normativity; the type of intervening items; and the complexity of the construction. Unfortunately, none of these factors can account for all results that were discussed so far.

Perception or production

Konieczny (2000) attributes the differences between reading times and acceptability judgements to a difference between language perception and language production. He hypothesizes that locality is a principle of language production and not of language perception. Other than reading times, acceptability judgements and corpus data concern language production and therefore exhibit locality effects. However, there is no theoretical reason why locality would only affect language production and not language perception. Linguistically, this is very unlikely. In fact, it is incompatible with the general idea that locality affects perception as well as production, for instance in long-distance wh-movement.

Additionally, the difference between language production and language perception does not explain the discrepancy between the corpus data and acceptability judgements. Konieczny mentions that corpus data might have been edited several times, but it is unclear how this can account for this difference. There is no clear reason why editing would result in more frequent extraposed structures.

Global or local costs, and normativity

Hawkins (2014) attributes the difference between corpus data and reading times to the fact that reading times reflect local points of processing load, in this case the reading times at the point of reading the main verb. Corpus data, on the other hand, reflect the structures selected based on global measures of processing ease. He argues that locality effects are not necessarily expected to be reflected in local reading times. Even if this is true, this does not account for

the differences between the corpus data and the speakers' judgements. According to Hawkins, the judgements "suggest a possible confound resulting from a normative bias" (Hawkins 2014:56). However, there is no clear reason why normativity would lead to a preference for interrupting over extraposed relative clauses.

The types of elements involved

A third possible explanation for the difference between corpus data on the one hand and reading times and acceptability judgements on the other could come from the types of elements involved. This is an approach taken by Vasishth and Lewis (2006). They argue that items that are active in memory are easier to process. According to their theory, when an item α predicts the presence of a following item β, β becomes easier to process when it is preceded by α. In addition, intervening items that have a relation with either α or β reactivate the prediction of β, which facilitates processing of β; an antilocality effect. This effect is cancelled when the intervening item is similar to the predicted element. For instance, if a verb predicts the presence of a human-referring noun phrase, processing is not facilitated by an intervening noun that is also human-referring. Finally, if the intervening item does not reactivate the predicted element, or is very complex itself, processing becomes harder, because the activation of the predicted element begins to decay. This leads to a locality effect.

In this theory, intervening elements can thus facilitate processing, hinder processing, or neither facilitate nor hinder processing, depending on three key ingredients: predictions, similarity, and complexity. Unfortunately, Vasishth and Lewis (2006) do not explicate these notions. For instance, they assume items to be similar when they are "mutually similar along some dimension" (Vasishth and Lewis 2006:781). This notion is thus open to interpretation, which makes it very difficult to implement this theory to new data. This will become evident in section 4.3.2. Moreover, this theory cannot explain the discrepancy between the reading times and the acceptability judgements observed by Konieczny (2000). As these experiments included the same items, the similarity-based theory does not predict the results of these experiments to differ from each other.

Another problem for the similarity-based interference theory of Vasishth and Lewis (2006) comes from yet another processing experiment, conducted by Levy (2008). He demonstrated that antilocality effects can even show up when the intervening constituent does not reactivate the upcoming head. He reports on an experiment performed by Jaeger et al. (2005) that measured reading times at the matrix-clause verb in the sentences in (87). This experiment showed that reading times at the matrix verb are lower when there are more adverbs in the intervening relative clause. Crucially, there is no dependency relation between the adverbs in the relative clause and the elements in the matrix clause.

(87) a. The player [that the coach met at 8 o'clock] bought the house.

b. The player [that the coach met by the river at 8 o'clock] bought the house.
c. The player [that the coach met near the gym by the river at 8 o'clock] bought the house.

The complexity of the clause

Levy proposes that that the difficulty of a word is related to the probability of that word occurring in that context (see also Hale 2001). When a language user encounters a temporal phrase in the sentences in (87), it becomes less likely that another temporal phrase will be encountered, and more likely that the upcoming word will be the matrix verb. Processing the matrix verb is then easier when more material intervenes, which is reflected in the reading times.[59]

Levy (2008) thus argues that all preceding elements will limit the choice in the upcoming constituents. Constituents that are preceded by more material are easier to process. This theory would never predict locality effects to arise, contrary to fact. Levy discusses a finding by Grodner and Gibson (2005), who show that the embedded verb in an intervening relative clause is read more quickly in subject relative clauses than in object relative clauses, even though more elements have been encountered in an object relative clause. To account for this result, Levy hypothesizes that long-distance dependencies such as relativization are sensitive to locality, while local syntactic dependencies are only sensitive to expectations. The complexity of the clause would then affect whether locality plays a role. A problem for this explanation is that locality effects have been argued to occur in simplex constructions as well (reconsider Hawkins' examples in (83)). It thus remains a mystery if and when locality or antilocality effects do arise.

In addition to this problem, the difference between reading times and acceptability judgements that were observed by Konieczny's (2000) experiments cannot be attributed to the complexity of the construction, as these experiments used the same constructions.

4.2.3 Summary

This section looked at a variety of models of sentence processing. Two main types of processing preferences were distinguished: locality and antilocality. Where locality is often argued to be an effect of limitations on working memory, antilocality is argued to be helpful for language users' expectations. The various experiments discussed in this section exhibited contradicting results and none of the theories of language processing was able to account for all of

[59] In addition to antilocality effects, Levy's (2008) theory also predicts frequency effects. Since the expectations of language users are based on the experience they have with the words and types of constructions in a sentence, more common words or constructions will be less difficult to process (see also Keenan and Comrie (1977); MacDonald et al. (1994), among others). A problem with such frequency-based explanations is discussed in section 4.4.

the facts. Consequently, it remains unclear what variables play a role in language processing. If and when language processing is affected by locality and/or antilocality effects remains an open question. This makes it very hard to apply these models to the data under investigation here.

There is an additional problem for applying these models to three-verb clusters. In order to test the hypothesis that language processing affects the speakers' judgements in the comparative judgement task, the required notions need to be well-defined. Unfortunately, all of the processing models that were discussed in this section involve some abstract notions, such as 'relation', 'similarity', and 'complexity' that are not well-defined. This leads to problems in the implementation. Despite these problems, the next section investigates whether any interpretation of the processing models can account for the results of the comparative judgement task.

4.3 Processing verb clusters

The remainder of this chapter investigates if the word order preferences for verb clusters can be attributed – entirely or partially – to properties of language processing. If speakers' preferences are entirely driven by processing preferences, the assumptions about the grammatical structure of verb clusters that were proposed in chapter 3 should be set aside to the extent that they do not follow from functional factors. This means that none of the six potential orders of three-verb clusters should be excluded on the basis of grammatical properties. This would fit neatly in the idea that functional approaches "typically recognize no level more abstract than surface structure and have no real equivalent to abstract parameter settings" (Newmeyer 2005:43). By initially setting aside all assumptions about the grammatical structure of verb clusters that were proposed in chapter 3, it can be thoroughly investigated whether those assumptions are really necessary to account for the observed order preferences, or whether the preferences can be attributed entirely to language processing.

It is also conceivable that the informants' preferences are only partly driven by processing preferences, and the grammatical theory proposed in chapter 3 should be assumed. In fact, many current functional models are completely compatible with the presence of an abstract language system. Therefore, processing models that take the assumptions about grammatical structure into account should be investigated as well. Section 4.4 discusses such an approach.

The central hypothesis that is investigated in this section is depicted in (88).

(88) When speakers can choose between multiple verb orders and they prefer one order to another, the preferred order will be easier to process.

For reasons of simplicity, only one of the two types of verb clusters is discussed here, namely *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF.' The test sentence for this cluster has the fewest arguments and no adverbs, which makes

it the least complex.[60] The average results of the comparative judgement task for this cluster are repeated in figure 4.1.

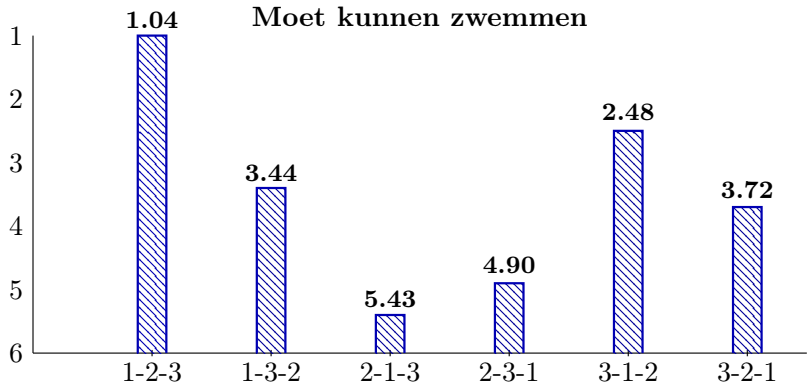


Figure 4.1: Results comparative judgement task for *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF'

In the previous section, a number of preferences of language processing were discussed that might play a role in the speakers' judgements. Hawkins' (2004; 2014) and Gibson's (2000) locality-based theories would predict orders to be easier to process when related items are close to each other. Antilocality theories, such as Konieczny (2000) predict opposite effects, especially considering the fact that the test sentences were relatively uncomplicated. Vasishth and Lewis (2006) might predict either locality or antilocality effects, depending on the definition of 'similarity'. Finally, Levy (2008) might also predict an antilocality effect, however, his model also allows for frequency effects, which leads to different predictions. All of these possibilities are explored in this section.

4.3.1 Locality effects

Hawkins' minimal domains

According to Hawkins (1994, 2004, 2014), the human parser prefers linear orders that minimize the number of words in which syntactically and semantically related elements can be combined. As was mentioned in section 4.2.1, a single sentence can contain multiple relations, all of which might be affected by this processing principle. One type of relation discussed by Hawkins is that of phrasal combination; the human processor prefers to minimize the domains in which a mother phrase can be combined with its immediate constituents

[60] The theory in chapter 3 is inexplicit about the exact structural relations of verb clusters. For instance, the 3-1-2 order might involve a raised subject, or a PRO-subject. These assumptions might be relevant for language processing. However, since none of the processing models is explicit in how the syntactic derivation can affect language processing, one can only guess what effects these assumptions will have. Therefore, this issue is set aside here.

(ICs). Hawkins provides a metric that makes it possible to compare the distances of Phrasal Combination Domains (PCDs) in different sentences. For each sentence, the number of constituents that need to be combined are divided by the total number of words that are required to combine them. By aggregating the ratio scores for an entire construction, it is possible to compare competing constructions to each other.

This metric is illustrated for three-verb clusters in (89). In three-verb clusters, the immediate constituents of VP_1 can be recognized on the basis of two words: the head (V_1) and the head of its complement (V_2). The constituents of VP_2 can be recognized on the basis of V_2 and V_3. For VP_3 only V_3 needs to be processed. The IC-to-word ratios are illustrated for the 1-2-3 order in (89a) and for the 3-1-2 order in (89b).

(89) a.

V_1	V_2	V_3.		
1	**2**		PCD VP_1:	2/2 or 100%
	1	**2**	PCD VP_2:	2/2 or 100%
		1	PCD VP_3:	1/1 or 100%
				Mean: 100%

b.

V_3	V_1	V_2.		
	1	**2**	PCD VP_1:	2/2 or 100%
1	2	**3**	PCD VP_2:	2/3 or 66.7%
1			PCD VP_3:	1/1 or 100%
				Mean: 88.9%

The domains of phrasal combination are minimal in the uniformly ascending 1-2-3 and descending 3-2-1 orders, and non-minimal in all other orders. There is no difference in the PCDs between these other orders. Consequently, the preference to Minimize Domains predicts the ranking: 1-2-3, 3-2-1 > all other orders. This does not account for the results of the comparative judgement task, which for instance revealed a much higher ranking for the 3-1-2 than the 3-2-1 order.

Since Hawkins' Minimize Domains principle can affect various types of relations, other relations between elements in a sentence might also be affected by it. This leads to many conceivable implementations of this theory, all of which make different predictions for preferences in verb cluster orders. This becomes particularly clear when one compares two previous studies of verb clusters that apply Hawkins' theory. Both Culicover (2014) and Bloem et al. (2017) discuss the effect of Minimize Domains on structures with two-verb clusters, as in (90).

(90) a. $S - O - V_{1.FIN} - V_{2.MAIN}$
b. $S - O - V_{2.MAIN} - V_{1.FIN}$

According to Culicover (2014), Hawkins' theory makes the prediction that the 2-1 order is easier to process than the ascending 1-2 order, because the main verb immediately follows its arguments in the descending 2-1 order, while the

auxiliary verb intervenes in the 1-2 order. On the other hand, Bloem et al. (2017) state that the 1-2 order should be easier to process, because the subject is in a dependency relation with the finite auxiliary verb. These two interpretations of Hawkins' theory thus make the exact opposite predictions. This contradiction shows very clearly that Hawkins' broad definition of a 'relation' is highly problematic. Since Hawkins is not explicit about the relevant relations, the orders of three-verb clusters could theoretically be affected by a large number of relations, in addition to the Phrasal Combination Domains: the θ-relation between the subject and the main verb, a relation between the auxiliary verbs and the main verb, and an agreement relation between the subject and the finite verb. Different combinations of these variables lead to different outcomes. The next graphs depict the results of three of these possible implementations.[61] Here, the results are plotted in a single graph with the results of the comparative judgement task. If any of these interpretations of the Minimize Domains principle were in line with the speakers' judgements, the graphs should be comparable to the results of the comparative judgement task. This is not the case. The 3-1-2 order, for instance, was found much more acceptable than the 3-2-1 order, but none of the implementations of the Minimize Domains principle led to a higher score for the 3-1-2 order than the 3-2-1 order. In addition, while the most unacceptable 2-1-3 and 2-3-1 orders often fall out as the most difficult orders, the difference with the other orders is not as large as one might expect based on the results of the comparative judgement task. Consequently, the results of the comparative judgement task cannot straightforwardly be attributed to the processing preference to Minimize Domains.

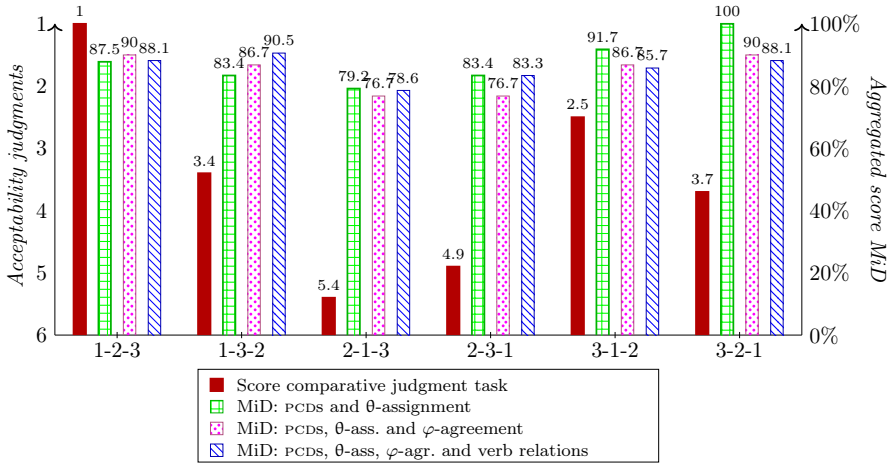


Figure 4.2: Comparing the Meertens Panel judgements with the predicted processing preferences, following Hawkins' locality-based principle.

Now, a problem presents itself. Since Hawkins is inexplicit about the relations

[61] The calculations can be found in appendix A.

that are relevant for the processor in addition to Phrasal Combination Domains, these implementations of the theory might be wrong. Potentially, a different set of relations could lead to the correct results. For this reason, many conceivable combinations of relations were applied to the data. So far, I have been unable to achieve the correct results. However, note that even if one of these selections had been successful, it would not be explanatory, as there is no independent evidence for selecting the winning set of relations.

Hawkins' minimal domains + Haider's scope preference

Section 4.2.1 demonstrated that Hawkins' theory was insufficient to account for the observed preference for crossed over nested dependencies. It was hypothesized that Hawkins' theory has to be supplemented with another property of processing that can account for this preference. Culicover (2014) argues that the order variation patterns in verb clusters can be explained in terms of the interaction of two complexity biases. The first is based on Hawkins (1994, 2004): the preference for orders in which heads are positioned close to their dependents. The second is in the spirit of Haider (2003): a parser preference for orders in which scope-taking elements precede the material they scope over. For the scope-preference, the 1-2-3 verb cluster has the perfect order. This hence favors sentences with crossed dependencies over nested dependencies. For the dependency bias, Culicover argues that orders are preferred in which 3 is more to the front, closer to the arguments of the sentence. Culicover (2014) does not discuss the dependency relation between the subject and the finite verb in this sentence. Nor does he discuss the dependency relation between the various verbs. Hawkins' theory does not explicate which of the many possible relations are of relevance (see also the discussion page 106). For reasons of simplicity, Culicover's assumptions are adhered to here.

According to Culicover, all verb orderings are in principle available for all languages, and the interaction of the two complexity biases can lead to different effects. He argues that 1-2-3 and the 3-2-1 orders are cross-linguistically more frequent than the other orders, because they are both optimal for one of the complexity biases; 1-2-3 perfectly reflects the scope order, while the 3-2-1 order is perfect for dependency distances. However, the results of the comparative judgement task did not indicate that the 3-2-1 order is preferred over all other orders, such as the 1-3-2 order.

It is possible to draw different predictions from the two complexity biases. While the 1-2-3 and the 3-2-1 orders are indeed perfect for one of the two complexity biases, they also maximally violate the other complexity bias. The 1-3-2 and 2-3-1 orders, conversely, are neither perfect for both complexity biases, nor do they maximally violate both complexity biases. This is illustrated in table 4.1.

order	complexity	perfect order	intermediate	maximal violation
1-2-3	scope	✓		
	dependency			✓
1-3-2	scope		✓	
	dependency		✓	
2-1-3	scope		✓	
	dependency			✓
2-3-1	scope		✓	
	dependency		✓	
3-1-2	scope		✓	
	dependency	✓		
3-2-1	scope			✓
	dependency	✓		

Table 4.1: Complexity bias score for the verb orderings, following Culicover (2014)

Another potential ranking on the basis of these results might lead to 3-1-2 > all other orders > 2-1-3. This does not fully account for the ranking of the verb clusters provided by the Meertens Panel. For instance, the 1-3-2 order is not predicted to be more acceptable than the 2-3-1 order. Hence, the language users' preferences cannot be attributed solely to these preferences of language processing.

Bach et al.'s multiple dependencies

Bach et al.'s (1986) assumption that orders in which material that can immediately be integrated into the structure are easier to parse, cannot explain the results of the comparative judgement tasks either. Consider the relations in the 3-1-2 and the 1-3-2 orders. Regardless of whether the relations between the verbs are assumed to be relevant or not, these distances do not predict the 3-1-2 order to be more acceptable than the 1-3-2 order.

(91) a. ...dat iedereen moet$_1$ zwemmen$_3$ kunnen$_2$.
...that everyone must swim can
'...that everyone should be able to swim.'

b. ...dat iedereen zwemmen$_3$ moet$_1$ kunnen$_2$.
...that everyone swim must can

One might stipulate that the relation between the subject and the finite verb is not relevant. In that case, the 3-1-2 order is correctly predicted to be more acceptable, as it would involve one crossed dependency less. However, the 3-2-1 order is then wrongly predicted to be much more acceptable than both of these

orders, as no relations are nested or crossed in the 3-2-1 order, as is illustrated in (92). This is not in line with the results of the comparative judgement task, which clearly indicated that the 3-1-2 order is more acceptable than the 3-2-1 order.

(92) ...dat iedereen zwemmen$_3$ kunnen$_2$ moet$_1$.

To conclude, the results of the comparative judgement task cannot be attributed to the number of nested and crossed dependencies.

Gibson's costs of integration and storage

Where Hawkins measures distance in terms of the number of words, Gibson (2000) argues that distance is affected by the number of discourse referents that intervene between two related items. His locality theory has two components: (i) the costs of structural integrations, which involves connecting a word into the structure built thus far, and (ii) keeping the structure in memory, which includes keeping track of incomplete dependencies. In addition to this, there are costs involved with discourse integrations. Gibson mentions that the exact relationship between integration and memory costs is still unclear. Therefore, both types of costs are considered here.

Gibson first focusses on the combined costs of discourse and structural integrations. Discourse integrations concern accessing or constructing the discourse structure of each discourse referent. Discourse referents are defined as words introducing new discourse elements, namely NPs and the main verbs of VPs that refer to events. Structural integrations concern connecting incoming words into the structure. Gibson argues that the processing costs for structural integrations are affected by discourse referents that intervene between items that need to be connected to each other. The distance-based integration cost profile for the 1-2-3 and 3-2-1 orders is presented in table 4.2. The amount of energy that is required to integrate a word in the structure is quantified in terms of energy units (EUs). The top row displays the costs associated with constructing the new discourse referents in the sentence: the subject and the verb that refers to a new discourse events, i.e. the lexical verb. The second row displays the costs of structural integration. In three-verb clusters, the head of VP$_1$ needs to be structurally connected with the subject and V$_2$, and the head of VP$_2$ needs to be structurally connected with V$_3$.

In the sentence with a 1-2-3 cluster, the first discourse referent that is encountered is 'Jan'. This integration thus consumes 1 energy unit. Subsequently, the highest verb of the cluster, 'moet', is integrated with the subject. No new discourse referents have been processed since the subject 'Jan' was processed, so the distance-based integration cost is 0 energy units at this point. The next point at which integration takes place is at the middle verb 'kunnen', which is integrated with V$_1$ without integration costs. Finally, the main verb is integrated into the structure. The cost of building the new discourse structure is 1

energy unit, because 'zwemmen' is a discourse referent. It costs 0 energy units to structurally integrate this phrase, since there are no intervening discourse referent heads between V_2 and 'zwemmen'.

	...dat ...that	Jan Jan	$moet_1$ must	$kunnen_2$ can	$zwemmen_3$. swim
discourse integration	0	1	0	0	1
structural integration	0	0	0_S	0_{V1}	0_{V2}
total costs	0	1	0	0	1
	...dat ...that	Jan Jan	$zwemmen_3$ swim	$kunnen_2$ can	$moet_1$. must
discourse integration	0	1	1	0	0
structural integration	0	0	0	0_{V3}	$1_S + 0_{V2}$
total costs	0	1	1	0	1

Table 4.2: Word-by-word integration costs for the 1-2-3 and 3-2-1 verb clusters.

In the 3-2-1 cluster, integration of the verbs occurs slightly differently. The lowest verb V_3 cannot be integrated into the structure until the middle verb is processed. At that point, V_2 is integrated as the head for V_3. No costs are associated with this integration, since the middle verb is not a discourse referent. At the point of processing the highest verb of the cluster, V_1, both the subject and the middle verb can be integrated into the structure. One discourse referent, 'zwemmen', was processed since the subject was input, so this integration consumes 1 energy unit.

Gibson assumes that "the overall intuitive complexity of a sentence depends to a large degree on the maximum complexity incurred at any processing state during the processing of a sentence" (Gibson 2000:105). So the difficulty of a sentence is not calculated by summing the different costs, but by looking at local difficulties. This assumption can be used to compare the complexity of the different verb clusters to each other. Since all verb orders consume maximally one energy unit at one point, there should be no difference in the complexity involved in integrating the different verb clusters. In other words, integration costs do not entail that different verb cluster orders are associated with different processing costs. Hence, this cannot be used to account for the results of the comparative judgement task.[62] A problem for this implementation is that Gibson mentions that not only discourse referents, but all words cause some processing cost increments. Since he does not explicate how to model different degrees of processing costs, it is very unclear how to weigh such effects. These

[62] If one were to assume that the 3-1-2 and the 1-3-2 orders involve a nominalized 3, it becomes even harder to account for the results of the comparative judgement task. These orders involve an additional discourse referent, as V_2 is now the main verb. As a consequence, the 3-1-2 order will have a higher maximal processing cost than the 3-2-1 order, even though the 3-1-2 order was found much more acceptable in the comparative judgement task.

potential costs are therefore set aside here.

The second component in Gibson's (2000) processing theory concerns storage costs; the costs involved with storing the words that are required by other words. Gibson argues that there is a storage cost associated with each syntactic head that is still required to complete the current input string as a grammatical sentence. For instance, in the sentences under investigation, at the point of processing the complementizer, at least two syntactic heads are still required to form a grammatical sentence: a noun and a verb. There is therefore a cost of 2 'memory units' at this point. Consider the storage costs associated with the different verb orders, depicted for 1-2-3 and 3-2-1 in table 4.3. In the 1-2-3 cluster, the first encountered verb is the finite modal verb, which requires an infinitival main verb. Conversely, in the 3-2-1 cluster, the first encountered verb is the main verb, which requires a finite verb.

	...dat ...that	Jan Jan	$moet_1$ must	$kunnen_2$ can	$zwemmen_3$. swim
requires	S + V_{FIN}	V_{FIN}	V_{MAIN}	V_{MAIN}	-
storage costs	2	1	1	1	0
	...dat ...that	Jan Jan	$zwemmen_3$ swim	$kunnen_2$ can	$moet_1$. must
requires	S + V_{FIN}	V_{FIN}	V_{FIN}	V_{FIN}	-
storage costs	2	1	1	1	0

Table 4.3: Word-by-word storage costs for the 1-2-3 and 3-2-1 verb clusters

No verb cluster order lead to maximum storage costs that exceed the 2 memory units arising at the point of processing the complementizer. As a result, this property of processing also does not make the prediction that different verb orders are associated with differences in processing costs. To conclude, no application of the various locality-based models is able to account for the results of the comparative judgement task.

4.3.2 Antilocality effects

Some have argued that intervening items can actually decrease, rather than increase, processing difficulty. However, simply reversing the predictions based on Hawkins' locality theory, does not lead to the correct results. For reasons of space, I shall leave it to the reader to verify this. Since Vasishth and Lewis (2006) argue that the types of elements in a clause affect whether locality or antilocality effects show up, this section focusses on predictions drawn from their theory.

According to Vasishth and Lewis (2006), items are easier to process when they are predicted to occur. So when an item α predicts the presence of a

following item β, β becomes easier to process when it is preceded by α. In addition, intervening items that have a relation with either α or β reactivate the prediction of β, which facilitates processing of β. However, when these intervening items are similar to the predicted β, this facilitation is cancelled. The definitions of 'similar' and 'predicted' are hence crucial to the implementation of this theory. Consider the verb cluster under investigation.

(93) ...dat iedereen moet$_1$ kunnen$_2$ zwemmen$_3$.
...that everyone must can swim

First, when a language user processes the subject in this sentence, (s)he predicts there to be a finite verb and a main verb (or a finite main verb), as those items are still required to make a grammatical sentence. Potentially, a V_2 that precedes either of these verbs might reactivate these predictions and hence facilitate processing. However, depending on the definition of 'similarity', this reactivation might be cancelled. Unfortunately, Vasishth and Lewis do not properly define this notion, so it is unclear whether V_2 will facilitate processing or not. Both options are investigated here.

The first option is that V_2 reactivates the prediction of the finite and the lexical verb. In (93), the subject has activated the prediction of the finite verb and the main verb. In the orders 2-1-3 and 2-3-1, the presence of V_2 will reactivate this prediction, because it has a relation with both the finite and the main verb. This will therefore facilitate processing of V_1 and V_3. Orders in which V_2 precedes the other two verbs, 2-1-3 and 2-3-1, are then predicted to be the easiest to process. This is not in line with the results of the comparative judgement task, as these orders in fact received the worst scores.

The second option is that V_2 does not reactivate the prediction of the finite and the main verb, because it is considered 'similar' to the other verbs. In that case, an intervention of V_2 will neither hinder, nor facilitate processing. As a consequence, the different verb orders are not predicted to display differences in processing. This leads to the wrong results. The 2-1-3 order, for instance, would be predicted to be as acceptable as all other orders.

In addition, neither of these possible implementations of antilocality would predict a difference between the 1-3-2 and the 3-1-2 orders. Nevertheless, the 3-1-2 order was found much more acceptable than the 1-3-2 order. To conclude, antilocality cannot account for the results of the comparative judgement task.

4.3.3 The language users' expectations

As discussed in section 4.2.2, Levy (2008) argues that words are easier to comprehend in contexts where they are highly predictable. According to him, this is affected by the experience that language users have with the words and types of constructions in a sentence. He hypothesizes that constructions that are rare might be more difficult to process, because they are less likely to occur. Words are easier to process when they frequently occur in the position where they are

observed, i.e. by statistical regularities. Following this hypothesis, the comparative judgements might be based on the probability of each verb occurring in its position in the different verb clusters.

There is a theoretical problem with the hypothesis that the lower frequency of a construction causes difficulties for the language user, as the reverse is also a theoretical possibility; the low frequency of this order might be the result of its difficulty. According to Hawkins (2004), structures that are preferred in performance are selected more frequently in usage. According to this view, the low frequency of a construction is a result of it being disfavored in language performance. This leads to a *chicken-and-egg* problem. Either a construction is more difficult to process because it is less frequent, or a construction is less frequent because it is harder to process. There is no clear-cut way to distinguish between these theoretical possibilities. For now, this problem is ignored and it is investigated whether frequency of occurrence could have affected the speakers' judgements.

A search was conducted using the PaQu search engine. This search engine enabled a search through 129.921 syntactically annotated sentences from the Spoken Dutch Corpus and 8.707.708 syntactically annotated sentences from LASSY large. The Spoken Dutch Corpus is a corpus of Dutch spoken by adults living in Flanders and the Netherlands, and LASSY Large is a corpus of sentences taken from Wikipedia articles.[63,64]

Unfortunately, this database did not contain enough data to determine the likelihood of the various words in the test sentence. For instance, the likelihood of encountering the modal verb 'moet' as the first verb in the test sentence could be determined by using trigrams. To that aim, one first needs to find all sentences that started with a complementizer followed by a noun or a pronoun and then any modal finite verb. This search only led to 162 instances in Lassy Large and 4 instances in the Spoken Dutch Corpus (SDC). These numbers are too small to make it possible to draw reliable conclusions. For that reason, the search was simplified and focussed on the occurrences of three-verb clusters. The results are depicted in table 4.4.

[63] I am grateful to Liesbeth Augustinus and Jelke Bloem for showing and explaining this search engine to me and to Erik Tjong Kim Sang and Gertjan van Noord for helping me perfect my search.

[64] The methodology for this search is described in appendix B.

	MOD.FIN-MOD.INF-V.INF		MOD.FIN-AUX.INF-PTCP	
	SDC	LASSY Large	SDC	LASSY Large
1-2-3	6	286	7	1315
1-3-2	0	0	5	115
2-1-3	0	0	0	0
2-3-1	0	0	0	0
3-1-2	0	0	7	969
3-2-1	0	0	0	0

Table 4.4: Frequencies in the two corpora using PaQu

The most striking results concern the MOD.FIN-MOD.INF-V.INF verb cluster. Since only one of those orders occur in standard Dutch, all others are equally improbable. These results hence do not account for the results of the comparative judgement task.

Although the frequencies of the orders for the MOD.FIN-AUX.INF-V.PTCP verb clusters closely match the ranking of the different verb orders, they are also not sufficient to account for the patterns. Especially since the 3-2-1 order is completely absent from standard Dutch, speakers are not expected to rank this order much higher than the 2-1-3 and the 2-3-1 orders.[65] In addition, these frequencies might make the prediction that the 1-2-3 order is more acceptable than the 3-1-2 order, contrary to fact. There is thus no evidence that shows that the speakers' judgements in the comparative ranking task are a result of experience.

It is conceivable that the processing models discussed so far do not make the correct predictions, because there are additional factors that play a role in the order of verbs in a cluster. Corpora of real-world texts have revealed many factors that play a role in the use of verb clusters within one language. The next subsection takes a short detour to discuss an approach that implements these factors in a processing model.

4.3.4 A usage-based processing model

Usage-based approaches often attribute variation to a combination of different factors. In overviews of corpus research by Coussé et al. (2008); Sapp (2011) and

[65] A potential explanation for the fact that speakers did find the 3-2-1 order in both verb clusters more acceptable than the non-occurring 2-1-3 and 2-3-1 orders comes from familiarity with what happens in varieties of Dutch. Perhaps speakers are familiar what happens in the varieties and their acceptability is (partly) based on that knowledge. Speakers may be familiar with the 3-2-1 order, since this order occurs frequently in the North. The experience-based theory might then make the prediction that speakers who have (more) contact with the varieties where this order occurs will find this order more acceptable. However, as was discussed extensively in chapter 3, this prediction is not borne out. The 3-2-1 order is not more acceptable for speakers from areas where that order is observed, than speakers from other areas.

Bloem et al. (2014) the following factors are argued to affect order variation in verb clusters: *the type of clause, whether or not the sentence has an extraposed phrase, the finiteness of the verbs, the frequency of the main verb, the genre of the text, the information value of preceding word, the length of the middle field, whether the main verb is a particle verb or not, whether or not a participle has an adjectival status, the depth of embedding, priming, the region of the language user, rhythmic factors, the social class of the language user, the time period,* and *the type of auxiliaries involved.*

As there are so many, partly unrelated, factors involved, corpus linguists often make use of so-called multifactorial models to unravel the relative effect of these factors (see Lötscher 1978; De Sutter 2005; Sapp 2006; Arfs 2007; Coussé et al. 2008; De Sutter 2009; Dubenion-Smith 2010; Bloem et al. 2014, among others). Since multifactorial models can quantify over different variables, the effect of a factor can be measured while controlling for other factors. In this manner, Bloem et al. (2017), for instance, have revealed a ranking of various factors that affect the order of two-verb clusters across constructions. This is displayed in table 4.5, in which the highest ranked variable has the largest effect on the order of verbs in a cluster.

Rank	**Factor**
1	type of auxiliary
2	priming
3	te-infinitive
4	extraposition
5	length of the middle field
6	frequency of the main verb
7	information value of preceding word
8	morphological structure of the main verb
9	multi-word units
10	syntactic depth
11	definiteness of the preceding word

Table 4.5: Results Bloem et al. (2017)

The question that arises is why these different factors affect verb clusters. Bloem et al. hypothesize that many of these factors could be attributed to processing complexity. According to them, there is a relation between the complexity of these factors and the observed verb orders. They argue that the variables that are more difficult to process are often associated with the ascending 1-2 order and conclude from this that the 1-2 order must be easier to process. This conclusion follows from the assumption that more difficult contexts will be more likely to have verb orders that are easier to process. In this way, speakers can reduce the total processing complexity of a sentence. For instance, Bloem et al. (2017) argue that particle verbs are more complex than regular main verbs and they demonstrate that such particle verbs are more likely to occur

with the 1-2 order. They conclude that the 1-2 order must be easier to process. They provide similar arguments for the factors 'extraposition', 'length of the middle field', 'multi-word units' and 'definiteness'.[66]

The conclusion that the 1-2 order is always easier to process is questionable. First, it is not obvious that more difficult constructions require easier orders. In addition, there is no apparent reason for assuming that one order is easier to process to start with. It makes one wonder why the other order would ever be used. Furthermore, if one order is indeed easier to process, it is not obvious that this is the 1-2 order. The argumentation provided by Bloem et al. is not fully valid, as some results make the opposite prediction. For instance, Bloem et al. demonstrate that sentences with deeper structural embeddings are less likely to occur in the 1-2 order, even though these are presumably harder to process. There are more such problematic results. For instance, Bloem et al. (2017) argue that longer middle fields are harder to process, because they are more likely to lead both to additional dependencies and to longer dependency lengths (in line with Gibson 1998). Since they find that the 1-2 order is associated with longer middle fields, they argue that this illustrates that this order is easier to process. However, Bloem et al. also discuss an opposite (anti-locality) view suggested by De Sutter (2007), who argues that longer middle fields make it easier to accurately predict the properties of the upcoming verb. This would undermine their conclusion that the 1-2 order is easier to process.

To conclude, there is no validity to the assumption that language processing can explain the verb order patterns.

4.3.5 Intermediate conclusion

This section aimed at investigating whether properties of language processing can account for the results of the comparative judgement task. Many, partially contradicting, theories of language processing were discussed. To be able to apply those models to this type of data, it is essential for them to be well-defined. It became very apparent that this is not the case. As a matter of fact, the models are very imprecise, even on crucial aspects of the theory. For instance, the broad definition of a 'relation' provided by Hawkins (1994, 2004, 2014) can be applied to a lot of dependency relations, leading to an explosion of possible implementations of this model. The most salient interpretations of the various models have been applied to the data. Crucially, none of these implementations led to the correct results. There is no apparent way in which processing models can be applied to the data that leads to results that are in line with the results of the comparative judgement task. This is especially striking in light of the fact that the previous chapter has demonstrated that a grammatical analysis can account for a substantial part of the results of the comparative judgement task.

[66] Note that this model does not explain the relative weight of these factors. It remains a mystery why, for instance, extraposition has a larger effect on the order of verbs in a cluster than a longer middle field.

The next section aims to investigate if a processing model that takes the assumptions about grammatical structure into consideration is better able to account for the results.

4.4 Language processing as a Third Factor

The previous sections have demonstrated that there is no processing account that successfully predicts the results of the comparative judgement task. However, if one were to follow Chomsky's (2005; 2007; 2008) Third Factor model, processing preferences do not need to account for all order variation. In such a model, processing preferences can only select from structures made available by the grammar system (see also Altmann and Steedman (1988), a.o.). This limits the amount of variation that processing models need to explain.

The first thought that comes to mind in combining a processing approach and a grammatical approach is using a grammar-based model of complexity, such as the Derivational Theory of Complexity (DTC) (Miller and Chomsky 1963). According to this theory, the complexity of a structure is dependent on the number of transformations that are required to generate that structure. The relevance of issues of language processing for generative theory was re-established by Marantz (2005). According to him, generative theory is psycholinguistic by nature, as it addresses representations and computations in the minds and brains of speakers. The complexity of the derivation should therefore in principle affect language processing. As was argued in chapter 3, the various observed orders of verb clusters do not require any transformations – they can all be base-generated. These orders are hence not be affected by the DTC. Consequently, this theory cannot account for the results of the comparative judgement task. For instance, it remains unclear why the 1-3-2 and the 3-1-2 orders, which can both be base-generated, are not equally acceptable.

Another possibility is to combine the processing models discussed in section 4.3 with the grammatical model that was proposed in chapter 3. In this section it is investigated whether such a combined model can account for the results of the comparative judgement task. The question that immediately arises is how such a combined model would work. If one takes the assumption seriously that the human processor can only select from structures that have been made available by the grammar system, at least three scenarios are conceivable:

1. All orders that can be derived by the grammar are considered by the human processor, regardless of whether these orders are a part of the language variety. This means that only the 2-1-3 and 2-3-1 orders are excluded and the human processor is able to rank the other orders.

2. Only the orders that are grammatical in the language variety are considered. For standard Dutch, this means that the 3-2-1 and the 1-3.N-2 orders are never considered.

3. Only orders that are grammatical in the language variety and that are syntactically and categorically equivalent are considered by the processor. This means that the processor has nothing to say about the choice between the 1-2-3 and 3-1-2 orders.

Here, predictions are drawn from all these scenarios.

Scenario 1: All derivable orders are considered by the language processor

It is likely that speakers made use of the knowledge of their own language variety in the comparative judgement task. However, it is theoretically possible that the grammar only played a small role in the comparative judgement task and properties of the informants' own language varieties have not affected their ranking. This only excludes two verb orders from being assessed by the language processor; the 2-1-3 order can never be merged and the 2-3-1 order can never be derived with the verb clusters under investigation.

Let's consider this theoretical possibility. The processing model then needs to account for the ranking between 1-2-3, 3-1-2, 1-3-2 and 3-2-1. For the *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF' cluster, this ranking is: 1-2-3 > 3-1-2 > 1-3-2 > 3-2-1. This does not improve the results. In section 4.3, it has been explicitly mentioned that the processing difficulties for these orders do not match their relative ranking, as the reader can verify for him- or herself.

Scenario 2: Only orders that are possible in the language variety are considered by the language processor

Potentially, the human processor only considers orders that can be derived in the language variety. Following this hypothesis, there are two orders that will not even be considered by the informants, because they are not a part of the language used in the comparative judgement task. First, the 3-2-1 order requires a different linearization, as was discussed in chapter 3. Secondly, the 1-3.INF-2 order requires nominalization of the infinitival 3 as well as interruption of this non-verbal element. Since no language variety has both these properties, this order should be ungrammatical. Consequently, language processing can only affect the 1-2-3, 3-1-2 and 1-3-2 orders for the *moet hebben gemaakt* 'must.MOD have.AUX made.PTCP' cluster, and the 1-2-3 and 3-1-2 orders for the *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF' cluster.

(94) a. Ranking for *moet hebben gemaakt* 'must.MOD have.AUX made.PTCP': 3-1-2 > 1-2-3 > 1-3-2

b. Ranking for *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF': 1-2-3 > 3-1-2

The implementation of Hawkins (1994, 2004, 2014) theory massively improves if one follows these assumptions. As the results in figure 4.2 on page 107 demonstrated, there are two possible implementations of Hawkins' theory that lead to a higher score for the 1-2-3 than the 3-1-2 order for the *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF' cluster. The guiding idea in these implementations is that the distance between 3 and its dependent V_2 is larger in the 3-1-2 order than in the 1-2-3 order. As a result, the 3-1-2 order is predicted to be worse than the 1-2-3 order.

To see how well Hawkins' theory handles the *moet hebben gemaakt* 'must.MOD have.AUX made.PTCP' cluster, one first needs to determine the domain distances. As this cluster has an additional argument and an adverb, the mean distances for this verb cluster are different than in the *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF' cluster. Appendix A provides the calculations for this verb cluster. The implementation in which all conceivable relations are considered, comes very close to the ranking of the comparative judgement task.

Domains	1-2-3	1-3-2	3-1-2
PCDs + θ-ass	87.5 %	81.7 %	85.4%
PCDs + θ-ass + φ-agr.	80 %	75.3 %	76.3 %
PCDs + θ-ass + φ-agr. + verb relations	85.7 %	77.6 %	78.3 %
PCDs + θ-ass + φ-agr. + verb relations + relation adv. & v_3	81.3 %	76.3 %	81.1 %

Table 4.6: Predicted processing preferences for must.MOD have.AUX made.PTCP, following Hawkins' locality-based principle

(95) Results comparative judgement task for *moet hebben gemaakt* 'must.MOD have.AUX made.PTCP': 3-1-2 (mean 1.65) > 1-2-3 (mean 1.56) > 1-3-2 (mean 3.36)

If one follows these assumptions, it is possible to attribute a large part of the speakers' ranking to preferences of language processing, although it is not explained why the 3.PTCP-1-2 order receives a slightly better score than the 1-2-3.PTCP order.

The other processing models cannot be used to account for this part of the results of the comparative judgement task. None of the salient interpretations of those models provides the correct ranking for both verb clusters. This is not discussed in detail here, but is supported by the following conclusions that can be drawn from the discussion in section 4.3.

- As table 4.1 on page 109 indicates, Culicover's (2014) theory does not make the prediction that the 1-2-3 order is easier to process than the 3-1-2 order for the *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF' cluster.

- Depending on the relations that are assumed to be relevant, Bach et al.'s (1986) theory either makes the prediction that the 1-2-3 order is more acceptable than the 3-1-2 order, or vice versa. This ranking is not predicted to depend on the types of verbs involved, contrary to fact.
- Gibson's (2000) theory does not make the prediction that any verb order is more acceptable (see the discussion on page 111-112).
- Vasishth and Lewis' (2006) antilocality theory would not predict a processing difference between the 3-1-2 and 1-3-2 orders (see the discussion on page 113).
- For an antilocality theory that reverses the predictions drawn from Hawkins (2014), there is no implementation that provides the correct results for both verb clusters.
- An account based on statistical regularities would wrongly predict the 1-2-3.PTCP order to be more acceptable than the 3.PTCP-1-2 order, as the 1-2-3 order is more frequent (see table 4.4 on page 115).

Scenario 3: Only orders that are possible in the language variety and that are syntactically and categorically equivalent are considered by the language processor

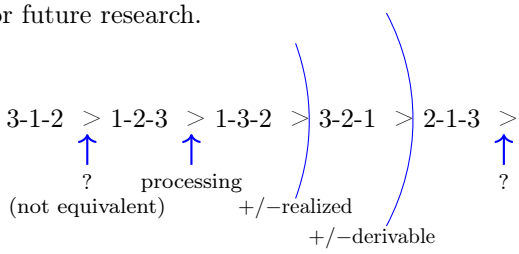
It is conceivable that the language processor can only choose between orders that are syntactically and categorically equivalent. In light of this, the language processor would never have to choose between the 1-2-3 and the 3-1-2 orders, as these orders are syntactically very different from each other. As was discussed in chapter 3, the 1-2-3 order is a three-verb cluster, while the 3-1-2 order is a two-verb cluster with a non-verbal 3. This entails that for the *moet hebben gemaakt* 'must.MOD have.AUX made.PTCP' cluster, only the choice between the 3-1-2 and 1-3-2 orders can be affected by language processing. The 2-1-3 and the 2-3-1 orders cannot be derived, the 3-2-1 order requires a different linearization, and the 1-2-3 order is syntactically different. For the *moet kunnen zwemmen* 'must.MOD can.MOD swim.INF' cluster, the 1-3-2 is not considered either, as this order is not part of the language variety.

This massively limits the part of the variation that can be explained by language processing. Only 3.PTCP-1-2 and the 1-3.PTCP-2 orders are true competitors. Indeed, the fact that the 3-1-2 order was found much more acceptable than the 1-3-2 order for this cluster can be attributed to properties of language processing. For instance, multiple interpretations of Hawkins' (2004; 2014) processing model indicate that the 3-1-2 order is easier to process, as is illustrated in table 4.6 above.

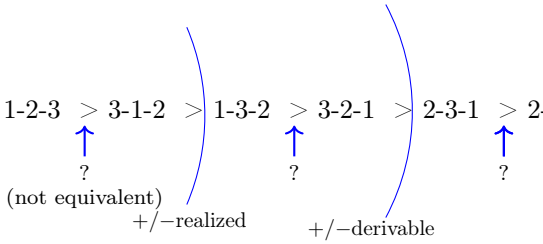
This combined approach can thus account for a large part of the comparative judgement task. This is illustrated in (96). Some rankings still remain unexplained, however. For instance, if processing can only guide a choice between

orders that are syntactically and categorically equivalent, it remains unclear how the informants choose between the 3-1-2 and 1-2-3 orders. Potentially, the semantics of the participle has affected their choice here. The fact that the 1-2-3.PTCP order was ranked higher than 3.PTCP-1-2 suggests that the verbal interpretation of the participle was preferred over a stative interpretation.[67] Additionally, if processing does not assess orders that are not part of the language variety, it is unclear how informants chose between unrealized orders. These issues remain open for future research.

(96) a. MOD-AUX-PTCP: 3-1-2 > 1-2-3 > 1-3-2 > 3-2-1 > 2-1-3 > 2-3-1



b. MOD-MOD-INF: 1-2-3 > 3-1-2 > 1-3-2 > 3-2-1 > 2-3-1 > 2-1-3



4.5 Summary and discussion

The results of the comparative judgement task clearly showed that speakers have intuitions on orders that can and cannot occur in varieties of Dutch. Speakers distinguish between what does occur, what can occur, and what cannot occur. This chapter further investigated speakers' potential strategies in this task. It was hypothesized that language processing partly drives their intuitions.

The chapter started with an evaluation of a number of processing models proposed in the literature. A problem that immediately appeared is that there is no consensus on the type of preferences that affect language processing. In addition to this, it became apparent that the current models of language processing are inexplicit on a number of factors that are crucial for their theories, such as the definitions of 'related' and 'similar' items.

These issues are very problematic for any approach that aims to draw predictions from these models. A very illustrative example came from two contradicting interpretations of Hawkins' (2004; 2014) theory. For this reason, a variety of possible applications of the processing models were investigated.

[67] This may be due to properties of V_2. In the test sentence V_2 was *hebben* 'have'. It would be interesting to see if the results change with verb clusters in which *zijn* 'be' is the middle verb.

None of predictions drawn from those models could account for the results of the comparative judgement task. It can be concluded that it is not possible to attribute the informants' ranking to properties of language processing alone.

Subsequently, it was hypothesized that a combined model that integrates processing theories in the grammatical theory outlined in chapter 3 could successfully account for the observed data. The results indicated that this approach is successful, especially if one assumes that the language processor only considers orders that are (i) possible in the language variety and (ii) syntactically and categorically equivalent. One can conclude from this that preferences of language processing play a limited role. This result is especially striking considering that in many functionalist approaches the explanatory role of a formal theory is often downplayed in sake of a functional theory.

In light of this, an important additional observation that was not discussed so far, is that none of these processing models can account for the geographic co-occurrence patterns that were discussed in section 2.10 of chapter 2. Chapter 3 has demonstrated that the grammatical theory is able to account for these patterns. However, none of the processing models can explain these facts. For instance, processing models have nothing to say about why the 1-2-3.PTCP, 1-3.PTCP-2 and the 3.PTCP-1-2 orders co-occur, with the exclusion of the 3-2-1 order. Neither can the processing models explain why the 1-3.INF-2 order only occurs in transitional areas. These facts further support the grammatical theory outlined in chapter 3.

Chapter 3 argued that the grammatical model allows for a number of choices, for instance the choice between different orders of Merge. This chapter presented a possible solution for the question how the language user makes a choice between different options. The next chapter of this dissertation delves deeper into the assumption that the timing of Merge, to a certain extent, is free, providing a choice between the 3-1-2 and 1-3-2 orders. It focusses on the parallel between these constructions, particle-verb constructions and so-called *verb cluster interruption*. It is demonstrated that the extent to which verb clusters can be interrupted by non-verbal material can further enlighten us on the underlying structure of verb clusters.

CHAPTER 5

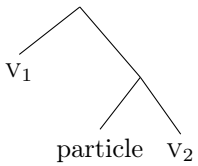
Verb cluster interruption

What are you going to do about it Belgium?
Call me when you get your own language.
John Stewart, the Daily show 30-9-2010

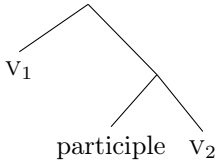
5.1 Introduction[68]

Chapter 3 discussed verb clusters that are interrupted by particles and adjectival participles. These types of constructions were argued to have the same underlying structure; of the type 1-x-2, as in (97).

(97) a.



b.



The chapter further discussed verb cluster interruption by bare nouns. It was shown that this phenomenon is mostly restricted to the Flemish part of the language area. This is especially interesting in light of the fact that the orders in which particles and participles interrupt the verb cluster was also shown to be common in Flanders. It seems that cluster interruption in general is a southern phenomenon. In fact, in this region, phrasal material, such as full noun

[68] Parts of this subsection are also discussed in Barbiers, Bennis, and Dros-Hendriks (2017)

phrases, can also interrupt the verb cluster. In (98) the interruption possibilities are depicted in a descending order.[69]

(98) a. MOD$_1$-**PTCL**-V$_2$: n=182
Jan had het hele brood wel [*willen* **op** *eten*].
Jan had the whole bread AFF want up eat
particle; verywhere except Friesland (SAND II-31b)

b. MOD$_1$-**PTCP**-V$_2$: n=163
...dat hij voor drie uur de wagen... [*moet* **gemaakt**
...that he before three o'clock the car... must made
hebben].
have
participle; everywhere except the north of the Netherlands (SAND II-17b)

c. MOD$_1$-**N**-V$_2$: n= 62
Ik weet dat Eddy morgen [*wil* **brood** *eten*].
I know that Eddy tomorrow wants bread eat
bare noun; frequent in the south-west of the language area, sporadic in the rest of the language area; (SAND II-28a)

d. MOD$_1$-MOD$_2$-**ADV**-V$_3$: n=54
Eddy *moet* [*kunnen* **vroeg** *opstaan*].
Eddy must can early rise
VP-adverb; absent in the Netherlands; frequent in the west of Flanders, sporadic in the rest of Flanders; (SAND II-28b)

e. MOD$_1$-**N.PL**-V$_2$: n=46
Ik weet dat Jan [*wil* **varkens** *kopen*].
I know that Jan wants pigs buy
plural noun (object); absent in the Netherlands; frequent in the west of Flanders, sporadic in the rest of Flanders; (SAND II-29a)

f. MOD$_1$-**OBJ.INDEF**-V$_2$: n=27
Ik weet dat Jan [*moet* **een nieuwe schuur** *bouwen*].
I know that Jan must a new barn build
indefinite object DP; only in the west of Flanders; (SAND II-29b)

[69] Note that verb cluster interruption can sometimes look like embedded V2, where the finite verb occurs in the second position after the complementizer, usually following the subject. This phenomenon is observed in some varieties of Dutch. However, there are two reasons for rejecting an analysis of verb cluster interruption as embedded V2. First, adverbs and objects can intervene between the subject and the verb, as some of the examples in (98) indicate. Secondly, the distribution of embedded V2 is a property of varieties from the north of the language area (see the data from the SAND atlas (Barbiers et al. 2008)). It is not observed in precisely those areas where verb cluster interruption occurs.

g. MOD_1-**PP**-V_2: n=26
Ik vind dat Jan [*moet* **naar Jef** *bellen*].
I think that Jan must to Jeff call
prepositional phrase; absent in the Netherlands; sporadic in Flanders; (SAND II-30a)

h. MOD_1-**OBJ.DEF**-V_2: n=15
Ik zei dat Willy [*moest* **de auto** *verkopen*].
I said that Willy had the car sell
definite object DP; absent in the Netherlands; infrequent in Flanders; (SAND II-29c)

Map 5.1 depicts the proportion of verb cluster interruptions across the language area. Darker colors indicate more interruption types accepted in that particular area. The map illustrates clearly that the possibilities to allow interruption increase geographically in moving from north to south-west.[70]

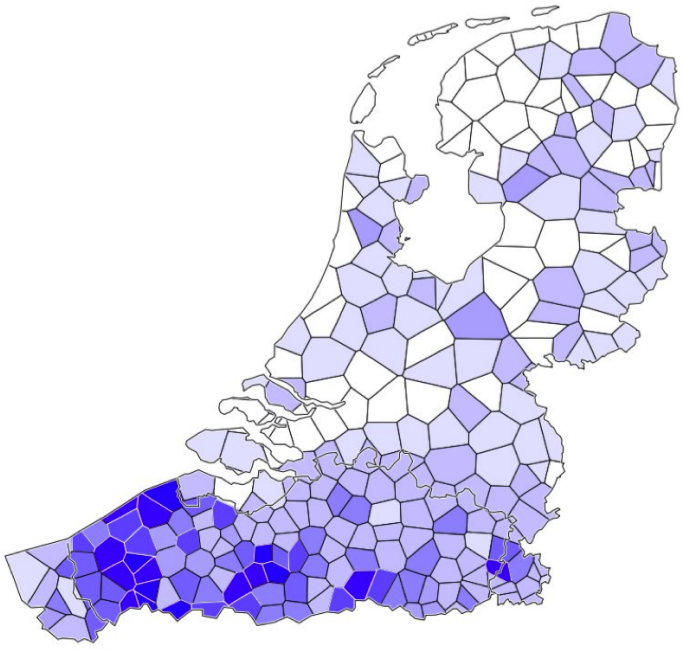


Figure 5.1: Cluster interruption – synthesis
(= occurrences of verb cluster interruption + particle interruption + 1-participle-2)[71]

Most types of interruption are not observed in Netherlandic Dutch varieties. Interruptions by phrasal material and adverbs are especially unacceptable in

[70] This observation will be discussed further in section 5.7.
[71] I'd like to thank Erik Tjong-Kim-Sang for his assistance with this map.

that part of the language area. The question that arises is whether all these types of interruption have an identical underlying structure.

Note that it is assumed here that both interrupted and non-interrupted orders are part of the West-Flemish grammar. Theoretically, there is the possibility that the two constructions are part of different sub-grammars possessed by speakers of West-Flemish (cf. Roeper 1999). Such an approach would be in line with the Minimalist claim that there is no optionality in grammar (Chomsky 1995). However, as section 5.3 will illustrate, cluster interruption is not a manner of a simple yes/no distinction. In three-verb clusters, West-Flemish allows not one, but two interrupting positions for manner adverbs: V_1-V_2-ADV-V_3 as well as V_1-ADV-V_2-V_3. Both orders are ill-formed in standard Dutch. Even if one were to argue that speakers of West-Flemish possess two grammars (say an interrupting grammar and a non-interrupting grammar), one would still need to account for the apparent optionality in the interrupting positions. I will simply assume here that all orders that can occur in West-Flemish are a part of a single grammar.

This chapter is organized as follows. For verb clusters with particles and participles, it was argued in chapter 3 that both the interrupted order and the non-interrupted order are base-generated. The next section will illustrate that other types of interruptions should be analyzed in a similar vein.

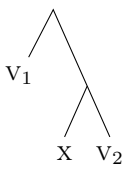
Section 5.3 will present data from the position of adverbs in the verb cluster. It will be illustrated that these data are problematic for previous theories of verb cluster formation. This hence supports the claim that verb clusters are base-generated. This claim will be further substantiated by the results in section 5.3, where it will be illustrated that all auxiliaries in varieties of Dutch behave the same in that they have to be merged in a low position.

The novel observation that will be presented from section 5.4 onward is that there is a clear cut-off point for cluster interruption. This cut-off point lies within the *v*P in West-Flemish, and lower in standard Dutch.

5.2 The underlying structure

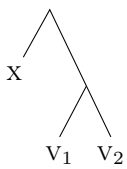
Chapter 3 argued that verb clusters with interrupted and non-interrupted particles and participles are base-generated. This is depicted in (99). This approach can account for the lack of an interpretative difference between these orders.

(99) a.



(interruption)

b.

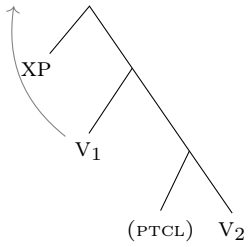


(no interruption)

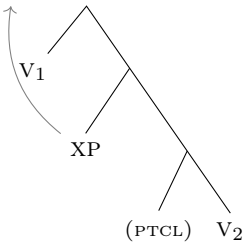
Potentially, all types of interruptions in (98), have the underlying structure of (99a). If this is the case, one needs to determine why all these elements can be base-generated in an interrupting position in West-Flemish, while in Netherlandic Dutch varieties, not all interruptions are acceptable.

Alternatively, it might be that the types of interruptions that are typical for West-Flemish are derived differently from interruptions by particles and participles. In such an analysis, a movement operation might underlie one of the orders. Two scenarios are conceivable. In the first scenario, aside from some elements such as particles and participles, non-verbal elements are always base-generated in a position preceding the verb cluster. This would mean that the Netherlandic Dutch order is the basic order and the Flemish interrupted order arises through head-movement of the auxiliary verb. This is depicted in (100a). In the second scenario, the interrupted order is the basic order and the non-interrupted order arises through movement of the non-verbal material, as in (100b). This would mean that West-Flemish exhibits the basic order and all interrupted elements in (98) are generated in their surface position. In Netherlandic Dutch, those elements obligatorily undergo movement to a higher position.

(100) a.



b.



This section aims at discovering which of these three options is correct. For a large part, this will be based on data from three native speakers of a variety of West-Flemish spoken in *Klemskerke*.[72]

[72] One of these speakers, Madga Devos, is both a linguist, as well as a speaker of that variety. She translated a large variety sentences from standard Dutch to West-Flemish. Subsequently, the three informants together provided judgements. Unless indicated otherwise, all judgements in the remainder of this chapter are provided by them. I cannot express my gratitude to Magda and her friends enough. They filled in multiple questionnaires without any complaints. The conclusions of this chapter could not have been reached without these informants. Of course, any wrongly drawn conclusions are my fault.

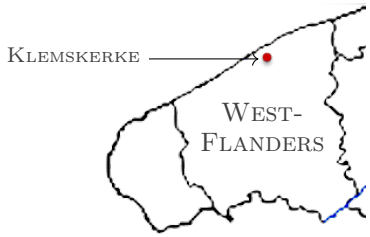


Figure 5.2: The West-Flemish village Klemskerke

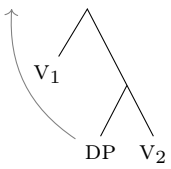
It will be argued that a base-generation approach can best account for the speakers' judgements. This hence provides a uniform analysis for all types of verb cluster interruptions.

5.2.1 Non-interrupted orders via movement of XP?

The first option to be investigated here is that non-verbal material such as DP objects are always generated inside the verb cluster. In this scenario, West-Flemish interrupted verb clusters are base-generated and non-interrupted verb clusters arise via movement of the non-verbal material. Sentence (101) would thus involve movement of the DP to a position preceding the verb cluster, as in (102).

(101) Ik zei dat Jan **de auto**$_i$ *moest* t$_i$ *kopen*.
I said that Jan the car had buy
'I said that Jan had to buy the car.'

(102)



This movement would be obligatory for speakers of Netherlandic Dutch varieties, and optional for speakers of West-Flemish varieties.

This approach would make a clear prediction with respect to further syntactic processes. Generally, constituents that have undergone syntactic movement become islands for extraction, i.e. become *frozen* (see for instance Corver (2017) and references cited therein). If XPs that precede the verb cluster have undergone movement, the prediction arises that nothing can be extracted from such constituents. Sentence (103) clearly demonstrates that this prediction is not borne out.[73] This sentence is well-formed in standard Dutch as well as in West-Flemish.

[73] See also Salzmann (2011) and references cited therein.

(103) Wat$_i$ heeft Jan laatst [$_{DP}$ t$_i$ voor auto's] *moeten kopen*?[74]
What has Jan the.other.day for cars had buy
'What kind of cars did Jan have to buy the other day?'

In contrast, extraction is not allowed from moved subjects (Den Besten 1985; De Hoop 1996), as is illustrated for standard Dutch in sentence (104b). This is in line with the general assumption that subjects are generated in a position lower than their surface position. Indeed, extraction is perfectly fine if the subject remains in the lower position and an expletive pronoun is placed in the higher position, as in (104c).

(104) a. [Dat soort mensen] zijn hard nodig.
That type.of people are hard needed
'That type of people are really needed.'

b. * Wat$_i$ zijn [t$_i$ voor mensen] hard nodig?
What are for people hard needed?

c. Wat$_i$ zijn er [t$_i$ voor mensen] hard nodig?
What are EXPL for people hard needed?

The fact that extraction is allowed from object DPs that precede the verb cluster, suggests that they are base-generated in their surface position.

An apparent contradiction to this suggestion arises when one considers the interpretation of sentences with interrupted and non-interrupted verb clusters. Haegeman and Van Riemsdijk (1986) demonstrate that sentences in which DPs

[74] It should be mentioned here that in West-Flemish varieties, extraction is also allowed from a position inside the verb cluster, as argued by Haegeman and Van Riemsdijk (1986). This also applies to LF movement of *wh*-words as in (i). They argue that the the *wh*-in-situ may have wide scope, allowing for a multiple question interpretation.

(i) K weten nie wien dan-ze *goan willen* voo wekken cursus *anduden*.
I know not whom that-they go want for which course appoint
'I wonder whom they will want to assign to which course.' (Haegeman and Van Riemsdijk 1986:451)

Indeed, my informants allowed extraction of a pronoun from a position inside the verb cluster.

(ii) ...dat Jan de borden daar$_i$ *moet* [**t$_i$** op] *zetten*.
...that Jan the plates there must on put
'...that Jan should place the plates on there.'

However, for reasons unknown to me, the West-Flemish informants did not allow *wh*-extraction from a position internal to the verb cluster (as in (iiib)).

(iii) a. Ik weet dat Jan laatst *moest* dat type auto *kopen*.
I know that Jan the.other.day had that type car buy
'I know that Jan had to buy that type of car the other day.'

b. * Wat heeft Jan laatst *moeten* voor auto *kopen*?
What has Jan the.other.day had for car buy
'What kind of cars did Jan had to buy the other day?'

Note that these facts argue against an approach that derives non-interrupted verb clusters through movement of the non-verbal material. Following such an approach, extraction should be allowed from a position internal to the verb cluster, but not from a position preceding the verb cluster. The judgements indicate, however, that extraction is allowed from a position preceding the verb cluster, but extraction is restricted from a position inside the verb cluster.

precede a verb cluster with a modal auxiliary are scopally ambiguous, while sentences in which DPs interrupt a verb cluster only have one interpretation. This is supported by the judgements in (105).

(105) a. ...dat Jan **geen toestemming** *heeft*$_1$ *kunnen*$_2$ *geven*$_3$.
...that Jan no permission has could give
'Jan was able to give no permission.' (MOD>NEG)
OR: 'Jan was not able to give permission.' (NEG>MOD)

b. ...dat Jan *heeft*$_1$ *kunnen*$_2$ **geen toestemming** *geven*$_3$.
...that Jan has could no permission give
'Jan was able to give no permission.' (MOD>NEG; *NEG>MOD)

At first sight, the interpretations suggests that DPs that precede the verb cluster are associated with a position below *kunnen* 'can'. However, this suggestion is in conflict with the lack of freezing effects in this ordering. Now, two options arise. First, one might argue that the DP has undergone movement in non-interrupted orders and, accordingly, stipulate an explanation for the possibility of extracting from this moved phrase. Alternatively, one might argue that the DP can be base-generated in a position preceding the verb cluster and, accordingly, argue that the modal verb can take scope over the DP in some other way. There are many plausible options to achieve such a result. The literature provides at least three. First, one might assume that modal verbs undergo *quantifier raising.*[75] Such a view is supported in a discussion on head movement by Matushansky (2006), who argues that "[i]f heads can reconstruct, they are predicted to be able to undergo Q[uantifier] R[aising] covertly as well." However, the question that this raises is where the landing site of the raised modal verb might be. Since, for instance, the scope of root modal verbs is smaller than the scope of epistemic modal verbs, one would have to assume multiple landing sites for different raised auxiliaries.

Another approach that allows modal verbs to be interpreted in a higher position than their surface position, is one in which a modal verb is generated in a low, lexical position, and forms a chain with a functional projection higher up in the structure, perhaps by covert movement. There is much theoretic literature on the presence of a functional projection for modal verbs higher in the clausal structure (Cinque (1999, 2006) and Wurmbrand (2001), among others).[76] Note that such a view crucially differs from Wurmbrand's as well as Cinque's, who argue that (epistemic and root) modal auxiliaries are generated as functional heads.

A final option by which modal verbs can occupy a higher position at LF, is one in which all verbs are assumed to move covertly to a higher position, such as T°. Salzmann (2011) also discusses the apparent contradiction between the scope facts and the lack of freezing effects in verb clusters and argues that verbs covertly incorporate into higher verbs. Subsequently, the entire verb

[75] But see footnote 78 on page 133.
[76] Cinque's theory will be explicated in section 5.3.

cluster covertly incorporates into T. Such a movement could be motivated by a requirement for verbs to be linked to tense, in order to anchor the reference of the event (Bennis and Hoekstra 1989).[77]

I conclude that there are at least three possible accounts according to which the modal verb might be interpreted in a higher position than its surface position. There are no conclusive arguments against either of these possible ways and I will not make a choice between these accounts here. I will simply assume that modal verbs can covertly raise to a higher position. The idea that head movement can have semantic effects has been established by Zwart (2001), Lechner (2007), Matushansky (2006), and Keine and Bhatt (2016) (contra Chomsky 2000).

We can now account for the interpretation of the sentences in (105). In sentence (105a), the DP is base-generated in a position preceding the modal verb and can hence take wide scope. Additionally, the modal verb can take wide scope over the DP, as these verbs covertly move to a higher position. In contrast, in sentence (105b), the DP is base-generated in a position below the modal verb and cannot take wide scope. The only possible interpretation of this sentence is one in which the modal verb takes scope over the DP.[78, 79]

I conclude that the contrast in scope and extraction possibilities do not straightforwardly follow from previous approaches to verb clusters.

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[77] Crucially, in this approach, linking to tense has to involve a movement of the verb to account for the scope facts. Hence, this cannot involve downward percolation of the tense features.

[78] The question that remains is why the DP cannot take wide scope from a position inside the verb cluster; why can it not undergo *quantifier raising*, especially considering the fact that wh-words can extract from the cluster without problems? One might assume that there is no such thing as quantifier raising. Quantifiers do not raise in order to get different scope relations. Such an approach is taken by Den Dikken (1994), following Kitahara (1992). He argues scope relations are encoded at s-structure. However, a dismissal of quantifier raising does not necessarily entail that scope is encoded at s-structure. Other covert movements can still affect scope relations. In fact, I argued above that modal verbs can always take wide scope as a result of a covert movement to a higher position. If there is no such thing as quantifier raising, such a movement would have to be triggered by something else. A few possibilities were discussed above.

[79] The freezing and scope effects do not straightforwardly follow from other theories of verb clusters. I will briefly illustrate this for the two most stereotypical of the previous approaches: one that assumes an underlying left-branching OV-order and one that assumes a right-branching VO order.

In an OV-approach with a left-branching structure, non-interrupted verb clusters arise because DPs are either stranded, or moved to a higher position before the verb (projection) raises. To account for the fact that a DP can take scope over the modal verb in non-interrupted orders, one needs to assume that this DP moves to a position above the modal verb in this order. This approach is not straightforward, as there is no clear motivation for the DP to move, especially considering the fact that this movement is apparently optional in West-Flemish. In addition, one needs to assume that the *wh*-word can be extracted from the DP prior to verb projection raising, to account for the extraction possibilities.

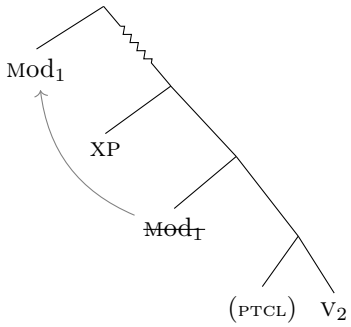
A VO-approach with a right-branching structure can clearly account for the scope facts in (105). However, it still does not explain why there are no freezing effects in non-interrupted verb clusters, as in (103). If the object has undergone movement in all these orders, one would not predict that *wh*-words can extract from these projections.

This subsection has argued that DPs that precede the verb cluster are generated in their surface position. To account for the fact that modal verbs can always take wide scope, it was argued that (auxiliary) verbs move covertly to a higher position.

5.2.2 Interrupted orders via movement of the auxiliary?

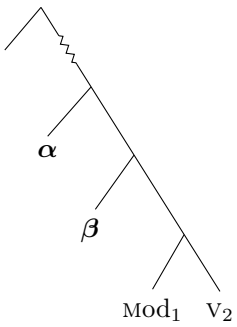
Another option worth investigating is that verb clusters interrupted by material other than particles and participles arise by means of movement of the auxiliary to some higher position. This is illustrated in (106). In this scenario, Netherlandic Dutch verb clusters are base-generated.

(106)

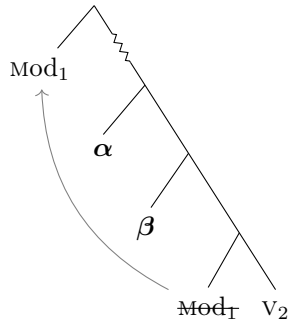


Following such an approach, verb clusters are interrupted when the modal verb overtly moves to the higher position and verb clusters are not interrupted when the modal verb does not move (overtly). In this scenario, verb cluster interruption should be all or nothing: either the verb overtly moves, or it does not. In other words, if two constituents (say α and β) can both interrupt a verb cluster, they may also be observed in a position preceding the verb cluster. However, it should not be possible to derive an order in which only one of these items interrupts the verb cluster. This situation is illustrated in (107).

(107) a. no verb movement → no verb cluster interruption:
...that SUBJ $\boldsymbol{\alpha}$ $\boldsymbol{\beta}$ MOD$_{\mathbf{1}}$ V$_{\mathbf{2}}$



b. verb movement → verb cluster interruption:
...that SUBJ MOD_1 $\boldsymbol{\alpha}$ $\boldsymbol{\beta}$ ~~MOD_1~~ V_2



c. * Impossible order:
...that he $\boldsymbol{\alpha}$ MOD_1 $\boldsymbol{\beta}$ V_2

In light of this, consider sentence (108), which contains an indefinite object as well as a PP resultative.

(108) I think that he has to$_1$ put$_2$ [$_{\text{DP}}$ something] [$_{\text{PP}}$ on a shelf].

The West-Flemish informants accepted both the orders in (109).

(109) a. MOD_1-**OBJ-PP-**V_2:
...dat hij *moet* **wat** **op een plank** *zetten.*
...that he must something on a shelf put

b. **OBJ-PP-**MOD_1-V_2:
...dat hij **wat** **op een plank** *moet zetten.*
...that he something on a shelf must put

If verb cluster interruption arises through movement of the modal verb to a single landing site, this landing site would have to precede both the DP and the PP. Now consider sentence (110), in which one of the phrases interrupts the verb cluster, while the other precedes the verb cluster.

(110) **OBJ-**MOD_1-**PP-**V_2 (partial verb cluster interruption):
...dat hij **wat** *moet* **op een plank** *zetten.*
...that he something must on a shelf put

Crucially, the informants also accepted this sentence. This suggests that verb cluster interruption is not the result of a single landing site of the modal verb.[80]

Another conceivable option is that there is a variety of higher positions to which the auxiliary can move, due to the presence of multiple landing sites for

[80] Note that this ordering cannot be attributed to a *scrambling* operation of the object. This was controlled for by using the indefinite, non-specific pronoun *wat*, which does not undergo scrambling (see Postma 1994).

the modal verb. While it might become difficult to motivate all required movements, this is a theoretical possibility.[81] However, there are empirical problems with this assumption. If the auxiliaries in sentence (105b) (repeated here) were generated in a position below the DP and have moved to their surface position, one would expect an interpretation in which the interrupting DP scopes over the modal verb. This is not the case.

(105) b. ...dat Jan *heeft*$_1$ *kunnen*$_2$ **geen toestemming** *geven*$_3$.
...that Jan has could no permission give
'Jan was able to give no permission.' (MOD>NEG; *NEG>MOD)

In contrast, Barbiers (2015) demonstrates that the original scope of a verb remains even after it moves to the second position of the clause (V2), across the negation marker.

(111) a. Ik denk dat Jan dat **niet** *hoeft*.
I think that Jan that not needs
'I think that it is not the case that Jan needs that.' (NEG>need)

b. Jan *hoeft* dat **niet**.
Jan needs that not
'I think that it is not the case that Jan needs that.' (NEG>need)[82]

Apparently, the scope relations of the base-position can be reconstructed after a verb undergoes head movement. It is hence unlikely that sentence (105b) involves movement of the modal verb across the DP.

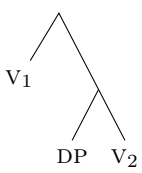
To conclude, it is unlikely that the difference between sentences with interrupted verb clusters and sentences with non-interrupted verb clusters lies in movement(s) of the auxiliary verb(s).

5.2.3 Base-generating all orders

If the difference between interrupted and non-interrupted verb clusters cannot be attributed to movement of the auxiliary, nor to movement of the non-verbal material, the option that remains is that both orders are base-generated. This should be a theoretical possibility. In a structure with a DP object and an auxiliary verb, the auxiliary selects the main verb, while the main verb selects the object. There is nothing in the Merge procedure that forces either of the required elements to be selected prior to the other.

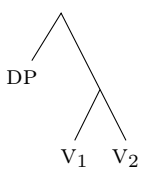
[81] Consider for instance Cinque's (1999) clausal spine, which contains a large variety of head-positions to which verbs can move (see section 5.3).
[82] The fact that *hoeven* 'need', does not take wide scope in (111b) could be attributed to this verb being a Negative Polarity Item, which needs to be interpreted in the scope of the negation.

(112) a.



(interruption)

b.



(no interruption)

As a consequence, all verb cluster interruptions are analyzed in a uniform manner; interruptions by particles and participles are not derived differently than other types of non-verbal material. No additional mechanisms are required to account for interruptions by phrasal material. This is particularly attractive in light of the facts that (i) all types of interrupted orders can co-occur with non-interrupted orders; (ii) neither of these types of interruptions display a meaning difference compared to their non-interrupted counterpart, putting aside the scopal differences discussed above; and (iii) cluster interruption by phrasal material displays a similar geographic distribution as verb clusters with particles and participles, in that interruption is more common in the south of the language area (see section 2.10.3 on page 40). This approach still requires an account for the lack of some types of interruptions in the Netherlandic Dutch varieties. Section 5.6 returns to this issue.

The next sections discuss cluster interruptions by adverbs. It will become clear that the variation in this construction poses problems for movement approaches to verb clusters. This further underlines the arguments presented in chapter 3 in favor of a free base-generation approach.

5.3 Verb cluster interruptions by adverbs

The previous section argued that all observed interrupted and non-interrupted verb clusters are base-generated. In non-interrupted verb clusters, all auxiliaries are hence merged directly in a low position. This section further substantiates this claim by considering verb cluster interruption by adverbs. The relevant issue here is that not all adverbs can freely be merged both inside and outside the verb cluster. While all adverbs that can interrupt the verb cluster can also occur in a position outside the verb cluster, the reverse is not true: some adverbs can only precede the verb cluster. This is illustrated in (114).

(113) a. ...dat Jan daarom *moet* **zacht** *praten.*
...that Jan therefore must quietly talk
'...that Jan therefore will have to talk quietly.'

b. ...dat Jan wel **zacht** *moet praten.*
...that Jan AFF quietly must talk.

(114) a. * ...dat hij vrijdag *moet* **helaas** *werken.*
...that he Friday must unfortunately work
'...that he unfortunately has to work on Friday.'

b. ...dat hij vrijdag **helaas** *moet werken.*
...that he Friday unfortunately must work.

It will be demonstrated in section 5.5 that theories in which verb clusters are assumed to have either an underlying left-branching OV-order, or a right-branching VO order require peculiar movements to account for the data.

Before going into this discussion, it is important to discuss the assumed position of adverbs in the clausal structure. According to Cinque (1999, 2006), the functional portion of each clause in all natural human languages consists of a hierarchy of rigidly ordered functional projections, as specified in (115).

(115) [MoodP $_{\text{speech act}}$ [MoodP$_{\text{evaluative}}$ [MoodP$_{\text{evidential}}$ [ModP$_{\text{epistemic}}$ [TP$_{\text{past}}$ [TP$_{\text{future}}$ [MoodP$_{\text{irrealis}}$ [TP$_{\text{anterior}}$ [ModP$_{\text{alethic}}$ [AspP$_{\text{habitual}}$ [AspP$_{\text{repetitive(I)}}$ [AspP$_{\text{frequentative}}$(I) [ModP$_{\text{volitional}}$ [AspP$_{\text{celerative(I)}}$ [AspP$_{\text{terminative}}$ [AspP$_{\text{continuative}}$ [AspP$_{\text{perfect}}$ [AspP$_{\text{retrospective}}$ [AspP $_{\text{proximative}}$ [AspP$_{\text{durative}}$ [AspP$_{\text{progressive}}$ [AspP$_{\text{prospective}}$ [AspP$_{\text{inceptive}}$(I) [ModP$_{\text{obligation}}$ [ModP $_{\text{ability}}$ [AspP $_{\text{frustrative/success}}$ [ModP $_{\text{permission}}$ [AspP$_{\text{conative}}$ [AspP$_{\text{completive}}$(I) [VoiceP [AspP $_{\text{repetitive(II)}}$ [AspP$_{\text{frequentative(II)}}$ [AspP$_{\text{celerative(II)}}$ [AspP $_{\text{inceptive}}$(II) [AspP $_{\text{completive}}$(II) [V]]]]]...] (Cinque 2006:175-176)

These projections are all headed by, possibly covert, functional heads. Each functional head has a semantic relation with an associating adverb that can be generated in its specifier. This entails that adverbs are generated in fixed positions in each and every human language. Cinque (2006) further argues that auxiliaries are merged as the functional head of these functional projections. This makes the prediction that the relative order of adverbs and auxiliaries is also rigid. However, this relative order can be changed, since Cinque argues that verbs can move to a higher head position in languages like Italian, as is illustrated in (116).

(116) Non gli riesco$_i$ [AspP$_{\text{terminative}}$ più [AspP$_{\text{frustrative/success}}$ t$_i$
Not to.him manage any.longer
[AspP$_{\text{continuative}}$ a continuare [a parlare
to continue to speak
'I do not manage to continue to speak to him any longer.'
(Cinque 2006:97, fn. 26)

Cinque's claim that adverbs are generated as specifiers of designated functional heads deviates from the traditional assumption that adverbs can be adjoined to various maximal projections. The data that I present in this chapter has nothing to say about which of these assumptions is correct. I further assume it

to be irrelevant whether the relative order of adverbs follows a rigid syntactic template (as in Cinque 1999, 2006) or is a result of semantic composition (as in Ernst 2001).[83] A choice between these approaches is beyond the scope of this dissertation. However, I make use of Cinque's hierarchy to demonstrate the relative position of adverbs. Broekhuis and Corver (2016) have established that the order of adverbs in Dutch for a large part corresponds to this hierarchy.[84] This is illustrated in (117).

(117) a. ...dat Jan helaas$_{evaluative}$ waarschijnlijk$_{epistemic}$ brutaal$_{voice}$
...that Jan unfortunately probably rudely
praat.
talk
'...that Jan unfortunately probably speaks rudely.'

b. * ...dat Jan brutaal$_{voice}$ waarschijnlijk$_{epistemic}$ helaas$_{evaluative}$
...that Jan rudely probably unfortunately
praat.
talks

The sentences in (118) illustrate that the relative order for auxiliary verbs also corresponds to Cinque's hierarchy (see also Barbiers 1995).

(118) a. ...dat Jan kan$_{epistemic}$ mogen$_{permission}$ zwemmen.
...that Jan can may swim
'It might be that Jan will be allowed to swim.'

b. * ...dat Jan mag$_{permission}$ kunnen$_{epistemic}$ zwemmen.
...that Jan may can swim

c. ...dat Jan mag$_{permission}$ kunnen$_{root}$ zwemmen.
...that Jan may can swim
'Jan will be allowed to be able to swim.'

As has been extensively discussed, in Dutch, all verbs cluster together in a sentence-final position. In this respect, this language is different from languages such as Italian, where verbs can occur in various positions between the adverbs. Consider for instance sentence (119), in which the auxiliary *mag* 'may' is preceded by a low, manner, adverb.

(119) ...dat Jan brutaal *mag praten.*
...that Jan rudely may talk
'...that Jan may speak rudely.'

The question that arises is how such sentence-final verbs clusters are derived, given Cinque's hierarchy. Important for any approach to verb clusters is that

[83] Ernst's (2001) theory is discussed further in section 5.5.3.
[84] See also Barbiers (2017).

the judgements of the West-Flemish informants with regards to cluster interruptions by adverbs show clear correspondences with Cinque's (1999; 2006) hierarchy. In a comparative judgement task, the informants rated cluster interruptions by lower adverbs as more acceptable than interruptions by higher adverbs. The informants were asked to rank sentences in which various adverbs interrupt a three-verb cluster. Five sentences containing different adverbs were presented at the same time. The three-verb cluster consisted of the auxiliary *gaat* 'will',[85] the modal auxiliary of obligation *moet* 'must', and a main verb. Three-verb clusters have two positions where adverbs might interrupt, so the informants were presented with two separate lists of sentences: one in which the adverbs interrupt the lowest position, as in (120a), and one in which the adverbs interrupt the highest position, as in (120b).

(120) a. (Jan wil niemand storen. Hij weet) dat hij daarom $gaat_1$
(Jan wants nobody interrupt. He knows) that he therefore will
$moeten_2$ **zacht** $praten_3$. (1-2-**ADV**-3)
must quietly talk
'Jan does not want to disturb anyone. He knows that he will have to speak quietly.'

b. (Jan wil niemand storen. Hij weet) dat hij daarom $gaat_1$
(Jan wants nobody interrupt. He knows) that he therefore will
zacht $moeten_2$ $praten_3$. (1-**ADV**-2-3)
quietly must talk

I asked the informants to rank the five different sentences relative to each other. In each of these sentences an adverb interrupted the verb cluster. The position of interruption was the same across the five sentences, but the type of adverbs was different. These were two manner adverbs: *wijs* 'wisely' and *zacht* 'quietly'; the continuative focus particle *nog* 'still'; the modal adverb *zeker* 'definitely' and the speaker-oriented adverb *helaas* 'unfortunately'. In Cinque's hierarchy, the manner adverbs are in a low position, the modal adverb is somewhat higher, and the speaker-oriented adverb is in a high position. As for the focus particle, this element could be in a variety of positions.[86]

For sentences in which the adverb interrupts the lowest position (1-2-ADV-3), the sentences were ranked as follows (from good to bad):

(121) *zacht* 'quietly' > *wijs* 'wisely' > *nog* 'still' > *zeker* 'definitely' > *helaas* 'unfortunately'.

[85] Actually, the standard Dutch sentence offered to the informants contained the auxiliary *zal*. Crucially, the informants translated this auxiliary with *gaat*, because they cannot use *zal* as a future auxiliary. As stated by Devos and Vandekerckhove (2005), *gaat* in West-Flemish is a future auxiliary and *zal* has a speaker-oriented modal flavor. (Note that Broekhuis and Corver (2016:135-141) (among others) argue that *zullen* is actually an epistemic modal in standard Dutch as well.) In order to avoid any misinterpretations, the examples in the text contain the auxiliary *gaat*.

[86] See for instance Barbiers (2014).

This clearly corresponds to Cinque's hierarchy, in that the two manner adverbs were ranked better than the modal adverb, which was ranked better than the speaker-oriented adverb.

For sentences in which the adverb interrupts the highest position (1-ADV-2-3), the ranking was almost identical:

(122) *wijs* 'wisely' > *zacht* 'quietly' > *nog* 'still' > *zeker* 'definitely' > *helaas* 'unfortunately'.

This means that, in both the 1-ADV-2-3 and the 1-2-ADV-3 orders, adverbs that are clearly lower in the clausal hierarchy were ranked better.[87] Thus, even in the highest position of three-verb clusters, lower adverbs are more acceptable than higher adverbs. For instance, for both the 1-2-ADV-3 orders in (123) as well as the 1-ADV-2-3 orders in (124) the informants ranked the sentence with the low adverb in (a) much better than the sentence with the higher adverb in (b).

(123) a. ...dat hij daarom *gaat moeten* **zacht** *praten.*
...that Jan therefore will must quietly talk
'(Jan does not want to disturb anyone. He knows) that he will have to speak quietly.'

b. * ...dat hij morgen *gaat moeten* **zeker** *werken.*
...that he tomorrow will must definitely work
'(Since he doesn't have to work today, Jan knows) that he will definitely have to work tomorrow.'

(124) a. ...dat hij daarom *gaat* **zacht** *moeten praten.*
...that Jan therefore will quietly must talk
'(Jan does not want to disturb anyone. He knows) that he will have to speak quietly.'

b. * ...dat hij morgen *gaat* **zeker** *moeten werken.*
...that he tomorrow will definitely must work
'(Since he doesn't have to work today, Jan knows) that he will definitely have to work tomorrow.'

Section 5.5 discusses the mechanisms involved in deriving verb cluster interruptions by adverbs in various previous approaches to verb cluster formation. It will become clear that the position of adverbs both inside and preceding the verb cluster poses problems for those approaches.

I argue that the position of adverbs with respect to the verb cluster can be understood if one takes the base-generation approach. It was established above,

[87] The fact that the two manner adverbs get different results might be a result of the methodology. The informants were forced to choose a single order. I take this difference to be irrelevant here. The main point is that these adverbs are the most acceptable as a cluster interrupter.

that low manner adverbs such as *zacht* 'quietly' are more acceptable inside the verb cluster than higher adverbs, such as *zeker* 'definitely'. In a 'regular' grammatical judgement task, the West-Flemish informants indeed judged interruptions by *zacht* 'quietly' (as in (125a)) as acceptable, while they judged interruptions by the higher adverb *zeker* 'definitely' (as in (125b)) as unacceptable.

(125) a. ...dat hij daarom *moet* **zacht** *praten.*
...that he therefore must quietly talk
'...that he therefore has to speak quietly.'

b. * ...dat Jan morgen *moet* **zeker** *werken.*
...that he tomorrow must definitely work
'...that he therefore definitely has to work.'

In light of this, consider the syntactic structure when other auxiliaries, such as *gaat* 'will' and *wil* 'want' are used. These auxiliaries are in a higher position according to Cinque's (1999; 2006) hierarchy. Now, a prediction arises. The aspectual adverbs *altijd* 'always' and *bijna* 'almost' are positioned higher than the functional projection where the root modal is licensed, but below the future auxiliary *gaat* 'will' and the volitional modal auxiliary *wil* 'want'. This is depicted in (126).

(126) [ModP$_{\text{epistemic}}$ ***zeker*** 'definitely'
[TP$_{\text{future}}$ *gaat* 'will'
[ModP$_{\text{volitional}}$ *wil* 'want'
[AspP$_{\text{perfect}}$ ***altijd*** 'always'
[AspP$_{\text{prospective}}$ ***bijna*** 'almost'
[ModP$_{\text{obligation}}$ *moet* 'must'
[VoiceP ***zacht*** 'quietly'
[VP V$_{\text{main}}$]]]]]]]]

If cluster interruption is dependent on the position of auxiliaries in Cinque's hierarchy, the future and volitional auxiliaries should allow cluster interruption by these aspectual adverbs, while the modal auxiliary *moet* 'must' should not allow cluster interruption by these adverbs.

Crucially, this prediction is not borne out. The informants were asked to rate the sentences in (127) and (128) on a five-point scale. If the acceptability of cluster interruption conforms to Cinque's hierarchy, the (a) sentences should be ill-formed, while the (b) sentences should be acceptable. The informants, however, scored all four sentences as ill-formed (with a score of 2 out of 5).

(127) a. * Ik weet dat Jan *moet* **bijna** *werken.*
I know that Jan must almost work
'I know that Jan almost has to work.'

b. * Ik weet dat Jan *gaat* **bijna** *werken.*
I know that Jan goes almost work
'I know that Jan almost goes to work.'

(128) a. * Ik weet dat Jan *moet* **altijd** *werken.*
I know that Jan must always work
'I know that Jan always has to work.'

b. * Ik weet dat Jan *wil* **altijd** *werken.*
I know that Jan wants always work
'I know that Jan always wants to work.'

These results clearly indicate that the acceptability of cluster interruption is not related to the position where the auxiliary should be licensed in Cinque's hierarchy.

The data indicate that all auxiliary verbs behave the same in that they can be merged freely with respect to low manner adverbs, but not with higher adverbs. This can be understood if one assumes that auxiliary verbs are base-generated in a low position, as part of a complex predicate. All auxiliaries have to be merged at least before higher functional projections, such as AspP – the position of aspectual adverbs – are merged. Lower functional projections, such as VoiceP can be merged in various orders with respect to the auxiliary, in a similar vein as has been argued for particle phrases in chapter 3. The question that now arises is where the exact cut-off point for merging the auxiliary is. This is the topic of the next section.

5.4 The extent of free merge

To investigate the exact cut-off point for cluster interruption, the informants were asked to provide judgements on cluster interruptions by a variety of adverbs. All test sentences consisted of a finite auxiliary, namely a modal of obligation, and an infinitival main verb. Aside from *volledig* 'completely', only adverbs that correspond to a single position in Cinque's (1999; 2006) hierarchy were included in these items. The relevant adverbs and their corresponding functional projections are listed in (129) and the entire list of test sentences can be found in appendix C.

(129) [MoodP$_{\text{evaluative}}$ *helaas* 'unfortunately'
[ModP$_{\text{epistemic}}$ *zeker* 'definitely'
[TP$_{\text{future}}$ *straks* 'later'
[MoodP$_{\text{irrealis}}$ *misschien* 'maybe'
[ModP$_{\text{alethic}}$ *onvermijdelijk* 'necessarily'
[AsP$_{\text{habitual}}$ *gewoonlijk* 'usually'
[AspP$_{\text{continuative}}$ *nog steeds* 'still'
[AspP$_{\text{perfect}}$ *altijd* 'always'
[AspP$_{\text{prospective}}$ *bijna* 'almost'
[ModP$_{\text{obligation}}$ *verplicht* 'obligatorily'
[AspP$_{\text{completive}}$(I) <*volledig* 'completely'>

[VoiceP *zacht, wijs* 'quietly', 'wisely'
[AspP$_{\text{completive}}$(II) <*volledig* 'completely'>] ...]]

Table 5.1 depicts the informants' judgements for each interrupting adverb.

Adverb		**Score**					
		Sounds bad					*Sounds good*
helaas	'unfortunately'	●	○	○	○	○	
zeker	'definitely'	○	●	○	○	○	
straks	'later'	●	○	○	○	○	
misschien	'maybe'	●	○	○	○	○	
onvermijdelijk	'necessarily'	○	○	●	○	○	
gewoonlijk	'usually'	○	○	●	○	○	
nog steeds	still	●	○	○	○	○	
altijd	'always'	○	●	○	○	○	
bijna	'almost'	○	●	○	○	○	
verplicht	'obligatorily'	○	○	○	●	○	
volledig	'completely'	○	○	○	●	○	
zacht	'quietly'	○	○	○	○	●	
wijs	'wisely'	○	○	○	○	●	

Table 5.1: The acceptability of various adverbs inside the verb cluster

These results clearly demonstrate that adverbs that are lower in the hierarchy are better interrupters.[88] The cut-off point for cluster interruption is not random, but lies somewhat below AspP$_{\text{prospective}}$; all lower adverbs can interrupt the verb cluster.

Note that obligation is a property usually attributed to the subject of the clause. The fact that the adverb of obligation *verplicht* 'obligatorily' is acceptable inside the verb cluster, leads to the prediction that low, indefinite subjects can also interrupt the verb cluster. This prediction is confirmed by sentence (130), which the informants found acceptable.[89]

(130) MOD$_1$-**SUBJ**-V$_2$:
Ik vind dat er morgen *moet* **een vrouw** winnen.
I think that EXPL tomorrow must a woman win.
I think that a woman has to win tomorrow.

Since it is generally assumed that subjects are generated in *v*P, one may hypothesize that this is the domain where auxiliaries can freely be merged in West-Flemish. After *v*P is merged, no auxiliaries can be merged anymore and

[88] There is one exception to this claim. The questionnaire included another alethic modal adverb, *mogelijk*, which was judged as acceptable as a verb cluster interrupter with a score of 4 out of 5. Currently I do not have an explanation for this.
[89] See also (Haegeman 1992:117), among others.

higher projections are merged. The cut-off point hence seems to lie on the border between the lexical and the functional domain of the clause.[90]

Cluster interruption by adverbs are thus derived as follows. A verb projection may take (an) auxiliary verb(s) to create a cluster that is interpreted as a complex predicate. The verb (projection) may also be modified by an adverb. Consequently, we find situations in which an auxiliary verb and an adverb are available for Merge with the main verb. In West-Flemish it clearly does not matter which element is merged first. No movements are involved to derive the available orders. Since manner adverbs, such as *zacht* 'quietly', are generated within *v*P, these types of adverbs can occur in various positions with respect to the auxiliaries.[91] Since the higher adverb *zeker* 'definitely' is generated in a higher position, this adverb cannot interrupt the verb cluster.

This provides an account for the unidirectional implicational relation observed in section 5.3. An adverb that can interrupt the verb cluster can also occur in a position preceding the verb cluster, but an adverb that can precede the verb cluster cannot always interrupt the verb cluster.

Section 5.6 considers the cut-off point for cluster interruption in varieties of Dutch spoken in the Netherlands. First, the next section demonstrates that previous theories of cluster formation cannot straightforwardly account for the available positions of adverbs with respect to the verb cluster.

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[90] Note that this cut-off point does not correspond to the classical distinction between clausal and predicate (or VP) adverbs (Jackendoff 1972). This distinction has been reestablished for Dutch by Broekhuis and Corver (2016) and Barbiers (2017). Both Broekhuis and Corver and Barbiers make use of a number of tests to distinguish clausal and predicate adverbs. Following these tests some aspectual adverbs, such as *altijd* 'always' and *nog steeds* 'still' fall into both classes. Nevertheless, these adverbs are unacceptable as verb cluster interrupters. It seems that only adverbs that belong solely to the class of VP adverbs can interrupt the verb cluster. This indicates that the aspectual adverbs belonging to the group of VP adverbs, are in a somewhat higher position than the cut-off point for cluster interruption.

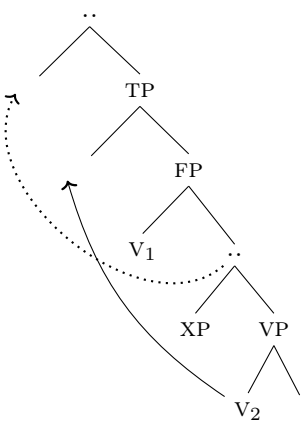
[91] An analysis in which adverbs can be base-generated in a higher position than where they are interpreted, requires some type of mechanism by which adverbs can be related to lower verbs. According to (Bouma 2003:25), in sentences in which two adverbs precede the verb cluster, multiple possible interpretations arise: The higher adverb modifies V_1, while the lower adverb modifies V_2, both adverbs modify V_1 or both adverbs modify V_2. A reading in which the higher adverb modifies V_2, while the lower adverb modifies V_1 (a "nested" reading) is impossible.
A possible way to account for these facts is to adopt Bouma's (2003) analysis and assume (following Van Noord and Bouma 1994) that the adverb is lexically introduced by the verb it modifies. This selection can then be *inherited* by higher verbs (in line with what has been proposed for arguments on page 61). In this way, a higher adverb can behave as an adjunct of an embedded verb. To account for the observation that the higher adverb cannot take a narrower scope than the lower adverb, Bouma argues that adjunct scope follows word order. There may be a deeper explanation for this fact. The relative positions of adverbs with respect to other adverbs resembles the relative position of arguments with respect to other arguments. While it is argued in this dissertation that arguments can be base-generated in higher positions, arguments are certainly not inserted at random with respect to each other. Rather, arguments that are associated with lower positions generally need to be merged first. This ordering restriction on adverbs and arguments hence seems to be a more general property of Dutch syntax. I hope to address these issues in future research.

5.5 Deriving the position of adverbs in previous approaches

5.5.1 The position of adverbs in a fixed head-initial base order

First consider an analysis with an underlying right-branching, head-initial order. Cinque argues that verb-final orders can be analyzed as "raising of the V to T/AGRs and then movement of the entire remnant past the V (cf. Kayne 1994:52)." (Cinque 2006:128)[92]

(131)



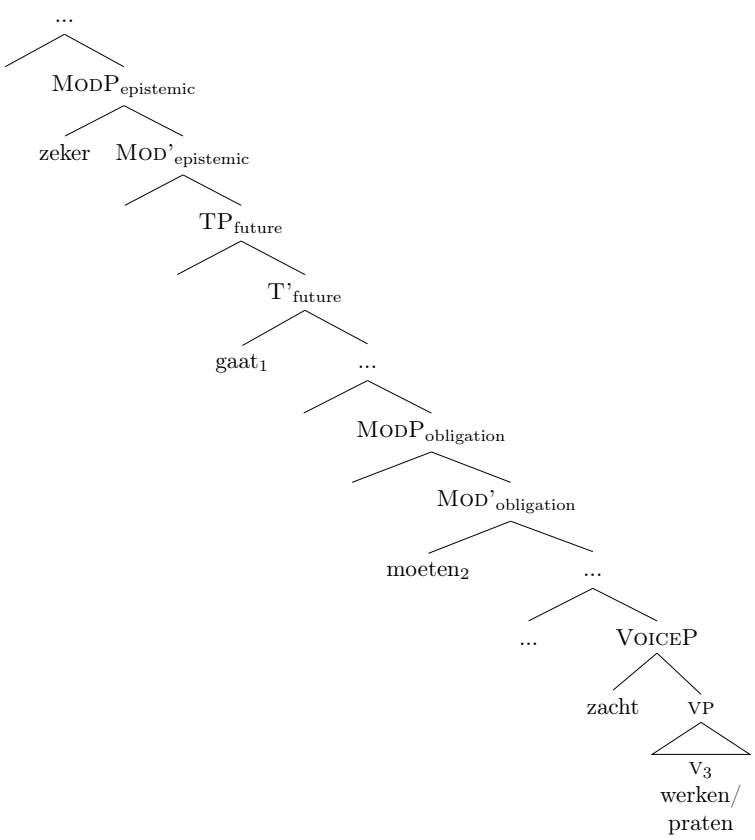
This movement can derive a verb cluster with a descending order, as in Frisian or German. To achieve an ascending word order, the landing site of the lower verb would have to be in a position below the higher verb. It is unclear what this position should be. Following the hierarchy in (115), this could not be TP. Of course, Cinque's clausal spine hosts many head positions where the verb may land, but there is no obvious motivation for such a movement.

Crucially, it is not only the movement of the verb that is not clearly motivated in this approach. In Cinque's (1999; 2006) framework, the sentences in (124) have a base-structure of (132).[93]

[92] Such a remnant movement approach is similar to Koopman and Szabolcsi (2000) and Hinterhölzl (2006), except that they argue that auxiliaries are main verbs that select full CP complements.

[93] For reasons of simplicity, the irrelevant projections are not depicted in this structure.

(132)



Since Cinque (1999, 2006) explicitly argues that adverbs do not move, the derivation of the 1-ZACHT-2-3 order is not straightforward in this structure. One way to derive this order would involve movement of (a projection containing) V_3 to a position above *zacht*, followed by movement of the projection containing *zacht* to a position in between V_1 and V_2.

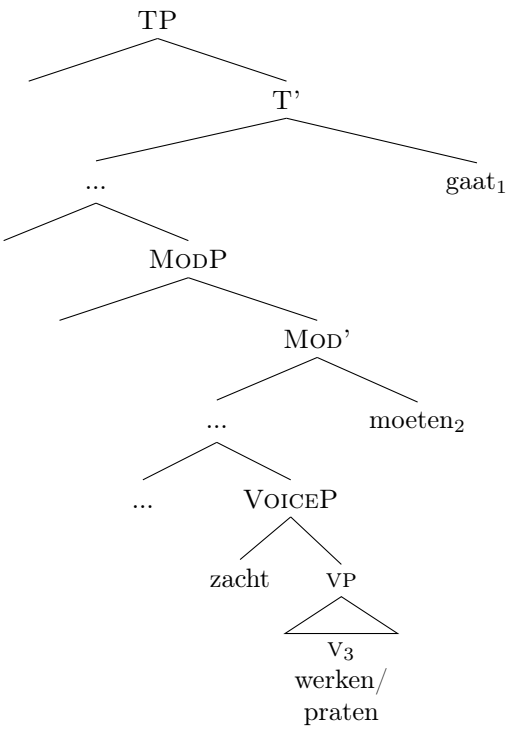
The motivations for moving the remnant projection are not straightforward in this approach, especially considering the fact that the remnant projection is empty except for the adverb, which does not provide a clear trigger for movement. Moreover, the ZACHT-1-2-3 order, which is a third possibility in these varieties, requires an additional landing site of the projection containing *zacht* above the highest auxiliary. One might attribute the difference between these landing sites to some type of parameter. However, this makes it difficult to explain why all three orders can occur in West-Flemish.[94]

[94] Hinterhölzl (2006) presents another approach to verb cluster formations, which also has an underlying SVO structure and is therefore worth mentioning here. His approach is similar to the approach taken by Koopman and Szabolcsi (2000), but involves fewer movement operations. He argues that all verbs project to a full CP. In this approach, a number of movements take place to derive verb clusters. First, elements such as objects move out of the embedded

5.5.2 The position of adverbs in a fixed head-final base order

The syntactic structure with an underlying left-branching order is depicted in (133).

(133)



Many different movements are required to derive the different positions of the adverb in the verb cluster. First, the 1-2-ZACHT-3 order requires movement of VoiceP to a position following *moeten* (but below the TP), and a subsequent movement of ModP to a position following *gaat*. The 1-ZACHT-2-3 order requires movement of VP to a position following *moeten*, followed by movement

verb phrase to a slightly higher position. Subsequently, the embedded AspP, which contains only the verb phrase and potentially a particle, moves to the embedded Spec-CP. After this movement, the embedded TP, which contains the objects, adverbs, and the trace of AspP, moves to a position above the higher verb, but below higher adverbs.
To derive verb cluster interruptions by elements other than particles, Hinterhölzl assumes that a projection higher than AspP is moved to the embedded Spec-CP. Again, these movements are difficult to motivate, especially considering the fact that there is optionality in verb cluster interruption within one language.
In addition, this approach requires further assumptions to account for the possibility of extracting from a DP preceding the verb cluster. Hinterhölzl argues that freezing is a "specificity effect" and therefore does not affect movement of objects out of the lower clause. See Salzmann (2011:476) for arguments against this claim.

of MODP to a position following *gaat*. Finally, the ZACHT-1-2-3 order presents the most problematic case. This requires movement of the VP to a position following *moeten*, followed by movement of MODP to a position following *gaat*. Importantly, this movement has to exclude the adverb. There are two ways in which one could achieve this, but both are problematic. The first is to assume that the verbs undergo head movement only in this order, which has obvious problems. The other way to derive the ZACHT-1-2-3 order is to assume that the adverb has undergone movement to a position above MODP. However, there is no clear trigger for moving this adverb, especially considering the fact that it does not move in the other two available orders.

To summarize, a derivation from an underlying left-branching SOV word order requires a number of movements that are difficult to motivate.

5.5.3 A lexicosemantically based position of adverbs

The derivations in the previous sections assumed that adverbs and auxiliaries are generated in fixed positions in the syntactic structure, in accordance with Cinque (1999, 2006). However, Ernst (2001) argues that the ordering of functional projections is not as rigid as claimed by Cinque, but depends on lexicosemantic properties. According to him, adverbs can be merged in a range of positions, as long as their surface positions meet their selectional properties. One adverb might select an event, while another selects a proposition. Crucially, events and propositions do not correspond to particular syntactic projections. In a well-formed clause, the projections are hierarchically ordered as in (134).

(134) Speech-Act > Fact > Proposition > Event > Specified Event

This hierarchy entails for instance that an adverb can take an event and turn it into a proposition. However, the reverse is not a possibility; a proposition cannot be turned into an event. The sentences in (135) illustrate this.

(135) a. Theo probably cleverly bought flowers.
b. * Theo cleverly probably bought flowers.
(Ernst 2001:19)

While *cleverly* takes an event as its argument to form an event, *probably* takes a proposition to form a proposition (as only propositions have truth-values). Once an event becomes a proposition, it can no longer function as an event. As a consequence, *probably* can select a proposition containing the event and the adverb *cleverly*, but the event-selecting *cleverly* cannot select the constituent containing the proposition with *probably*.

Ernst states that auxiliaries are merged in a position outside the event. Epistemic modals even select full propositions. The adverb *zacht* is a manner adverb; it selects an event. Accordingly, all auxiliaries always have to precede all manner adverbs (in a head-initial approach), or they always have to follow

manner adverbs (in a head-final approach). Consequently, the same problems arise as in the previous two sections.

5.5.4 The position of adverbs in a PF inversion approach

Another type of approach to verb clusters discussed in previous chapters is one where different verb orders are the result of a reordering at PF. Chapter 2 discussed two recent approaches. The first type of approach assumes that linearly adjacent words can be inverted (Salzmann 2013). Such an approach cannot explain why low adverbs, but not high adverbs, can interrupt the verb cluster. Salzmann himself mentions that his accounts overgenerates (Salzmann 2013:115).

The other type of PF approach involves an inversion of nodes that are sisters in the syntactic structure, as in Wurmbrand's (2006; 2017) modified version of Haegeman and Van Riemsdijk (1986). In this approach, an order in which the lowest adverb precedes the verb cluster cannot be derived. If one assumes a head-initial base order, the base-generated order is 1-2-ZACHT-3. Inversion of sister nodes cannot place the adverb in a position preceding the highest verb. If one assumes a head-final base order, all verb projections have to invert to derive an ascending verb cluster. These inversions cannot exclude the lowest adverb. Again, the ZACHT-1-2-3 order cannot be derived.

These sections clearly demonstrate that earlier approaches to verb clusters cannot straightforwardly derive the various available positions of adverbs in the verb cluster. This further supports the claim that auxiliaries are generated and spelled-out in a low position. Such a base-generation approach can account for the available positions of adverbs.

I thus argue that cluster interruption is the result of a free choice in the timing of merging the auxiliary with respect to other low material. In West-Flemish, 'low' corresponds to vP, as was argued in section 5.4. The next section investigates the restrictions on cluster interruption in Netherlandic Dutch. The theory outlined so far makes the prediction that Netherlandic Dutch should also have a clear cut-off point for cluster interruption.

5.6 The restrictions on VCI in NL Dutch

So far, it has been argued that verb cluster interruptions arise because the auxiliary can be merged after other vP-internal material is merged. Chapter 3 already showed that varieties of Netherlandic Dutch, such as standard Dutch, also allow a free order of Merge between particles and auxiliaries. In fact, it seems that the particle can interrupt anywhere inside the verb cluster; this is illustrated in (136a). Interruptions by adverbs, as in (136b), however, are completely unacceptable in standard Dutch.

(136) a. ...dat Jan het hele brood wel (**op**) *had* (**op**) *willen* (**op**) *eten*.
...that had the whole bread AFF up had up want up eat
'...that Jan would have liked to eat up the whole bread.'

b. ...dat Jan daarom (**zacht**) *had* (***zacht**) *moeten* (***zacht**) *praten*.
...that Jan therefore quietly had quietly must quietly talk
'...that he therefore had to speak quietly.'

Note that the restrictions on verb cluster interruptions in Netherlandic Dutch formed problems for all previous analyses of verb clusters. None of the movement analyses provides a clear explanations for this issue. As an example, consider the account by Blom (2005:110), who states that "projections are excluded from the cluster-internal position in (standard) Dutch. This can be accounted for by assuming that Verb Raising may only apply to V-bars that do not contain projecting words." This statement is descriptively correct (if one assumes that adverbs are XPs), but not explanatory.

To determine the underlying structure of the verb cluster, it is important to notice that bare nouns, but not full noun phrases, can interrupt the verb cluster in standard Dutch.

(137) ...dat Jan kan **fluit**-spelen.
...that Jan can flute-play
'...that Jan can play the flute.'

These bare nouns block the presence of an additional argument, which indicates that the interrupting bare noun receives a theta-role.

(138) a. ...dat mijn dochter een liedje *kan fluiten*.
...that my daughter a song can flute
'...that my daughter can play a song on the flute.'

b. * ...dat mijn dochter een liedje *kan* **fluit** *spelen*.
...that my daughter a song can flute play

Crucially, singular count nouns such as *fluit* generally require an article. Bare singular nouns in Dutch typically do not occur in regular argument positions; this is illustrated in (139) (De Swart et al. 2007).

(139) a. * Kat drinkt graag melk.
cat drinks gladly milk

b. * Ze kocht fluit.
she bought flute

Regular argument positions require nominals that introduce a discourse referent. Farkas and De Swart (2003) and De Swart and Zwarts (2009) argue that

discourse referents are specified for number and/or definiteness. As a consequence, bare nouns, which are not specified for number and definiteness, cannot occur in argument positions.[95]

The fact that the interrupted position requires nouns to be bare, indicates that this is not an argument position. Sentence (140c) indeed illustrates that bare nouns that precede or interrupt the verb cluster are not referential in standard Dutch.

(140) a. Ik denk dat ik vanavond een fluit$_i$ *moet hebben*. Kun jij 'm$_i$
I think that I tonight a flute must have. Can you it
meenemen?
with.take
'I think I need to have a flute$_i$ tonight. Could you take it$_i$ with you?'

b. Ik denk dat ik vanavond *moet* **fluit**$_i$ *spelen*. *Kun jij 'm$_i$
I think that I tonight must flute play. Can you it
meenemen?
with.take
'I think I need to play flute$_i$ tonight. *Could you take it$_i$ with you?'

c. Ik denk dat ik vanavond **fluit**$_i$ *moet spelen*. *Kun jij 'm$_i$
I think that I tonight flute must play. Can you it
meenemen?
with.take
'I think I need to play flute$_i$ tonight. *Could you take it$_i$ with you?'

Such nouns are usually referred to as incorporated nouns, whether or not a movement process is assumed to underlie this construction. Incorporated nouns are typically not referential (see Mithun 1984).

I follow Mithun (1984), Farkas and De Swart (2003) and De Swart and Zwarts (2009) and assume that the bare nouns that precede or interrupt the verb cluster form a part of the predicate. As a consequence, they receive a part-of-predicate interpretation.[96] The noun-verb combination forms a single event, where the noun is part of the activity denoted by the verb, in a stereotypical way.

Bare nouns thus participate in the formation of the predicate. The noun does not refer to a discourse referent and can hence denote an activity together with

[95] The idea that bare nouns are not specified for number is confirmed by the meaning of sentence (ia).

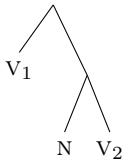
(i) a. Jan moet brood bakken.
Jan must bread bake
'= Jan has to bake one or more breads.'

b. Jan moet een brood bakken
Jan must a bread bake
'= Jan has to bake one bread.'

[96] See also De Hoop (1996).

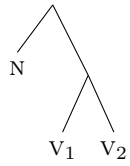
the verb. The fact that bare nouns can also precede the verb cluster suggests that they can also be a part of the predicate in that position. Accordingly, one can analyse verb cluster interruptions by bare nouns in a similar vein as verb cluster interruptions by particles:

(141) a.



(interruption)

b.



(no interruption)

The fact that bare nouns can interrupt the verb cluster follows if they are part of the event or state denoted by the verb. In fact, it seems that only elements that can be part of the predicate can interrupt the verb cluster in Netherlandic Dutch varieties. Indeed, many have noted that elements that interrupt the verb cluster in Netherlandic Dutch varieties often form a semantic unit with the main verb (Verhasselt 1961, Koster 1994, among others). Particles can clearly be part of the event or state denoted by the verb.

Low adverbs, which are less acceptable interrupters, are generated in a higher position than particles:

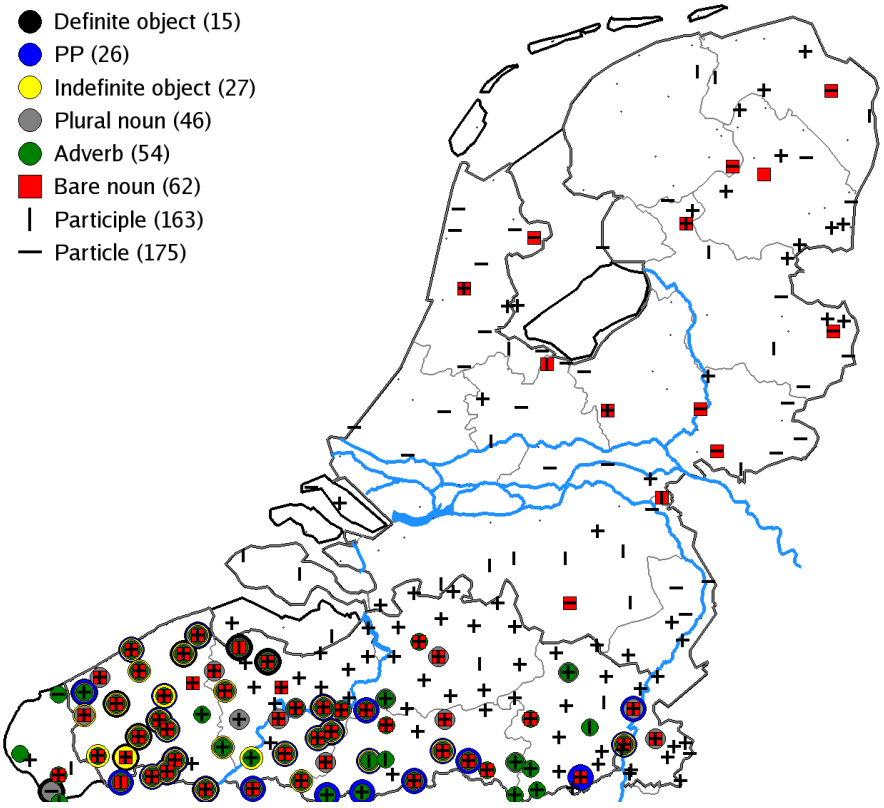
(142) ...dat Jan <**zachtjes**> af <***zachtjes**> wast.
...that Jan quietly PTCL quietly washes
'...that Jan quietly washes dishes.'

Section 5.4 argued that the cut-off point for verb cluster interruption in West-Flemish is *v*P. The auxiliary can be merged anywhere within that domain. The results in this section suggest that the cut-off point in Netherlandic Dutch varieties is lower within the predicate. In an approach where predicates are decomposed into three subevental components: a causing subevent, a process-denoting subevent and a subevent corresponding to result state (Ramchand and Svenonius 2002; Ramchand 2008; Ramchand and Svenonius 2014), auxiliary verbs in Netherlandic Dutch have to be assumed to be spelled out in the lowest verbal head, below the level of manner adverbs, which most likely attach to the process phrase. I assume that anything that is merged in that projection forms a part of the event or state denoted by the verb, and anything that forms a part of the event or state can interrupt the verb cluster in Netherlandic Dutch.

5.7 A transition zone

The previous section argued that variation in cluster interruption is a result of differences in the order of merging auxiliaries, objects and adverbs. This ordering is freer in West-Flemish varieties than in Netherlands Dutch varieties.

In West-Flemish, the auxiliary can be freely merged with any element within *v*P. In Netherlandic Dutch, only elements that are a part of the event or state denoted by the verb can be merged prior to the auxiliary. The cut-off point for cluster interruption is hence much lower in Netherlandic Dutch varieties than in West-Flemish varieties. In light of this, consider the geographic distribution of verb cluster interruptions.



Map 5.1: Interruption of the verb cluster by non-verbal elements

The map clearly illustrates that there is no clear border between the West-Flemish region where cluster interruption is very acceptable, and the Netherlandic Dutch varieties where cluster interruption is exceptional. Rather, there is a gradual decline.[97] Some items are more commonly accepted than other items. Informants from areas closer to West-Flemish accepted more types of interruption than informants from areas further away. This becomes particularly clear when the frequencies are divided into regions, as in table 5.2.

[97] Note, this gradual decline is another argument against assuming that verb cluster interruption arises through a movement of the verb to a higher position. There is no apparent reason why verb movement would be sensitive to the type of object involved.

	West Flanders	East Flanders	Flemish Brabant	Limburg	Antwerp
Bare noun	20	14	7	5	2
Low adverb	18	12	12	6	2
Plural noun	18	14	7	4	2
Indefinite object	17	7	2	1	0
PP object	11	5	7	3	0
Definite object	10	4	0	0	0
High adverb	0	0	0	0	0

Table 5.2: Verb cluster interruptions by region (Barbiers et al. 2008)

Hypothetically, the area in between West-Flanders and the Netherlands is a transition zone.[98,99]

The hypothesis that these languages are in transition accounts for the disorder in the acceptability of the types of interruptions in this region. For instance, bare nouns are among the most common and acceptable interrupters in both West-Flemish and Netherlandic Dutch varieties. Interruptions by indefinite noun phrases, on the other hand, are only acceptable in West-Flemish varieties. Now, in the transition zone, some informants accepted an interruption by an indefinite object, while they rejected an interruption by a bare noun. This is not expected if these languages are in their final state, but it might be expected in a transitional phase.

If the other Flemish languages are in a transition from a West-Flemish type of language to a Netherlandic Dutch type of language, one might predict the cut-off point in these varieties to be somewhere in between *v*P and the predicate. Indeed, while there is a lot of variation in the types of elements that can interrupt the cluster in these varieties, no informant accepted interruptions by the high adverb *jammergenoeg* 'unfortunately'.

Hypothetically, the languages in the transitional area have cut-off points that correspond to precise functional projections, such as VP. Unfortunately,

[98] For Flemish Brabant and Antwerp, this has been independently argued for by Barbiers et al. (2016).

[99] Potentially, the observed synchronic variation reflects a diachronic change. Unfortunately, the data are too scarce to make statements of this nature. However, it does seem that such a change has taken place in varieties spoken in the Netherlands as well, as these varieties used to have more interruption possibilities. It has been observed in Old-Frisian texts (Van der Meer 1990; Hoekstra 2007) and texts from Holland (Coussé 2002, 2003)), Brabant, Drenthe and Utrecht (Coupé 2007). The construction started to decline in the 17$^{\text{th}}$ century (Koelmans 1965; Hoeksema 1993, 1994).

(i) Dat hi daer *soude* **de viande** *jaghen* uut sijns vader lande.
that he there should the enemy chase from his father land
'That he should chase the enemy from his father's land there.'
14$^{\text{th}}$ century Holland. From: Rijmkroniek van Melis Stoke (From Brill (1885) as cited by Hoeksema (1993:160))

It thus seems that northern varieties have undergone a change to fewer interruption possibilities.

I currently do not have the data to investigate the cut-off points for these intermediate varieties. This requires further detailed research.

5.8 Conclusion

This chapter considered properties of verb cluster interruptions, which provide further support for the claim that auxiliaries are base-generated in a low position. This support is based on the lack of freezing effects, the position of adverbs in the verb cluster, and the types of adverbs that can interrupt clusters with different types of auxiliaries. First, the fact that there are no freezing effects in the extraction from DPs that precede the verb cluster, suggests that these elements are base-generated in their surface position. Secondly, the various positions of adverbs in verb clusters posed problems for all theories of cluster formation that assumed movements in syntax or at PF. Finally, while the position of adverbs is indicative of their ability to interrupt the verb cluster, the type of auxiliary did not play a role; all auxiliaries obligatorily occupy a low position.

The chapter further illustrated that there is a clear cut-off point for cluster interruption just above vP in West-Flemish, and lower in Netherlandic Dutch. Auxiliaries form a part of the event or state denoted by the verb in standard Dutch, but form a part of the entire lexical domain in West-Flemish. As a result, West-Flemish exhibits much more freedom of Merge than standard Dutch.

CHAPTER 6

Conclusion

6.1 Summary and discussion

The main aim of this dissertation was to provide a principled account of the (limits to the) variation observed in verb clusters. I have argued that this variation is not coincidental, but follows from properties of the human linguistic system. Two types of variation were discussed in this dissertation: the order of verbs in a verb cluster, and the acceptability of non-verbal material inside the verb cluster. First, while many orders of verbs in a verb cluster are observed, certain orders never occur. For instance, many speakers of Dutch allow both the orders in (143a) and (143b), but the order in (143c) is never observed.

(143) a. ...dat hij de wagen *moet*$_1$ *hebben*$_2$ *gemaakt*$_3$.
...that he the car must have made
'...that he must have repaired the car.'

b. ...dat hij de wagen *gemaakt*$_3$ *moet*$_1$ *hebben*$_2$.
...that he the car made must have

c. * ...dat hij de wagen *hebben*$_2$ *gemaakt*$_3$ *moet*$_1$.
...that he the car have made must

Secondly, while some non-verbal items can precede or interrupt the verb cluster, many non-verbal items can only precede the verb cluster. This is illustrated for West-Flemish in (144) and (145).

(144) a. ...dat hij daarom **zacht** *moet praten.*
...that he therefore quietly must talk
'...that he therefore has to speak quietly.'

b. ...dat hij daarom *moet* **zacht** *praten*
...that he therefore must quietly talk

(145) a. ...dat Jan morgen **zeker** *moet werken.*
...that he tomorrow definitely must work
'...that he therefore definitely has to work.'

b. * ...dat Jan morgen *moet* **zeker** *werken.*
...that he therefore must definitely work

I have argued that the observed variation in this domain can be explained by properties of human grammar. By carefully examining the patterns of microvariation in verb clusters, it became clear that a new approach to verb cluster formation is required. Previous approaches to verb clusters aimed at deriving the various orders that are observed in the language area, while excluding the orders that are not observed. Most of those approaches can derive the observed word orders, while also excluding the impossible word orders 2-1-3 and 2-3-1.

Crucially, a consideration of the geographic distribution of verb clusters unraveled some patterns in the orders that are possible. For instance, the 1-3-2 and 3-1-2 orders occur in grammars that have ascending (1-2), rather than descending (2-1), verb clusters. Secondly, the 1-3.PTCP-2 order is most common in the region where non-verbal material can interrupt the verb cluster. In previous approaches to verb cluster formation, these patterns would have to be assumed to be coincidental.

Chapter 3 of this dissertation provided a principled explanation for the geographic patterns. It was argued that verb clusters in Dutch varieties are merged and linearized in fully ascending (1-2-3) or fully descending (3-2-1) orders. Other orders that are observed in the language area involve non-verbal material, namely adjectival participles, or nominal infinitives. As a result, this approach does not involve any unmotivated movements that are specific to verb clusters.

Support for this analysis came from (i) the interpretation of participles; and (ii) selectional requirements of the verbs. Both types of support were based on non-northern Dutch, as in northern Dutch only descending orders occur.The interpretation of participles indicate that such elements can behave like adjectives inside the verb cluster. This explains why both the 1-2 and 2-1 orders can co-occur in many varieties of Dutch. In the 1-2.PTCP order the participle is verbal, and in the 2.PTCP-1 order, the participle is adjectival. The adjectival participle precedes the main verb, just like other non-verbal complements in the language. Such an analysis corresponds to the interpretation of the sentences: the participle can only receive an adjectival interpretation in the 2.PTCP-1 order.

This analysis was extended to infinitives, which were also argued to be non-verbal in non-ascending verb clusters. This was supported by selectional requirements of verbs. Verbs such as *laten* 'let' which select verbal complements, but disallow non-verbal complements, do not allow verb orders that deviate

from fully ascending orders. This supports the idea that orders such as 3-1-2 involve a non-verbal 3. This order is only possible if the main verb selects a non-verbal complement.

Considering this approach, the co-occurrence patterns discussed above become almost trivial. For instance, the 1-3-2 and 3-1-2 orders are argued to be ascending orders with a non-verbal 3. It is hence not surprising that these orders occur in those varieties that have ascending verb clusters. Secondly, the 1-3.PTCP-2 order is argued to be an interrupted V_1-V_2 cluster with a non-verbal 3. Consequently, it is not surprising that the 1-3-2 order occurs in the region where verb clusters are often interrupted by non-verbal material.

This theory supports the idea that the variational patterns observed with verb clusters are not coincidental, but follow from properties of the human linguistic system. For instance, it was claimed that certain orders are never observed because the language system cannot derive them. This leads to the expectation that speakers will be able to distinguish between orders that are ungrammatical, and orders that can be derived but are not a part of their language variety. This expectation was borne out in an experiment in which I asked a large number of speakers distributed over the Dutch language area to rank all logically possible orders, including orders that are not a part of their own variety of Dutch. The results demonstrate that speakers indeed apply their syntactic knowledge to rank verb cluster orders that they do not use themselves. They find orders that cannot be derived by human grammars more acceptable than orders that can be derived, but are not a part of their language variety. Speakers thus seem aware of the ways in which languages can vary.

By assuming that human grammar provides clear limits on the extent to which languages can vary, it becomes much easier to explain why children can acquire any human language without problems, even though there is much variation in the properties of languages across the world. If the child makes use of grammar, (s)he will know that the potential properties of the mother language are not endless, but restricted.

According to current Minimalist theory (Chomsky 2005, 2007, 2008), it is not only the human language system that plays role in the shaping of human languages, but also two additional factors: experience (i.e. input from the environment), and principles not specific to the language system, which include principles of efficient computation. The fact that experience cannot account for the speakers' word order preferences in this domain was discussed in chapter 3. **Chapter 4** considered the possibility that the speakers' judgements are a result of properties of efficient computation. Many different types of language processing models were considered in that chapter. Most of these models assume that sentence processing is affected by the distance between words that are related to each other. For instance, it is often claimed that structures that have longer phrases embedded within them are harder to process (eg. Hawkins 1994). Hawkins discusses the observation that in English, center-embeddings

are ungrammatical when the embedded material is clausal, but not when the embedded material is an NP. This is illustrated in (82) (repeated here).

(82) a. ∗[Did [$_{S}$ that John failed his exam] [surprise Mary]]?
b. [Did [$_{NP}$ this fact] [surprise Mary]]?

According to Hawkins (1994), language processing occurs more rapidly and efficiently when constituents that belong together are closer to each other. The chapter investigated whether such principles (as well as others that are proposed in the literature) could have played a role in the comparative judgement task. Crucially, the chapter illustrated in depth that none of the existing processing models can account for the speakers' preferences.

The chapter went on to investigate whether the predictions based on those models improve when one takes the properties of human grammar into account. In such a system, the processing models do not have to account for all of the speakers' preferences. For instance, the fact that the 2-1-3 and the 2-3-1 orders are rated as bad, is already accounted for by the grammar. The only choice that might be affected by processing models would be a choice between orders that are syntactically and categorically equivalent, such as the choice between the 1-3-2 and the 3-1-2 orders. These orders both involve an ascending verb cluster with a non-verbal 3. The only difference seems to lie in the timing of merging the auxiliary. Potentially, the choice between these orders might be attributed to properties of processing preferences. Of these orders, the 3-1-2 order was judged to be more acceptable. The chapter discussed in detail that at least one implementation of Hawkins' (2004; 2014) processing model makes the correct prediction that the 3-1-2 order is easier to process than the 1-3-2 order. The results support the idea that the language processor only considers orders that are (i) possible in the language variety, and (ii) syntactically and categorically equivalent.

Chapter 5 turned to discuss verb cluster interruption. The beginning of chapter 5 presented arguments in favor of a similar underlying structure for all types of non-verbal elements in the verb cluster. It was argued that auxiliaries that precede non-verbal material have not moved from a lower position. Extraction from DPs that precede the verb cluster does not lead to *freezing* effects, indicating that DPs can be base-generated in the position preceding the verb cluster. These facts support the claim that verb clusters are base-generated.

The acceptability of cluster interruption is affected by (i) the geographical location of the language variety, and (ii) the type of non-verbal element in the verbal cluster. First, West-Flemish varieties allow many more types of items to interrupt the verb cluster than Netherlandic Dutch varieties. Secondly, some items are much more acceptable inside the verb cluster than other items. For instance, in West-Flemish, lower adverbs, particularly manner adverbs, can interrupt as well as precede the verb cluster, while higher adverbs can only precede the verb cluster (see (145)). The chapter discussed at length how previous

approaches to verb clusters, which involve a movement of V(P)s at PF or in syntax, have problems accounting for these data.

Interestingly, the type of auxiliary had no effect on the acceptability of non-verbal material inside the verb cluster. The acceptability of higher adverbs inside the verb cluster did not improve with auxiliaries that are often presumed to be in a higher position. Auxiliaries such as *gaat* 'will' and *wil* 'want' are often argued to occupy a higher functional position in the clausal structure than root modals such as *moet* 'must'. Nevertheless, the acceptability of adverbs such as *bijna* 'almost' and *altijd* 'always', did not improve with these auxiliaries. All of the following sentences were rated as ill-formed:

(146) a. * Ik weet dat Jan *moet* **bijna** *werken.*
I know that Jan must almost work
'I know that Jan almost has to work.'

b. * Ik weet dat Jan *gaat* **bijna** *werken.*
I know that Jan goes almost work
'I know that Jan almost goes to work.'

(147) a. * Ik weet dat Jan *moet* **altijd** *werken.*
I know that Jan must always work
'I know that Jan always has to work.'

b. * Ik weet dat Jan *wil* **altijd** *werken.*
I know that Jan wants always work
'I know that Jan always wants to work.'

These facts clearly underline the claim that all auxiliaries are generated in a low position in varieties of Dutch.

A particularly nice fact presented in chapter 5 is the discovery of a clear cut-off point for cluster interruption. I asked the West-Flemish informants to judge a variety of sentences that contained interrupted verb clusters by an adverb. Table 5.1 (repeated here) depicts the informants' judgements for each interrupting adverb. The adverbs are depicted in the order that corresponds to Cinque's (1999; 2006) hierarchy of functional projections.

Adverb		**Score**					
		Sounds bad	0	0	0	0	*Sounds good*
helaas	'unfortunately'	●	0	0	0	0	
zeker	'definitely'	0	●	0	0	0	
straks	'later'	●	0	0	0	0	
misschien	'maybe'	●	0	0	0	0	
onvermijdelijk	'necessarily'	0	0	●	0	0	
gewoonlijk	'usually'	0	0	●	0	0	
nog steeds	'still'	●	0	0	0	0	
altijd	'always'	0	●	0	0	0	
bijna	'almost'	0	●	0	0	0	
verplicht	'obligatorily'	0	0	0	●	0	
volledig	'completely'	0	0	0	●	0	
zacht	'quietly'	0	0	0	0	●	
wijs	'wisely'	0	0	0	0	●	

Table 5.1 (repeated): The acceptability of various adverbs inside the verb cluster

These results clearly demonstrate that adverbs that are lower in Cinque's hierarchy are better interrupters. In a traditional clausal structure, one might take the modal adverb *verplicht* 'obligatory' to be positioned in the lexical domain (vP). This provides a clear cut-off point for cluster interruption in West-Flemish, which is clearly not a random position.

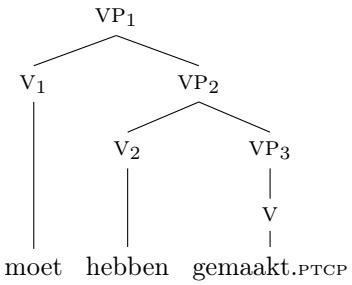
Subsequently, the chapter demonstrated that the cut-off point for cluster interruption lies lower in standard Dutch, where only elements that are part of the event or state denoted by the verb can interrupt the verb cluster. As for the area in between West-Flemish and Netherlandic Dutch, I suggested that this may be a transitional area.

The theory presented in this dissertation can account for most of the properties of verb clusters that were left unaccounted for by previous theories of cluster formation, as discussed in **Chapter 2**.

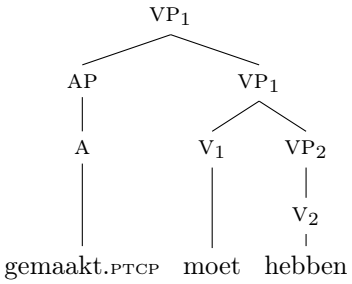
- All varieties of Dutch display various orders across verb types, except for many Frisian varieties, where only the 3-2-1 order is observed. It was argued that Frisian verb clusters are linearized in a different direction, leading to descending verb clusters in this region. As a consequence, the direction of linearization of verbal and non-verbal material is the same in these varieties: both verbal and non-verbal complements precede their selecting verb. In Dutch varieties, however, non-verbal items are linearized before their selecting verb, and verbal items are linearized after their selecting verb. As a result, three different orders can be derived in Dutch grammars. First, a three-verb cluster will lead to the 1-2-3 order, as in (148a). Secondly, a two-verb cluster in which a non-verbal 3 precedes the verb cluster will lead to the 3-1-2 order, as in (148b). Thirdly, a two-verb

cluster in which the non-verbal 3 interrupts the verb cluster (in a similar vein as particles) will lead to the 1-3-2 order, as in (148c). In Frisian grammars, however, the 3-2-1 order arises in each case. This is illustrated in the corresponding examples in (149).

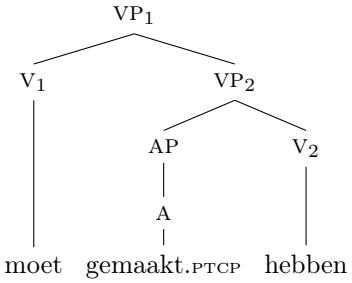
(148) a. = 1-2-3



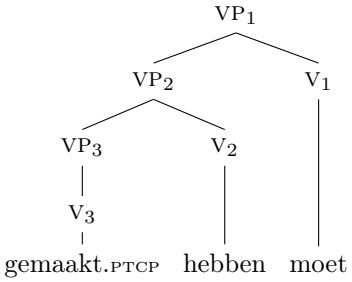
b. = 3-1-2

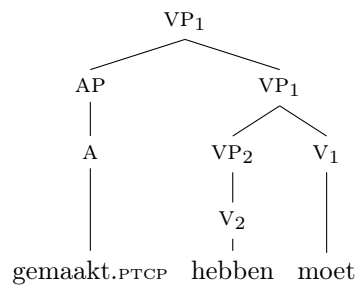


c. = 1-3-2

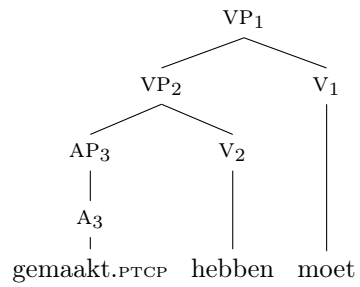


(149) a. = 3-2-1



b. 

= 3-2-1

c. 

= 3-2-1

- The distribution of verb cluster orders depends on the types of verbs involved. This can be attributed to the categorial status of those verbs. For instance, data from two-verb clusters indicate that Flemish varieties have little categorial ambiguity in verb clusters. When 2 is an infinitive, these varieties only allow ascending 1-2 orders. This indicates that bare infinitives are never nominalized inside the verb cluster. On the other hand, when 2 is a participle, these varieties prefer 2-1 orders. This indicates that participles are never verbal. Following these assumptions, the 3-1-2 and the 1-3-2 orders are expected to be ill-formed when 3 is an infinitive, while the 1-2-3 order is expected to be ill-formed when 3 is a participle. These predictions are borne out.

- The word order variation in these languages contrasts with a rigid ordering in the nominal domain. This issue is partly solved in this theory. The categorial ambiguity of participle and infinitives can explain why varieties allow two orders with these verbs; they allow 3-1-2 orders when 3 is non-verbal, and 1-2-3 orders when 3 is verbal. However, it cannot explain why both the 1-3-2 and the 3-1-2 orders can co-occur within a single variety. Why is the order of Merge free in this respect?

- The 1-3.PTCP-2 order, particle incorporation and verb cluster interruption show similar geographic distributions. This fact is attributed to the claim that the 1-3-2 order involves a non-verbal 3. In this sense, all these types of constructions are of the type V_1-X-V_2.

- The 1-3.INF-2 order occurs only in border varieties as a secondary order. This was attributed to the claim that this order should not be possible

in Dutch grammars, since no variety of Dutch has both nominalized infinitives in the verb cluster, and allows nominal items to interrupt the verb cluster. Nominalized infinitives in the verb cluster are not observed in Flemish varieties, while cluster interruption by nominal items is rare outside of Flanders.

The fact that the 1-3.INF-2 order occurs in border varieties, was argued to be a transitional phenomenon. This can explain the fact that this order is not restricted to a certain dialect group, such as Limburgish Dutch, but can be found across different dialect groups, and within those groups only in border varieties.

- The acceptability of non-verbal material inside the verb cluster seems to be a West-Flemish phenomenon. Its acceptability decreases geographically in moving from West-Flanders to the north. This issue was attributed to the fact that the cut-off point for cluster interruption is structurally higher in West-Flemish than in Netherlandic Dutch. It was suggested that the gradual decline of cluster interruption from West-Flanders to the Netherlands indicates that the intermediate varieties are in transition from one type of language to another.

Note that the theory presented here deviates from previous theories of cluster formation in three ways. First, it is assumed that only the 1-2-3 and the 3-2-1 orders represent three-verb clusters. Secondly, it is argued that these two orders are base-generated, and do not involve movement operations. Thirdly, it is assumed that the other observed orders involve non-verbal material. Crucially, the first and the third assumptions could be added to previous theories of cluster formation as well. For instance: a theory that assumes all varieties of Dutch and Frisian to have a fixed underlying right-branching (1-2-3) order might assume that V/VP-movement is all or nothing (leading to only 3-2-1 and 1-2-3 orders). The other orders that are observed contain non-verbal material. This will lead to many of the same predictions as the approach taken here. Such a theory still requires movements or operations that are specific to the derivation of verb clusters. This is not required in a base-generation approach, as the two 'real' three-verb clusters can be base-generated. Occam's razor makes the base-generation approach conceptually more attractive. However, if one prefers to maintain Kayne's (1994) antisymmetry theory, and argue that all syntactic structures are uniform, this could be a potential approach.[100]

6.2 Theoretical contributions

This dissertation contributes to the theory of cluster formation by providing a detailed overview of the limits of variation concerning cluster interruption

[100] Note that cluster interruption by adverbs would still be problematic in such an approach.

in West-Flemish. I have presented a number of findings that have not been discussed before.

1. The geographic distribution of verb clusters provide insight in their grammatical properties. The results from chapter 3 demonstrate that the geographic distribution of different verb cluster orders are not random, but systematic, and can be given a principled explanation. In this way, geographic co-occurrence patterns helped unravel the phenomenon of verb clustering.

2. Speakers can distinguish ungrammatical word orders from orders that can occur in language varieties different from their own. It was argued in chapter 3 that this capacity is best explained by properties of grammar.

3. General properties of information processing cannot account for the speakers' preferred word orders on their own. However, when the grammatical properties of verb clusters are taken into account, processing preferences make much better predictions. This provides another strong argument for a generative approach to syntactic variation.

4. Verb clusters are base-generated in a low position. Chapter 5 has demonstrated that there is a clear difference in the acceptability of cluster interruptions by different types of adverbs; adverbs that are generally assumed to be merged in a lower structural position are much more acceptable than adverbs that are assumed to occupy a higher structural position. For auxiliaries, however, no such effect was observed. Auxiliaries that are generally assumed to occupy a high position do not allow more cluster interruptions than lower auxiliaries. This suggests that all auxiliaries are generated in the same (low) position.

5. There is a clear cut-off point for cluster interruption in the syntactic structure. In West-Flemish, this cut-off point lies around vP; elements that are merged within this projection can interrupt the verb cluster.

6. The limits to cluster interruption in Netherlandic Dutch varieties no longer pose a problem for theories of cluster formation. This can be attributed to a lower cut-off point for the Merge of auxiliaries in these varieties than in West-Flemish varieties. In this sense, all varieties of Dutch have syntactically similar properties. This theory hence does not require (i) positing a restriction to verb projection raising to non-projecting heads, or (ii) variable landing sites for non-verbal items.

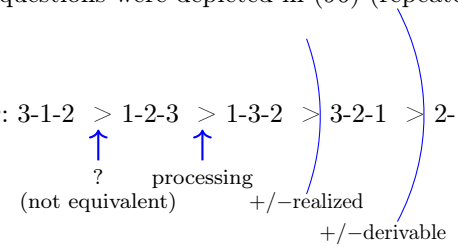
6.3 Prospects for future research

There were a number of issues raised in this dissertation that lead to interesting questions, which can be investigated further.

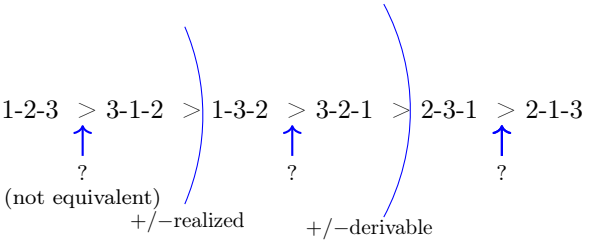
The first issue relates to the results of the comparative judgement task. Chapter 3 argued that a large part of the speakers' rankings could be explained by grammatical properties: namely the fact that speakers judged orders that are grammatical, but unrealized in their variety, better than orders that are ungrammatical. Subsequently, chapter 4 argued that properties of language processing might have affected speakers' ranking of orders that are (i) possible in their language variety, and (ii) syntactically and categorically equivalent.

Now, a large part of the results are accounted for. However, as discussed in section 4.4, some results remain unexplained. For instance, it is unclear how the informants made a choice between the 3-1-2 and 1-2-3 orders. Nor is it clear how the speakers evaluated orders that are not part of their grammar, namely 2-1-3 and 2-3-1. The open questions were depicted in (96) (repeated here).

(96) a. MOD-AUX-PTCP: 3-1-2 > 1-2-3 > 1-3-2 > 3-2-1 > 2-1-3 > 2-3-1



b. MOD-MOD-INF: 1-2-3 > 3-1-2 > 1-3-2 > 3-2-1 > 2-3-1 > 2-1-3



The results of the comparative judgement task raised another interesting question for future research. The dissertation mainly focussed on the variational patterns observed in varieties of Dutch and Frisian. The order variation observed in German varieties was only discussed briefly at the end of chapter chapter 3. It would be particularly interesting to ask speakers of German varieties to rank the different verb cluster orders. However, this first requires detailed information of all orders that can occur in all German varieties, in order to investigate the influence of the speakers' experience with other varieties.

A further issue that is open for future research is the fact that the V_1-X-V_2 and the X-V_1-V_2 orders can co-occur within a single variety. Such free orderings are not observed in other domains. For instance, modifiers in compound nouns always precede the compound. This is illustrated in (150).

(150) a. rood-vlees-soep
red-meat-soup
'soup with red meat'

b. rood soep-vlees
red soup-meat
'red meat that is meant for soup'

c. * soep-rood-vlees
soup-red-meat

A final issue raised in this dissertation that leads to many interesting questions for future research relates to the cut-off point for cluster interruption. Chapter 5 argued that the varieties spoken in the areas in between West-Flanders and the Netherlands are undergoing a transition from one language type to another. The cut-off point for cluster-interruption in those varieties should hence lie in between the West-Flemish and Netherlandic Dutch cut-off points. Future research should investigate whether each of those varieties have a clear structural cut-off point, such as VP, or whether they display more messy behavior.

APPENDIX A

Applying Hawkins' theory to the data

1-2-3 (...dat) iedereen	moet$_1$	kunnen$_2$	zwemmen$_3$			
	1	**2**		PCD_{VP1}: 2/2:	100	%
		1	**2**	PCD_{VP2}: 2/2:	100	%
			1	PCD_{VP3}: 1/1	100	%
1	2	3	**4**	θ-roles S by V3: 2/4:	50.0	%
1	**2**			φ-agreement: 2/2:	100	%
	1	2	**3**	Relation V1-V3: 2/3:	66.7	%
		1	**2**	Relation V2-V3: 2/2:	100	%
Unless percolation changes the θ*-relations*:						
1	**2**			θ-role S by V1: 2/2:	100	%
1-3-2 (...dat) iedereen	moet$_1$	zwemmen$_3$	kunnen$_2$			
	1	2	**3**	PCD_{VP1}: 2/3:	66.7	%
		1	**2**	PCD_{VP2}: 2/2:	100	%
		1		PCD_{VP3}: 1/1	100	%
1	2	**3**		θ-roles S by V3: 2/3:	66.7	%
1	**2**			φ-agreement: 2/2:	100	%
	1	**2**		Relation V1-V3: 2/2:	100	%
		1	**2**	Relation V2-V3: 2/2:	100	%
Unless percolation changes the θ*-relations*:						
1	**2**			θ-role S by V1: 2/2:	100	%
2-1-3 (...dat) iedereen	kunnen$_2$	moet$_1$	zwemmen$_3$			
	1	**2**		PCD_{VP1}: 2/2:	100	%
	1	2	**3**	PCD_{VP2}: 2/3:	66.7	%
			1	PCD_{VP3}: 1/1	100	%

1	2	3	**4**	θ-roles S by V3: 2/4:	50.0%
1	2	**3**		φ-agreement: 2/3:	66.7%
		1	**2**	Relation V1-V3: 2/2:	100 %
	1	2	**3**	Relation V2-V3: 2/3:	66.7%
Unless percolation changes the θ*-relations*:					
1	**2**			θ-role S by V2: 2/2:	100.0%

2-3-1 (...dat)	iedereen	kunnen$_2$	zwemmen$_3$	moet$_1$		
		1	2	**3**	PCD_{VP1}: 2/3:	66.7%
		1	**2**		PCD_{VP2}: 2/2:	100 %
			1		PCD_{VP3}: 1/1	100 %
	1	2	**3**		θ-roles S by V3: 2/3:	66.7%
	1	2	3	**4**	φ-agreement: 2/4:	50.0%
			1	**2**	Relation V1-V3: 2/2:	100 %
		1	**2**		Relation V2-V3: 2/2:	100 %
Unless percolation changes the θ*-relations*:						
	1	**2**			θ-role S by V2: 2/2:	100.0%

3-1-2 (...dat)	iedereen	zwemmen$_3$	moet$_1$	kunnen$_2$		
			1	**2**	PCD_{VP1}: 2/2:	100 %
		1	2	**3**	PCD_{VP1}: 2/3:	66.7%
		1			PCD_{VP3}: 1/1	100 %
	1	**2**			θ-roles S by V3: 2/2:	100 %
	1	2	**3**		φ-agreement: 2/3:	66.7%
		1	**2**		Relation V1-V3: 2/2:	100 %
		1	2	**3**	Relation V2-V3: 2/3:	66.7%

3-2-1 (...dat)	iedereen	zwemmen$_3$	kunnen$_2$	moet$_1$		
			1	**2**	PCD_{VP1}: 2/2:	100 %
		1	**2**		PCD_{VP2}: 2/2:	100 %
		1			PCD_{VP3}: 1/1	100 %
	1	**2**			θ-roles S by V3: 2/2:	100 %
	1	2	3	**4**	φ-agreement: 2/4:	50.0%
		1	2	**3**	Relation V1-V3: 2/3:	66.7%
		1	**2**		Relation V2-V3: 2/2:	100 %

1-2-3 (...dat)	S O ADV	moet$_1$	hebben$_2$	gemaakt$_3$		
		1	**2**		PCD_{VP1}: 2/2:	100 %
			1	**2**	PCD_{VP2}: 2/2:	100 %
				1	PCD_{VP3}: 1/1	100 %
	1 2 3	4	5	**6**	θ-roles s&o by V3: 3/6:	50 %
	1 2 3	**4**			φ-agreement: 2/4:	50 %
		1	**2**		Relation V1-V2: 2/2:	100 %
			1	**2**	Relation V2-V3: 2/2:	100 %
	1	2	3	**4**	Relation ADV-V3: 2/4:	50 %
Unless percolation changes the θ*-relations*:						
	1 2 3	**4**			θ-roles s&o by V1: 3/4:	75 %

1-3-2 (...dat) S O ADV	moet$_1$	gemaakt$_3$	hebben$_2$			
	1	2	**3**	PCD$_{VP1}$: 2/3:	66.7%	
		1	**2**	PCD$_{VP2}$: 2/2:	100	%
		1		PCD$_{VP3}$: 1/1	100	%
1 2 3	4	**5**		θ-roles s&o by V3: 3/5:	60	%
1 2 3	**4**			φ-agreement: 2/4:	50	%
	1	2	**3**	Relation V1-V2: 2/3:	66.7%	
		1	**2**	Relation V2-V3: 2/2:	100	%
1	2	**3**		Relation ADV-V3: 2/3:	66.7%	
Unless percolation changes the θ-relations:						
1 2 3	**4**			θ-roles s&o by V1: 3/4:	75	%
2-1-3 (...dat) S O ADV	hebben$_2$	moet$_1$	gemaakt$_3$			
	1	**2**		PCD$_{VP1}$: 2/2:	100	%
	1	2	**3**	PCD$_{VP2}$: 2/3:	66.7%	
			1	PCD$_{VP3}$: 1/1	100	%
1 2 3	4	5	**6**	θ-roles s&o by V3: 3/6:	50	%
1 2 3	4	**5**		φ-agreement: 2/5:	40	%
	1	**2**		Relation V1-V2: 2/2:	100	%
	1	2	**3**	Relation V2-V3: 2/3:	66.7%	
1	2	3	**4**	Relation ADV-V3: 2/4:	50	%
2-3-1 (...dat) S O ADV	hebben$_2$	gemaakt$_3$	moet$_1$			
	1	2	**3**	PCD$_{VP1}$: 2/3:	66.7%	
	1	**2**		PCD$_{VP2}$: 2/2:	100	%
		1		PCD$_{VP3}$: 1/1	100	%
1 2 3	4	**5**		θ-roles s&o by V3: 3/5:	60	%
1 2 3	4	5	**6**	φ-agreement: 2/6:	33.3%	
	1	2	**3**	Relation V1-V2: 2/3:	66.7%	
	1	**2**		Relation V2-V3: 2/2:	100	%
1	2	**3**		Relation ADV-V3: 2/3:	66.7%	
Unless percolation changes the θ-relations:						
1 2 3	**4**			θ-roles s&o by V2: 3/4:	75	%
3-1-2 (...dat) S O ADV	gemaakt$_3$	moet$_1$	hebben$_2$			
		1	**2**	PCD$_{VP1}$: 2/2:	100	%
	1	2	**3**	PCD$_{VP1}$: 2/3:	66.7%	
	1			PCD$_{VP3}$: 1/1	100	%
1 2 3	**4**			θ-roles s&o by V3: 3/4:	75	%
1 2 3	4	**5**		φ-agreement: 2/5:	40	%
		1	**2**	Relation V1-V2: 2/2:	100	%
	1	2	**3**	Relation V2-V3: 2/3:	66.7%	
1	**2**			Relation ADV-V3: 2/2:	100	%
3-2-1 (...dat) S O ADV	gemaakt$_3$	hebben$_2$	moet$_1$			
		1	**2**	PCD$_{VP1}$: 2/2:	100	%
	1	**2**		PCD$_{VP2}$: 2/2:	100	%
	1			PCD$_{VP3}$: 1/1	100	%
1 2 3	**4**			θ-roles s&o by V3: 3/4:	75.0%	
1 2 3	4	5	**6**	φ-agreement: 2/6:	33.3%	
		1	**2**	Relation V1-V2: 2/2:	100	%

	1	**2**	Relation V2-V3: 2/2: 100 %
1	**2**		Relation ADV-V3: 2/2: 100 %

APPENDIX B

Search using PaQu

Since the hierarchic orders are presumably the same for different verb orders, this search was crucially based on linear orders, rather than hierarchic orders. Furthermore, in order to exclude sentences in which the finite verb occupies the verb second position, the search was restricted to embedded clauses. This has the advantage that most results are syntactically similar with the test sentences.

An example of a search through Lassy Groot using XPath involves three verbs that are in the same embedded clause and where the finite modal verb is immediately followed by an infinite modal verb, which is immediately followed by an infinite non-auxiliary verb is depicted in (151).

(151)
```
//node[@pos="verb" and @wvorm="pv" and (@lemma="kunnen" or
@lemma="moeten" or @lemma="hoeven" or @lemma="mogen" or
@lemma="willen") and (some $x in ancestor::node[@cat="ssub"]
satisfies (some $y in $x//node[@pos="verb" and @wvorm="inf" and
(@lemma="kunnen" or @lemma="moeten" or @lemma="hoeven" or
@lemma="mogen" or @lemma="willen") ], $z in
$x//node[@pos="verb" and @wvorm="inf" and not(@lemma="kunnen"
or @lemma="moeten" or @lemma="hoeven" or @lemma="mogen" or
@lemma="willen" or @lemma="zullen" or @lemma="laten" or
@lemma="doen" or @lemma="hebben" or @lemma="zijn" or
@lemma="worden" or @lemma="blijven" or @lemma="gaan" or
@lemma="komen" or @lemma="zien" or @lemma="staan" or
@lemma="zitten" or @lemma="durven" or @lemma="beginnen" or
@lemma="leren")] satisfies $y/number(@begin)=number(@end) and
$z/number(@begin)=$y/number(@end) ))]
```

Since this search involves linear orders, I got some false results, for instance because the sentence included verb clusters across different phrases and there should be a

comma to separate the verbs. For that reason, I manually checked results fewer than 25 sentences.

APPENDIX C

Acceptability judgements on adverbs inside the verb cluster

The informants were asked to rate the following sentences on a five-point scale, where the lowest score indicates a sentence that sounds bad and the highest score indicates a sentence that sounds good.

(152) a. Jan weet dat hij vrijdag moet helaas werken.
Jan knows that he Friday must unfortunately work
'Jan knows that he unfortunately has to work on Friday.'

b. Jan weet dat hij morgen moet zeker werken.
Jan knows that he tomorrow must definitely work
'Jan knows that he definitely has to work tomorrow.'

c. Moeder zegt dat haar favoriete team moet straks winnen.
Mother says that her favorite team must later win
'Mother says here favorite team has to win later.'

d. De baas zegt dat Jan moet misschien werken.
The boss says that Jan must maybe work
'The boss says that Jan maybe has to work.'

e. Ik weet dat iedereen moet onvermijdelijk werken.
I know that everyone must necessarily work
'I know that everyone necessarily has to work.'

f. De baas waarschuwt dat iedereen moet mogelijk werken.
The boss warns that everyone must possibly work
'The boss warns that everyone possibly has to work.'

g. Ik weet dat iedereen moet gewoonlijk werken.
I know that everyone must usually work
'I know that everyone usually has to work.'

h. Ik weet dat Jan moet nog steeds werken.
I know that Jan must yet still work
'I know that Jan still has to work.'

i. Ik weet dat Jan moet altijd werken.
I know that Jan must always work
'I know that Jan always has to work.'

j. Ik weet dat Jan moet bijna werken.
I know that Jan must almost work
'I know that Jan almost has to work.'

k. Ik weet dat Jan moet verplicht werken.
I know that Jan must voluntarily work
'I know that Jan has to work voluntarily.'

l. Ik vind dat Jan de brief moet volledig typen.
I think that Jan the letter must completely type
'I think that Jan completely has to type the letter.'

m. Om dit probleem op te lossen weet ik dat Jan wel moet wijs handelen.
For this problem up to solve, know I that Jan AFF must wisely act
'In order to solve this problem, I know that Jan has to act wisely.'

n. Jan wil niemand storen. Hij weet dat hij daarom moet zacht praten.
Jan want nobody disturb. He know that he therefore must quietly talk
'Jan does not want to disturb anyone. He knows that he will have to talk quietly.'

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Samenvatting in het Nederlands

Introductie

Alle mensen over de hele wereld hebben taal, waarmee betekenissen kunnen worden gekoppeld aan klanken. Het lijkt een onderdeel te zijn van onze biologie (Lenneberg 1964). Voor zover wij weten, zijn talen van andere dieren lang niet zo complex als mensentalen (zie Hauser et al. (2002) voor een bespreking). Een centrale vraag in de taalkunde is wat menselijke taal speciaal maakt. Eén manier om daarachter te komen is door talen met elkaar te vergelijken en te onderzoeken welke eigenschappen de menselijke taal definiëren. Een eigenschap die we terug lijken te vinden in de meeste, zo niet alle, menselijke talen is dat zinnen hiërarchisch zijn opgebouwd. Hoewel we zinnen natuurlijk woord-voor-woord, dus lineair, uitspreken, zit er een duidelijke hiërarchische structuur in. Kijk bijvoorbeeld naar de zin in (1).

(1) Kunnen adelaars die vissen vangen vliegen?

Dit is één van de vele voorbeelden die de taalkundige Noam Chomsky heeft voorgedragen om te laten zien dat taal hiërarchisch van aard is. Het hulpwerkwoord *kunnen* slaat op een capaciteit van adelaars. Elke moedertaalspreker van het Nederlands zal stellen dat het de capaciteit om te vliegen betreft. Niemand zal stellen dat het in deze vraag gaat over de capaciteit van adelaars om vissen te vangen. De betekenis van deze zin is dus niet te herleiden tot de lineaire structuur. *Kunnen* staat immers lineair dichter bij *vissen vangen*, dan bij *vliegen*. De betekenis volgt direct als je uitgaat van de hiërarchische structuur. Het zinsdeel *die vissen vangen* is een betrekkelijke bijzin van *adelaars*. De hoofdzin is: *Kunnen adelaars vliegen?*

Een andere eigenschap van menselijke taal is dat er zoveel verschillende variëteiten bestaan. Er zijn een heleboel verschillende talen in de wereld. Elke taal heeft zijn eigen unieke eigenschappen. Zo is de woordvolgorde van het Japans totaal anders dan die van het Nederlands. Als taal een onderdeel uitmaakt van onze biologie, is het opvallend dat er zoveel variatie in kan voorkomen. Vooral als je bedenkt dat elk gezond kind zijn/haar moedertaal zonder problemen kan verwerven. Dit kan deels worden verklaard door de hypothese dat de variatie in menselijke taal grenzen heeft. Talen kunnen slechts tot een bepaalde hoogte van elkaar variëren (Chomsky 1995).

Een dergelijke benadering maakt het eenvoudiger om het relatieve gemak van taalverwerving te verklaren. De mogelijke eigenschappen van een taal zijn namelijk niet eindeloos.

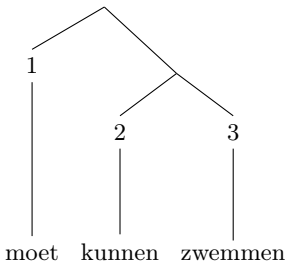
Inderdaad zijn sommige vormen van variatie die men zich zou kunnen inbeelden, empirisch afwezig in menselijke taal. In sommige gevallen kan dit toeval zijn. In andere gevallen is het mogelijk dat de grenzen van variatie een gevolg zijn van het menselijk cognitieve taalsysteem, of van algemene eigenschappen van de menselijke cognitie. In dit proefschrift bespreek ik twee illustratieve voorbeelden van grenzen aan de variatie. Ik betoog dat deze grenzen een gevolg zijn van eigenschappen van het menselijk taalsysteem.

Om de eigenschappen van menselijke taal te ontrafelen, is het praktisch om talen te vergelijken die minimaal van elkaar verschillen (Kayne 2000, 2005; Barbiers 2009, en anderen). Op die manier worden de effecten van mogelijk onverwachte variabelen geminimaliseerd. De vergelijking van minimale verschillen, meestal binnen een taal, noemen we de studie van *micro*variatie. Dit proefschrift richt zich op één type microvariatie: de volgordes die zijn geattesteerd in clusters van werkwoorden in variëteiten van het Nederlands. In Nederlandse bijzinnen staan alle werkwoorden samen aan het einde van de zin, zoals *Ik vind dat Roos Philou moet hebben aangekleed*. Er zit veel variatie in de volgorde van werkwoordclusters. De zinnen *Ik vind dat Roos Philou aangekleed moet hebben* en *Ik vind dat Roos Philou aan moet hebben gekleed* kunnen bijvoorbeeld ook worden gebruikt.

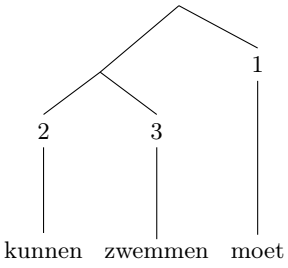
Toch is deze variatie niet onbeperkt (zie ook Barbiers 2009). Ten eerste komen sommige volgordes niet voor. De zin *Ik vind dat Roos Philou hebben aangekleed moet* wordt door iedereen afgewezen. Ten tweede kunnen er soms niet-werkwoordelijke elementen in het werkwoordcluster staan (zoals *aan*), maar niet alle woorden kunnen zomaar op die plek staan. De oorzaken voor deze beperkingen zijn niet meteen duidelijk. Ik betoog in dit proefschrift dat dit niet willekeurig is, maar een gevolg is van onze grammatica.

Als je de werkwoorden in een drie-werkwoordelijk cluster ongelimiteerd zou mogen verplaatsen, dan zijn er (3x2x1) zes volgordes mogelijk. Echter, als je de hiërarchische structuur intact houdt, dan zijn er nog maar vier volgordes mogelijk. In de zin *Ik vind dat Sem goed moet kunnen zwemmen* zegt *moet* iets over het *kunnen zwemmen* (wat Sem moet, is kunnen zwemmen) en *kunnen* zegt iets over *zwemmen* (wat Sem moet kunnen, is zwemmen). *Moet* is hiërarchisch het eerste werkwoord (V_1), *kunnen* is het tweede werkwoord (V_2) en *zwemmen* is het derde werkwoord (V_3). Als je woorden die hiërarchisch bij elkaar horen, naast elkaar zet, zijn er vier volgordes mogelijk. Dit is weergegeven in (2).

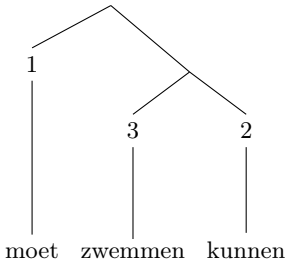
(2) a.



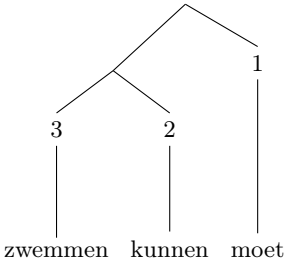
c.



b.



d.



De andere twee volgordes (*kunnen*$_2$ *moet*$_1$ *zwemmen*$_3$ en *zwemmen*$_3$ *moet*$_1$ *kunnen*$_2$) breken de hiërarchische structuur.

In de taalvariëteiten van Nederland en Vlaanderen komen vier verschillende volgordes voor. Echter zijn dit niet de vier volgordes die je zou verwachten op basis van de hiërarchische structuur. Zo komt de volgorde van (2c) niet voor, terwijl de volgorde *zwemmen*$_3$ *moet*$_1$ *kunnen*$_2$ wel voorkomt. De vraag die zich nu voordoet is hoe dit kan worden verklaard als taal inderdaad hiërarchisch van aard is.

Hoewel de variatie in dit domein willekeurig lijkt, zal ik laten zien dat er duidelijke patronen naar voren komen, zodra de geografische distributie van de verschillende volgordes wordt beschouwd. Geen van de bestaande theorieën over werkwoordclusters kan de gevonden geografische patronen verklaren. Ze zouden moeten aannemen dat deze patronen sociolinguïstisch toevallig zijn ontstaan. Ik betoog echter dat deze patronen niet willekeurig zijn, maar een gevolg zijn van eigenschappen van het menselijk taalsysteem.[1] Op deze manier biedt dit proefschrift een gefundeerde verklaring voor de eigenschappen van werkwoordclusters.

Niet weer een boek over werkwoordclusters

Hoewel er al heel veel literatuur bestaat over werkwoordclusters, is dit proefschrift in veel opzichten anders. Het heeft een ander beginpunt; er wordt een ander standpunt ingenomen; het gaat niet uit van één framework, maar gebruikt ideeën uit diverse frameworks; er wordt gebruikt gemaakt van een andere methodologie; en er worden een aantal nieuwe bevindingen gepresenteerd. Ik zal deze punten hier kort bespreken. Verderop in deze samenvatting zal ik er uitgebreider op in gaan.

1. Het beginpunt van dit proefschrift is de geografische distributie van de werkwoordvolgordes, hier zijn enkele duidelijke patronen in te vinden. Dit is het

[1] Deze benadering is in overeenstemming met Weinreich (1954).

onderwerp van dit proefschrift. Ik noem hier de meest opmerkelijke patronen op.

- In de meeste variëteiten van het Nederlands komen meerdere werkwoordvolgordes voor, behalve in de Noord-Nederlandse.
- Welke werkwoordvolgordes daadwerkelijk worden gebruikt buiten de Noord-Nederlandse taalvariëteiten hangt af van het type werkwoorden in de zin.
- De variatie die voorkomt in werkwoordclusters contrasteert met een vaste volgorde in andere domeinen.
- De 1-3-2 volgorde (waarin 3 een voltooid deelwoord is), partikelincorporatie en doorbreking van het werkwoordcluster door ander niet-werkwoordelijk materiaal vertonen vergelijkbare geografische distributies.
- De 1-3-2 volgorde (waarin 3 een infinitief is) komt alleen voor in de gebieden waar Nederlandse taalvariëteiten grenzen aan Noord-Nederlandse en Duitse taalvariëteiten.
- Werkwoordclusterdoorbreking is een typisch West-Vlaams fenomeen. Het gebruik hiervan neemt geleidelijk af hoe verder de variëteiten geografisch verwijderd zijn van deze regio.

Voor zover ik weet, is er geen andere theorie die deze patronen tracht te verklaren – met uitzondering van Barbiers en Bennis (2010), waar de huidige benadering op gebaseerd is.

2. In dit proefschrift wordt het standpunt ingenomen dat alleen de volledig oplopende 1-2-3 en aflopende 3-2-1 volgordes drie-werkwoordelijke clusters zijn. Alle andere volgordes bevatten niet-werkwoordelijk materiaal, zoals een bijvoeglijk gebruikt voltooid deelwoord, of een nominale infinitief.
3. Volgens de huidig Minimalistische theory (Chomsky 2005, 2007, 2008), spelen verschillende soorten factoren een rol in de vorming van menselijke talen, zoals principes die van belang zijn voor het verwerken van informatie. Een dergelijke theorie maakt het noodzakelijk om alle mogelijke factoren die de woordvolgordes van sprekers kunnen beïnvloeden te onderzoeken. Om deze reden zijn ideeën uit andere frameworks, zoals het functionalisme, ook in aanmerking genomen. Ik laat zien dat de diverse frameworks elkaar aanvullen, en niet tegenspreken. Door geen standpunt in te nemen over controversiële onderwerpen (bijvoorbeeld of *Merge* al dan niet specifiek voor taal is), hoop ik dat dit proefschrift allerlei soorten taalkundigen zal aanspreken.
4. In mijn onderzoek heb ik volop gebruik gemaakt van grammaticaliteitsoordelen om te ontraadselen welke volgordes er mogelijk zijn in de Nederlandse en Vlaamse taalvariëteiten. Maar ik heb ook gebruik gemaakt van een minder conventionele benadering, waarmee ik oordelen kon krijgen over volgordes die sprekers zelf niet gebruiken. Dit was een rangschikkingstaak. Informanten werd gevraagd om volgordes te rangschikken ten opzichte van elkaar. De taak bevatte niet alleen volgordes die de informanten zelf konden gebruiken, maar ook volgordes die alleen in andere taalvariëteiten voorkomen, alsmede volgordes die nergens voorkomen. De informanten konden alleen verder met de opdracht als ze alle items in een enkele volgorde hadden geplaatst. Hierdoor werden ze gedwongen om ook de volgordes die ze zelf niet gebruiken te beoordelen.

5. In dit proefschrift wordt een aantal nieuwe bevindingen gepresenteerd:

    - De geografische distributie van werkwoordvolgordes geeft inzicht in de grammaticale structuur van werkwoordclusters.
    - Taalgebruikers hebben kennis van woordvolgordes die in andere talen kunnen voorkomen. Dit kan worden verklaard door eigenschappen van de grammatica. Zowel familiariteit als eigenschappen van taalverwerking kunnen deze kennis niet volledig verklaren.
    - Werkwoordclusters zijn basis-gegenereerd in een lage positie.
    - Er is een duidelijke grens voor werkwoordclusterdoorbreking.

Eerdere theorieën

In hoofdstuk 2 van dit proefschrift worden eerdere theorieën over de vorming van werkwoordclusters besproken. Deze theorieën zijn erg divers. Er zijn theorieën die stellen dat alle volgordes eigenlijk altijd dezelfde onderliggende volgorde hebben. Er is dan dus één volgorde waarvan de andere volgordes zijn afgeleid. Aangezien andere woordgroepen in het Nederlands meestal slechts één volgorde toestaan – zo staat een lidwoord altijd vóór een zelfstandig naamwoord – is de gedachte dat alle volgordes afgeleid worden van één "basisvolgorde" niet zo gek. Ook is het idee van verplaatsingen niet gek. Verplaatsingen vinden bijvoorbeeld ook op andere plekken in de zin plaats. Zo wordt een vraagwoord in het Nederlands altijd naar voren in de zin verplaatst. De zin *Olivier eet 's avonds graag tomaatjes* wordt dan *Wat eet Olivier 's avonds graag –?* of *Wanneer eet Olivier – graag tomaatjes?*

Op dezelfde wijze zouden werkwoordvolgordes met verplaatsingen kunnen worden afgeleid. Dergelijke verplaatsingstheorieën zijn in twee kampen te verdelen: één waarin wordt aangenomen dat hoofdwerkwoorden altijd vóór de hulpwerkwoorden staan in de basisvolgorde, en één waarin wordt aangenomen dat hoofdwerkwoorden juist achter de hulpwerkwoorden staan. Volgens aanhangers van het eerste kamp is de basisvolgorde dus $zwemmen_3$ $kunnen_2$ $moet_1$ (ofwel 3-2-1). Dit is de volgorde die in het Fries en het Duits de standaard is. Volgens aanhangers van het tweede kamp is de basisvolgorde $moet_1$ $kunnen_2$ $zwemmen_3$ (ofwel 1-2-3).

Een probleem met deze methode, is dat het vaak onduidelijk blijft waarom deze verplaatsingen zouden plaatsvinden. Noam Chomsky heeft wel voorgesteld dat elke verplaatsing ergens door wordt veroorzaakt (Chomsky 1993). Een vraagwoord verplaatst bijvoorbeeld om een zin vragend te maken. Zulke oorzaken zijn bij werkwoordclusters niet duidelijk aanwezig. Er zit geen duidelijk verschil tussen de bijzinnen *dat Olivier tomaatjes heeft gegeten* en *dat Olivier tomaatjes gegeten heeft*. Het is dan ook niet duidelijk waarom een eventuele verplaatsing plaats zou hebben gevonden.

Anderen hebben gesteld dat er geen basisvolgorde is. Er kunnen meerdere volgordes worden gevormd, gewoon door de hiërarchische volgorde aan te houden. Welke volgordes daadwerkelijk gebruikt worden, wordt ergens anders door bepaald. Zoals hierboven is laten zien, doet dit op zichzelf niet de goede voorspellingen. Sommige volgordes die kunnen worden gevormd zijn niet heel aanvaardbaar, terwijl andere volgordes die niet kunnen worden gevormd juist heel vaak voorkomen. Daarom stellen sommige taalkundigen dat er nog wijzigingen kunnen plaatsvinden nadat de hele zin is gebouwd, maar voordat die wordt uitgesproken. Dan kunnen er bijvoorbeeld

woorden van plek verwisselen. Dit geeft veel theoretische problemen, aangezien er dan een heleboel extra aannames moeten worden gedaan om te voorkomen dat zulke verwisselingen zomaar overal kunnen voorkomen.

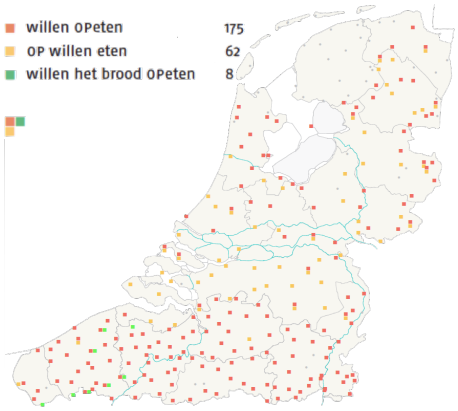
Dit was een vogelvlucht over een aantal van de bestaande theorieën. Het grootste probleem van deze theorieën is niet dat ze de bestaande volgordes niet kunnen afleiden, want dat kunnen ze allemaal. Er is een ander punt waar deze theorieën eigenlijk niets over te zeggen hebben. Als je kijkt naar de geografische distributie van de verschillende volgordes, dan komen er enkele duidelijke patronen naar voren. Deze patronen geven inzicht in de structuur van werkwoordclusters. Ik zal hier de meest opmerkelijke patronen bespreken.

- In de meeste variëteiten van het Nederlands komen meerdere werkwoordvolgordes voor, behalve in de Noord-Nederlandse. Zo komt in het Nederlands zowel 1-2 (*heeft gegeten*) als 2-1 (*gegeten heeft*) voor. Terwijl in het Noord-Nederlands alleen de 2-1 volgorde voorkomt.
- Welke werkwoordvolgordes daadwerkelijk worden gebruikt buiten de Noord-Nederlandse taalvariëteiten hangt af van het type werkwoorden in de zin. Als het hoofdwerkwoord een infinitief is, dan wordt de 1-2 volgorde gebruikelijker. De bijzin *dat Olivier goed moet*$_1$ *eten*$_2$ is gebruikelijker dan *dat Olivier goed eten*$_2$ *moet*$_1$.
- De variatie die voorkomt in werkwoordclusters contrasteert met een vaste volgorde in andere domeinen. In naamwoordgroepen kan bijvoorbeeld slechts één volgorde voorkomen: *Jacks mooie bloemen* wordt bijvoorbeeld nooit *Jacks bloemen mooie* of *mooie Jacks bloemen*.
- De 1-3.DLW-2 volgorde (waarin 3 een voltooid deelwoord is) zoals in (3a), vertoont een vergelijkbare geografische distributie als partikelincorporatie (zoals in (3b)) en doorbreking van het werkwoordcluster door ander niet-werkwoordelijk materiaal (zoals in (3c)).

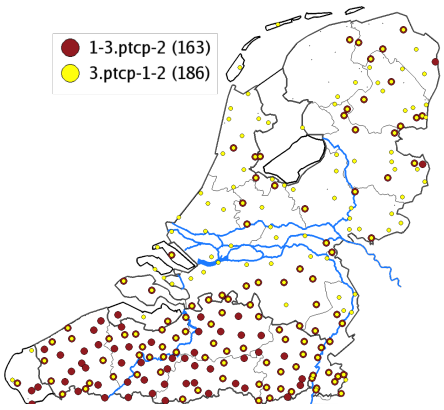
  (3) a. ...dat Anna een boek *moet*$_1$ **gelezen**$_3$ *hebben*$_2$.
  b. ...dat Anna een boek *moet*$_1$ **uit** *lezen*$_2$.
  c. ...dat Anna *moet*$_1$ **een boek** *lezen*$_2$.

  De 1-3-2 volgorde en partikelincorporatie kunnen in alle Nederlandse en Vlaamse taalvariëteiten worden gebruikt, maar ze zijn het meest gebruikelijk in Vlaanderen. Dit wordt weergegeven op de volgende kaarten.[2]

[2] De kaarten die hier getoond worden, komen uit de Syntactische Atlas van de Nederlandse Dialecten. Sommige kaarten komen direct uit de geprinte atlas (Barbiers et al. 2008). Andere zijn gemaakt door middel van DynaSAND (Barbiers et al. 2006); een online tool waarmee (i) gezocht kan worden in de data die voor de atlas zijn verzameld, en (ii) op basis van die data kaarten kunnen worden gemaakt.

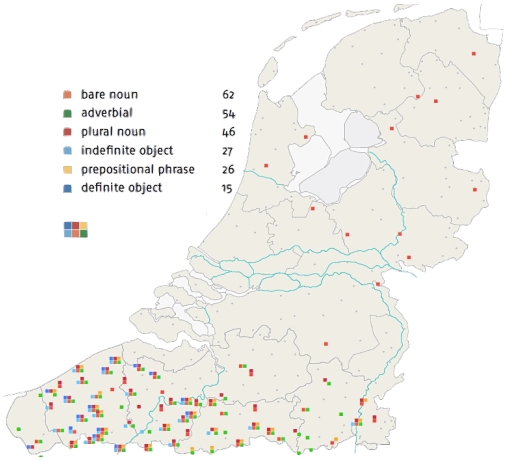


Kaart 1: partikelincorporatie SAND-II, map 2.3.1.7



Kaart 2: 1-3.DLW-2 en 3.DLW-1-2

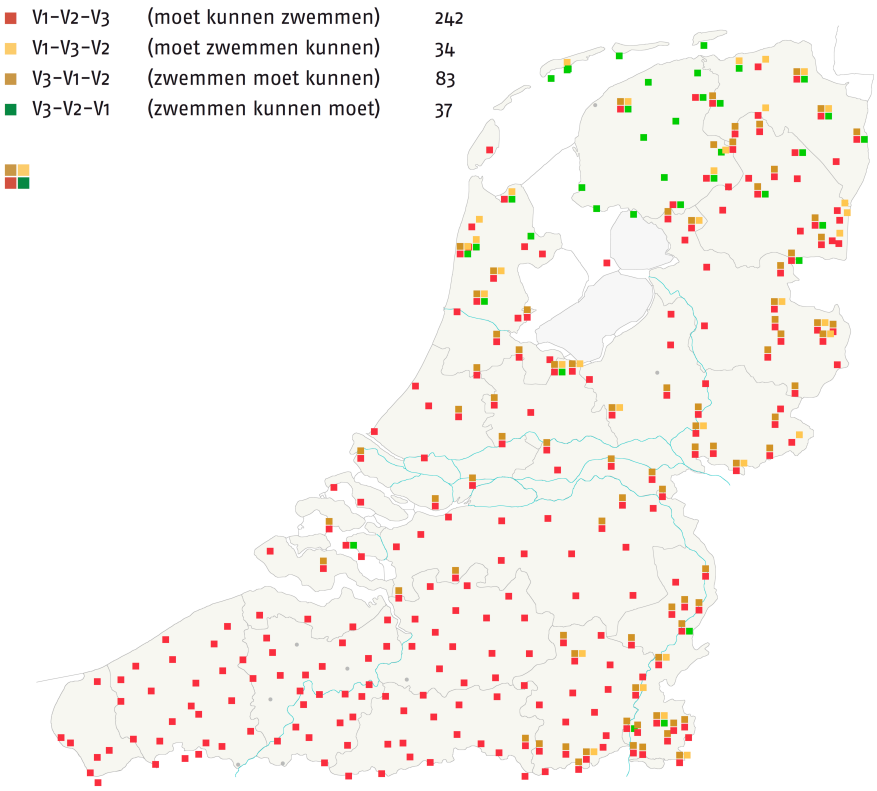
Werkwoordclusterdoorbreking is een verschijnsel dat enkel in Vlaanderen (met name in West-Vlaanderen) voorkomt. Het gebruik hiervan neemt geleidelijk af hoe verder de variëteiten geografisch verwijderd zijn van deze regio.



Kaart 3: Werkwoordclusterdoorbreking, SAND-II, map 2.3.2.2

- Als 3 een infinitief is, komt de 1-3-2 volgorde (zoals in (4)) alleen voor in de grensgebieden; waar Nederlandse taalvariëteiten grenzen aan Friese en Duitse taalvariëteiten.

  (4) ...dat Sem goed $moet_1$ $zwemmen_3$ $kunnen_2$.



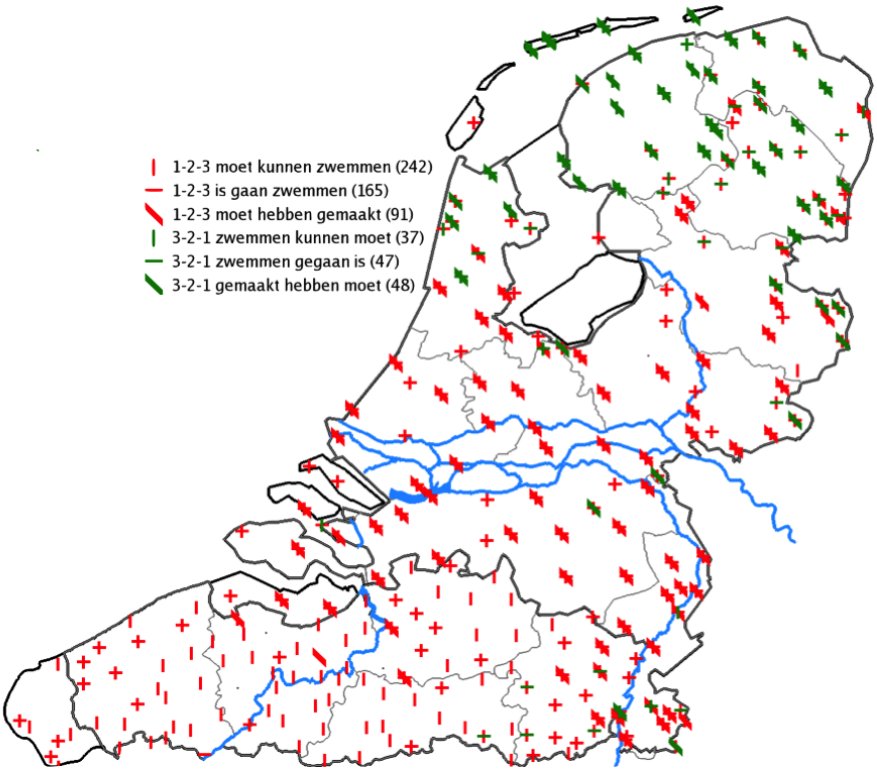
Kaart 4: SAND-II kaart 17a

Hoofdstuk 2 bespreekt in detail dat eerdere theorieën van werkwoordclusters vrijwel niets te zeggen hebben over deze patronen. Dit is met name een gevolg van het feit dat deze theorieën zich voornamelijk richten op de vorming van deze constructies en niet op de geografische distributie ervan.

De nieuwe theorie

In hoofdstuk 3 van dit proefschrift presenteer ik de analyse van werkwoordclusters die ik aanneem.[3] Hier wordt betoogd dat er in werkwoordclusters helemaal geen verplaatsingen plaatsvinden. Bovendien wordt aangenomen dat de structuur altijd in één richting wordt uitgesproken. Het gevolg van deze twee aannames is dat er eigenlijk maar twee echte volgordes zijn waarin werkwoorden kunnen staan: 1-2-3, zoals in de Nederlandse volgorde ($moet_1$ $kunnen_2$ $zwemmen_3$) en 3-2-1, zoals in de Friese volgorde ($swimme_3$ $kinne_2$ $moat_1$). Er zit geen optionaliteit in de uitspraakrichting. Zoals de volgende kaart toont, laten de twee volgordes een geografisch complementaire distributie zien.

[3] Dit hoofdstuk is een aangepaste versie van *Barbiers, Bennis, and Dros-Hendriks (forthcoming)*.



Kaart 5: De voorkomens van volgordes 1-2-3 (rood) en 3-2-1 (groen)

Over de andere volgordes (zoals *gemaakt*$_3$ *moet*$_1$ *hebben*$_2$) wordt betoogd in het hoofdstuk dat die niet-werkwoordelijk materiaal bevatten. Zo is algemeen bekend dat deelwoorden ook bijvoeglijk gebruikt kunnen worden. In sommige gevallen leidt dit tot een verschil in interpretatie (Kraak en Klooster 1968:149-159 e.a.). Een deelwoord zoals *geopend* kan worden geïnterpreteerd als 'open' of als 'open gemaakt'. In een 2-1 werkwoordcluster als in (5a), laat het deelwoord beide interpretaties toe. Echter, in de andere volgorde (5b) kan het deelwoord alleen werkwoordelijk worden geïnterpreteerd, met de betekenis 'is opengemaakt'.

(5) a. Hij zag dat de deur *geopend*$_2$ *is*$_1$.
b. Hij zag dat de deur *is*$_1$ *geopend*$_2$.
c. de geopende deur

Deelwoorden die in de attributieve positie van een naamwoordgroep staan (zoals in (5c)), laten beide interpretaties toe. Kennelijk laat een bijvoeglijke positie van het deelwoord zowel een werkwoordelijke, passieve interpretatie, als een adjectivale, statische interpretatie toe. Het feit dat in (5b) alleen de passieve interpretatie beschikbaar is, kan worden verklaard door aan te nemen dat het deelwoord in deze volgorde puur werkwoordelijk is. Uit het feit dat beide interpretaties beschikbaar zijn in (5a), kan men opmaken dat het deelwoord in deze positie bijvoeglijk is. Het verschil in de interpretatie van (5a) en (5b) is dus een categoriaal verschil. Op een vergelijkbare wijze kan

de 3-1-2 volgorde nu verklaard worden. In het Nederlands staat niet-werkwoordelijk materiaal over het algemeen vóór alle werkwoorden:

(6) a. ...dat Martin het huisje voor drie uur **gebouwd**$_3$ *moet*$_1$ *hebben*$_2$.
b. ...dat Martin het huisje voor drie uur **klaar**$_3$ *moet*$_1$ *hebben*$_2$.

Ook over infinitieven wordt betoogd dat ze niet-werkwoordelijk kunnen zijn. Er is wel gesteld in de literatuur dat infinitieven nominaal kunnen worden gebruikt (zie bijvoorbeeld Den Besten en Broekhuis 1989). Zo'n analyse wordt ondersteund door het feit dat infinitivale werkwoorden vervangen kunnen worden door een voornaamwoord:

(7) a. ...dat Sem **zwemmen**$_3$ *moet*$_1$ *kunnen*$_2$.
b. ...dat Sem **dat**$_3$ *moet*$_1$ *kunnen*$_2$.

Een benadering waarin 3 in de 3-1-2 volgorde niet-werkwoordelijk is, kan verklaren waarom deze volgorde wel gevonden wordt. De zinnen in (8) pleiten voor een dergelijke benadering. In zin (8a) selecteert *laten* een infinitief (*winnen*). Zin (8b) laat zien dat het hulpwerkwoord *laten* geen nominale complementen toestaat: *winnen* kan niet worden vervangen door *dat*. Dit doet de voorspelling dat *winnen* ook niet nominaal kan worden gebruikt, en dat de 3-1-2 volgorde daarmee ook niet mogelijk is. Zin (8c) laat zien dat deze voorspelling klopt.[4]

(8) a. Ik vind dat iedereen Stijn *moet*$_1$ *laten*$_2$ *winnen*$_3$.
b. * Ik vind dat iedereen Stijn **dat** *moet*$_1$ *laten*$_2$.
c. * Ik vind dat iedereen Stijn **winnen**$_3$ *moet*$_1$ *laten*$_2$.

Deze theorie kan alle volgordes van werkwoordclusters afleiden zonder verplaatsingen die specifiek zijn voor werkwoordclusters. De 1-2-3 en 3-2-1 volgordes zijn drie-werkwoordelijke clusters. De 3-1-2 volgorde is een twee-werkwoordelijk cluster met een niet-werkwoordelijke 3. In de 1-3-2 volgorde staat dit element binnen in het cluster, op dezelfde plek als partikels. De 2-1-3 volgorde kan niet worden afgeleid. Deze volgorde komt ook niet voor.[5] Dan blijft enkel de 2-3-1 volgorde onverklaard. Deze volgorde komt alleen voor als het hoogste werkwoord een hulpwerkwoord van tijd is, zoals *is*:

(9) Ik weet dat hij *gaan*$_2$ *zwemmen*$_3$ *is*$_1$

Hulpwerkwoorden van tijd, zoals *is*, selecteren normaliter een voltooid deelwoord:

(10) a. Ik weet dat Roos naar school *moest* ***lopen***.
b. Ik weet dat Roos naar school *is* ***gelopen***.

Als er echter twee werkwoorden volgen op een dergelijk hulpwerkwoord, is er geen voltooid deelwoord aanwezig:

(11) a. Ik weet dat Roos naar school *is gaan lopen*.

[4] Een * voor een zin geeft aan dat die zin onaanvaardbaar is.
[5] Salzmann (2013) bespreekt enkele gevallen van deze volgorde in Zwitsers Duits. Echter is deze volgorde beperkt tot een specifieke klasse van werkwoorden. Dit suggereert dat dit een ander soort constructie is.

b. * Ik weet dat Roos naar school *is gegaan lopen*.

Dit fenomeen staat bekend als Infinitivus-Pro-Participio (zie Wurmbrand 2006, 2017 voor een overzicht). In dit proefschrift probeer ik dit effect niet te verklaren. Het lijkt erop dat aan het tweede werkwoord geen deelwoordmorfologie kan worden toegekend als dit werkwoord al is samengevoegd met een ander werkwoord. Mogelijk kan aan een werkwoordcluster (zoals [*gaan lopen*]) geen deelwoordmorfologie worden toegekend.

In dit hoofdstuk wordt aangenomen dat het cluster [$gaan_2$ $lopen_3$] functioneert als een voltooid deelwoord bij het hulpwerkwoord *is*. Over voltooid deelwoorden is hierboven al beargumenteerd dat ze een ambigue categoriale status hebben: als ze vóór het hulpwerkwoord staan zijn ze bijvoeglijk en als ze achter het hulpwerkwoord staan zijn ze werkwoordelijk. De 2-3-1 volgorde kan dus worden geanalyseerd als een complex adjectivaal deelwoord, gevolgd door het werkwoord *is*.

Deze theorie ondersteunt het idee dat de variatie in werkwoordclusters niet toevallig is, maar een gevolg is van grammaticale eigenschappen. De 2-1-3 volgorde is bijvoorbeeld afwezig omdat die niet kan worden afgeleid. Dit leidt tot de verwachting dat sprekers in staat zullen zijn om volgordes die ongrammaticaal zijn te onderscheiden van volgordes die zij zelf niet gebruiken, maar wel grammaticaal zijn. Om deze verwachting te testen, is een groot aantal sprekers uit het hele taalgebied gevraagd om alle zes werkwoordvolgordes ten opzichte van elkaar te rangschikken. De resultaten laten duidelijk zien dat de verwachting uit komt: sprekers rangschikken de mogelijke, maar ongebruikte volgordes hoger dan de ongrammaticale volgordes. Zo wordt de Noord-Nederlandse volgorde in (12a) beter beoordeeld dan de ongrammaticale volgorde in (12b).

(12) a. Ik vind dat iedereen $zwemmen_3$ $kunnen_2$ $moet_1$.
b. Ik vind dat iedereen $kunnen_2$ $moet_1$ $zwemmen_3$.

Opvallend hierbij is dat de resultaten voor sprekers uit het hele taalgebied ongeveer gelijk waren. Hierdoor lijkt het erop dat de oordelen niet voortkomen uit onze kennis van de taalvariëteiten die in onze omgeving gesproken worden. In dat geval zouden de oordelen van mensen die regelmatig met een bepaalde volgorde in aanraking komen moeten verschillen van mensen die deze volgorde minder vaak horen. De voorspelling is dan dat mensen uit het noorden van het taalgebied de noordelijke 3-2-1 volgorde beter zullen vinden dan de zuidelijke 1-3-2 volgorde. En omgekeerd. Deze voorspelling komt niet uit.

De patronen

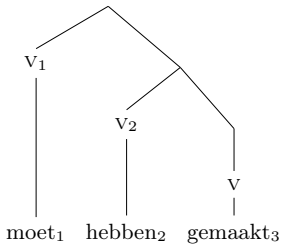
Deze theorie kan veel van de patronen die in hoofdstuk 2 werden genoemd verklaren.

- In de meeste variëteiten van het Nederlands komen meerdere werkwoordvolgordes voor, behalve in de Noord-Nederlandse. In Noord-Nederlandse variëteiten komt enkel de 3-2-1 volgorde voor. Dit kan worden toegekend aan het feit dat in het Noord-Nederlands werkwoordelijk en niet-werkwoordelijk materiaal aan dezelfde kant van het selecterende werkwoord staan. In de Nederlandse

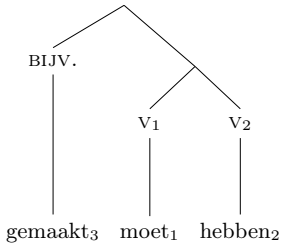
variëteiten staan werkwoorden aan de andere kant. Als een gevolg hiervan kunnen er in Nederlandse grammatica's drie volgordes worden afgeleid: een drie-werkwoordelijk cluster zoals in (13a), een twee-werkwoordelijk cluster met een niet-werkwoordelijke 3 voorafgaand aan het cluster, zoals in (13b) en ten slotte een twee-werkwoordelijk cluster met een niet-werkwoordelijke 3 binnenin het cluster, zoals in (13c). In Noord-Nederlandse grammatica's hebben deze drie soorten constructies allemaal dezelfde volgorde. Dit is geïllustreerd in (14).

(13)

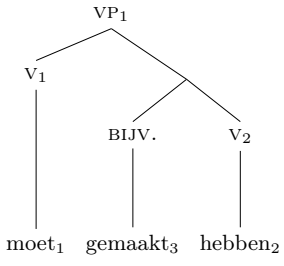
a.



b.

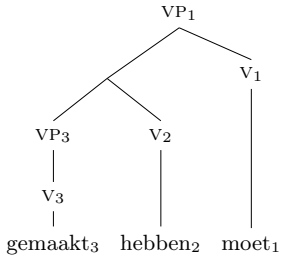


c.

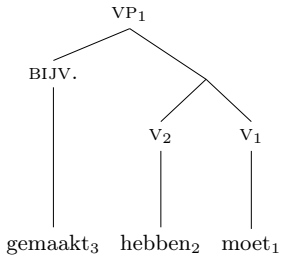


(14)

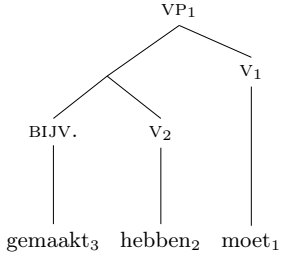
a.



b.



c.



- Welke werkwoordvolgordes daadwerkelijk worden gebruikt buiten de Noord-Nederlandse taalvariëteiten hangt af van het type werkwoorden in de zin. Dit kan worden verklaard door de categoriale status van de betreffende werkwoorden. Resultaten van twee-werkwoordelijke clusters laten zien dat deelwoorden in Vlaamse variëteiten alleen bijvoeglijk kunnen worden gebruikt; ze laten geen 1-2 volgordes toe. De theorie die hier is voorgesteld doet de juiste voorspelling dat dezelfde variëteiten in drie-werkwoordelijke clusters ook alleen de 3-1-2 en

1-3-2 volgordes toestaan. Op eenzelfde wijze lijken Vlaamse variëteiten geen nominale infinitieven toe te staan in het werkwoordcluster; ze laten geen 2-1 volgordes toe. Hiermee zijn ook de 3-1-2 en de 1-3-2 volgordes uitgesloten met dit type werkwoord.

- De variatie die voorkomt in werkwoordclusters contrasteert met een vaste volgorde in andere domeinen. Dit is voor een deel verklaard door onze benadering. Aangezien infinitieven en participia categoriaal ambigu zijn, wordt er zelfs volgordevariatie tussen 1-2-3 en 3-1-2 verwacht. Een werkwoordelijke 3 moet namelijk achteraan staan, maar een niet-werkwoordelijke 3 moet vóór het werkwoordcluster komen. Echter blijft een deel van de variatie onverklaard. De 1-3-2 en 3-1-2 volgordes komen namelijk naast elkaar voor. De optionaliteit in deze constructie komt overeen met optionaliteit in de plaatsing van ander niet-werkwoordelijk materiaal in het cluster. Zo kunnen partikels ook zowel binnen als buiten het werkwoordcluster voorkomen. De vraag die dan naar voren komt is hoe mensen kiezen tussen deze volgordes.
- De 1-3.DLW-2 volgorde (waarin 3 een voltooid deelwoord is), partikelincorporatie en doorbreking van het werkwoordcluster door ander niet-werkwoordelijk materiaal vertonen vergelijkbare geografische distributies. Dit kan worden toegekend aan de aanname dat het deelwoord bijvoeglijk is in deze volgorde. Deze constructies hebben daarmee alle drie de volgorde hulpwerkwoord–niet-werkwoordelijk item–hoofdwerkwoord.
- De 1-3.INF-2 volgorde (waarin 3 een infinitief is) komt alleen voor in de gebieden waar Nederlandse taalvariëteiten grenzen aan Friese en Duitse taalvariëteiten. Dit heeft meerdere oorzaken. Ten eerste is betoogd dat Vlaamse variëteiten geen nominale infinitieven in het werkwoordcluster toestaan. Ten gevolge daarvan komt de 1-3-2 volgorde daar niet voor. Ten tweede kunnen naamwoorden normaliter niet in het werkwoordcluster voorkomen in de Nederlandse variëteiten. Zo is de zin (15) voor velen niet acceptabel.

  (15) % Ik weet dat Anna en Sophie *willen*$_2$ **snoep**$_3$ *eten*$_1$.

  Hierdoor komt de verwachting naar voren dat de 1-3-2 volgorde weinig voorkomt in die variëteiten. Het feit dat het wel wordt gevonden in de gebieden die grenzen aan Friesland en Duitsland kan worden verklaard door aan te nemen dat dit een transitieverschijnsel is. Dit kan verklaren waarom het gebied waar deze volgorde voorkomt niet overeenkomt met één van de bekende dialectregio's, zoals het Limburgs.

Dan blijft er één patroon over, namelijk dat werkwoordclusterdoorbreking een typisch West-Vlaams fenomeen is. Het gebruik hiervan neemt geleidelijk af hoe verder de variëteiten geografisch verwijderd zijn van deze regio. Hierover gaat hoofdstuk 5.

Merk op dat twee van de aannames van de huidige benadering ook aan eerdere theorieën over werkwoordclusters kunnen worden toegevoegd. Bijvoorbeeld in een theorie waarin de onderliggende volgorde 3-2-1 is, zou men kunnen aannemen dat werkwoorden altijd of nooit verplaatsen. In een dergelijke theorie worden ook alleen de 1-2-3 en de 3-2-1 volgordes afgeleid als drie-werkwoordelijke clusters. De andere volgordes bevatten dan niet-werkwoordelijk materiaal. Op die manier kunnen ook eerdere benaderingen de besproken patronen verklaren.

Taalverwerking

Tot zover is er veel gezegd over de hiërarchische eigenschappen van taal. Onze cognitie heeft echter nog wat eigenschappen die mogelijk onze taal beïnvloeden. Eén eigenschap is bijvoorbeeld dat er een limiet zit aan ons werkgeheugen. Deze eigenschap komt duidelijk ook buiten ons taalgebruik naar voren, maar beïnvloedt ook onze taal. Zo kunnen zinnen niet oneindig worden ingebed:

(16) a. Het meisje [dat de jongen zag] ging fietsen.
b. Het meisje [dat de jongen [die de auto had] zag] ging fietsen.
c. ?? Het meisje [dat de jongen [die de auto [die geen achterrekje had] had] zag] ging fietsen.

In hoofdstuk 4 komen theorieën aan bod waarin dergelijke effecten op taal naar voren komen. In dergelijke theorieën wordt wel betoogd dat ze woordvolgordevariatie kunnen voorspellen. In het hoofdstuk wordt getoetst of de woordvolgordevariatie in werkwoordclusters kan worden verklaard middels de factoren die genoemd worden in die theorieën. Sommigen stellen bijvoorbeeld dat de complexiteit van zinnen wordt beïnvloed door de hoeveelheid woorden die tussen twee gerelateerde woorden in staan. Zo staat er in de zinnen in (16) heel veel materiaal tussen het onderwerp *het meisje* en de persoonsvorm *ging*. Anderen hebben juist gesteld dat informatieverwerking makkelijker wordt als er meer tijd voor is. Op die manier kunnen grotere afstanden in sommige gevallen juist minder complex zijn. In de eerste helft van het hoofdstuk bespreek ik diverse van dergelijke factoren die zijn voorgesteld in de literatuur. Daarbij wordt onderzocht of de betreffende theorieën de oordelen van de sprekers kunnen verklaren. De resultaten laten zien dat geen enkele theorie de juiste voorspellingen doet. Factoren van taalverwerking kunnen de geattesteerde intuïties over werkwoordclusters dus niet op zichzelf verklaren.

In de tweede helft van het hoofdstuk wordt gekeken of een gecombineerd model, waarin de grammatica wordt meegenomen, betere voorspellingen doet. Een model waarin factoren van de taalverwerking slechts die volgordes beschouwen die syntactisch en categorisch equivalent zijn, doet de juiste voorspellingen. Hierboven is al gesteld dat de grammaticale theorie veel van de volgordevariatie kan verklaren. Het had echter niets te zeggen over de keuze tussen de 1-3-2 en de 3-1-2 volgordes wanneer 3 een voltooid deelwoord is. In dit hoofdstuk komt naar voren dat in diverse modellen van taalverwerking de 3-1-2 volgorde als minder complex naar voren komt. Een dergelijk model kan dus verklaren waarom de 3-1-2 volgorde beter wordt gevonden dan de 1-3-2 volgorde. Een model waarin eigenschappen van taalverwerking worden toegepast op de grammaticale theorie die in hoofdstuk 3 is voorgesteld, doet dus de juiste voorspellingen.

Doorbreking van het werkwoordcluster

In hoofdstuk 5 wordt verder ingegaan op doorbroken werkwoordclusters. Hiervoor is er een heleboel nieuwe data over dit fenomeen verzameld. Deze data komen van moedertaalsprekers van een West-Vlaams dialect gesproken in *Klemskerke*.[6]

Figuur 1: De ligging van Klemskerke

De resultaten uit dat onderzoek bekrachtigen de claim dat werkwoordclusters basisgegenereerd zijn. Hier worden de belangrijkste resultaten opgesomd.

Er hebben geen verplaatsingen plaatsgevonden in werkwoordclusters. Ten eerste is er geen duidelijke evidentie voor een verplaatsing van het werkwoord in doorbroken werkwoordclusters. Integendeel, het bereik van een modaal hulpwerkwoord kan niet op een lagere plek worden gereconstrueerd. De West-Vlaamse zin in (17) heeft enkel de betekenis waarin *kunnen* bereik neemt over de negatieve DP. De zin heeft enkel de betekenis dat Jan in staat was om geen toestemming te geven (en niet dat Jan niet in staat was om toestemming te geven).

(17) ...dat Jan *heeft*$_1$ *kunnen*$_2$ **geen toestemming** *geven*$_3$.

Ten tweede lijkt het er ook niet op dat het object in niet-doorbroken werkwoordclusters uit een lagere positie is verplaatst. Een algemeen verschijnsel dat gevonden wordt in taal is dat er niet kan worden verplaatst uit een zinsdeel dat zelf al verplaatst is (zie Corver (2017) en referenties daarin). Zo kan een vraagwoord worden verplaatst vanuit het onderwerp in zijn basispositie (= na *er*), zoals zin (18b) laat zien. Echter, wanneer dit onderwerp is verplaatst naar de positie van *er*, kan het vraagwoord er niet meer uit (Den Besten 1985; De Hoop 1996).

(18) a. Zijn er [zulke mensen] nodig?
b. Wat$_i$ zijn er [t$_i$ voor mensen] nodig?

(19) a. Zijn [zulke mensen] nodig?
b. * Wat$_i$ zijn [t$_i$ voor mensen] nodig?

Overweeg nu de zin in (20). Deze zin is prima in het West-Vlaams. Een vraagwoord kan dus zonder problemen extraheren uit een DP die vóór het cluster staat; er zijn geen zogenoemde *freezing* effecten.

[6] Eén van de sprekers, Magda Devos, is zowel een taalkundige als een spreker van het dialect. Zij vertaalde een grote hoeveelheid zinnen van het standaard Nederlands. Vervolgens heeft ze met twee andere sprekers van die taal de zinnen beoordeeld.

(20) Wat$_i$ heeft Jan laatst [$_{DP}$ t$_i$ voor auto's] *moeten kopen*?

Dit wijst erop dat het zinsdeel [*wat voor auto's*] niet uit een positie in het werkwoordcluster is verplaatst.

Een volgende eigenschap van doorbreking van het werkwoordcluster is het feit dat er meerdere posities zijn waarop een niet-werkwoordelijk item het cluster kan doorbreken in het West-Vlaams. Zo kan een bijwoord van wijze op drie posities worden gevonden: (BIJW.)–V$_1$-(BIJW.)–V$_2$-(BIJW.)–V$_3$. In het hoofdstuk laat ik duidelijk zien dat eerdere theorieën van werkwoordclusters deze volgordes niet eenduidig kunnen afleiden zonder vreemdsoortige verplaatsingen aan te nemen.

De meest opmerkelijke bevinding die naar voren komt in hoofdstuk 5 is dat de positie van bijwoorden in de syntactische structuur de aanvaarding van werkwoordclusterdoorbreking beïnvloeden. Bijwoorden waarvan over het algemeen wordt aangenomen dat ze hoger in de syntactische structuur staan (zie Cinque 1999, 2006), worden minder goed bevonden in het werkwoordcluster dan lagere bijwoorden. Zo werden de zinnen in (21) als goed bevonden, maar de zinnen in (22) niet.

(21) a. Ik weet dat Jan *moet* **verplicht** *werken*.
b. Om dit probleem op te lossen weet ik dat Jan wel *moet* **wijs** *handelen*.

(22) a. * Ik weet dat iedereen *moet* **onvermijdelijk** *werken*.
b. * Ik weet dat Jan *moet* **bijna** *werken*.

De resultaten laten duidelijk zien dat bijwoorden die geassocieerd worden met een lagere positie, beter worden gevonden binnen het werkwoordcluster.

Verplichting is een eigenschap die normaliter toegekend wordt aan het onderwerp van de zin. Het feit dat het bijwoord *verplicht* het werkwoordcluster kan doorbreken, doet de voorspelling dat lage, indefiniete onderwerpen dat ook kunnen. Deze voorspelling komt uit. Zin (23) werd door de informanten geaccepteerd.

(23) Ik vind dat er morgen *moet* **een vrouw** *winnen*.

De resultaten suggereren dat de grens voor werkwoordclusterdoorbreking in het West-Vlaams boven het lexicale domein (vP) ligt.

Een andere opmerkelijke bevinding die in dit hoofdstuk aan de orde komt, heeft betrekking op verschillende soorten hulpwerkwoorden. Hiervan is ook wel betoogd dat ze op verschillende posities in de zinsstructuur staan. Volgens Cinque's (2006) hiërarchische structuur, staan de hulpwerkwoorden *gaan* en *willen* hoger in de syntactische structuur dan het modale hulpwerkwoord van verplichting *moeten*. In zijn syntactische structuur staan bijwoorden zoals *altijd* en *bijna* boven *moeten*, maar onder *willen* en *gaan*.

(24) [*gaat*
[*wil*
[**altijd**
[**bijna**
[*moet*
[$_V$]]]]]]

Dit doet de voorspelling dat werkwoordclusterdoorbreking door *altijd* en *bijna* beter zal worden gevonden bij de hogere hulpwerkwoorden. Deze voorspelling komt niet uit. De informanten werd gevraagd om de zinnen in (25) en (26) te beoordelen op een vijfpuntsschaal. Al deze zinnen werden door hen als slecht beoordeeld (met een score van 2 op 5).

(25) a. * Ik weet dat Jan *moet* **bijna** *werken.*
I know that Jan must almost work
'I know that Jan almost has to work.'

b. * Ik weet dat Jan *gaat* **bijna** *werken.*
I know that Jan goes almost work
'I know that Jan almost goes to work.'

(26) a. * Ik weet dat Jan *moet* **altijd** *werken.*
I know that Jan must always work
'I know that Jan always has to work.'

b. * Ik weet dat Jan *wil* **altijd** *werken.*
I know that Jan wants always work
'I know that Jan always wants to work.'

Deze resultaten ondersteunen de claim dat alle hulpwerkwoorden in eenzelfde lage positie staan.

Het hoofdstuk bespreekt verder de beperkingen op werkwoordclusterdoorbreking in het standaard Nederlands. Hoewel partikels zonder problemen het werkwoordcluster kunnen doorbreken in deze taal (zoals in (27a)), zijn doorbrekingen door bijwoorden (zoals in (27b)) onaanvaardbaar.

(27) a. ...dat Anna de baby (**aan**) *had* (**aan**) *willen* (**aan**) *kleden.*
b. ...dat Stijn (**zacht**) *heeft* (*__zacht__) *moeten* (*__zacht__) *praten.*

Kale naamwoorden kunnen in sommige gevallen ook het werkwoordcluster doorbreken.

(28) ...dat Roos kan motor-rijden.

In de literatuur wordt wel betoogd dat dergelijke kale naamwoorden een onderdeel uitmaken van het predikaat (Mithun 1984; Farkas en De Swart 2003; De Swart en Zwarts 2009). Dit kan verklaren waarom er geen lidwoord bij hoeft, terwijl normale argumenten dat wel moeten:

(29) * (De) motor is kwijt.

En het kan ook verklaren waarom dergelijke naamwoorden niet referentieel zijn.

(30) Ik denk dat ik vanavond *moet* **viool**$_i$ *spelen.* *Kun jij 'm$_i$ meenemen?

Ik neem aan dat de combinatie van naamwoord en werkwoord samen een evenement vormen, waarbij het naamwoord op een stereotypische manier een onderdeel is van de activiteit die door het werkwoord wordt aangeduid. Daardoor kunnen dergelijke naamwoorden het werkwoordcluster doorbreken. Het lijkt erop dat de doorbreking van het werkwoordcluster in het standaard Nederlands alleen mogelijk is met items die onderdeel uitmaken van de activiteit of toestand die door het werkwoord wordt uitgedrukt. In eerdere literatuur is wel gesteld dat, in de variëteiten die gesproken worden in Nederland, woorden die het werkwoordcluster kunnen doorbreken een semantische eenheid vormen met het hoofdwerkwoord (Verhasselt 1961; Koster 1994 en anderen).

In een benadering waarin predikaten zijn opgebouwd uit drie componenten – een oorzaak, een proces en een resultaat (Ramchand and Svenonius 2002; Ramchand 2008; Ramchand and Svenonius 2014), moet voor het Nederlands gesproken in Nederland worden aangenomen dat werkwoorden in de laagste werkwoordelijke hoofdpositie worden uitgespeld; lager dan het niveau van de bijwoorden van wijze, die waarschijnlijk in het procescomponent zit.

Het hoofdstuk bespreekt ten slotte nog de eigenschappen van het gebied tussen West-Vlaanderen en Nederland, wat een transitiegebied lijkt te zijn.

Slotwoord

Dit proefschrift bespreekt de beperkingen op de volgordevariatie in het werkwoordcluster. Hoewel er meerdere werkwoordvolgordes voorkomen in het taalgebied zijn er volgordes die niet voorkomen. Hiernaast zijn er beperkingen op de items die het werkwoordcluster kunnen doorbreken. Hoewel alle items die in het werkwoordcluster kunnen staan, ook vooraf kunnen gaan aan het werkwoordcluster, kunnen sommige items alleen vóór het werkwoordcluster staan. Werkwoordclusterdoorbreking heeft een duidelijke syntactische grens, die hetzelfde is voor alle type hulpwerkwoorden. Dit ondersteunt het idee dat werkwoordclusters zijn basis-gegenereerd in een lage positie.

Het proefschrift heeft laten zien dat de variatie in het werkwoordcluster, alsmede de beperkingen daarop, niet toevallig zijn, maar een gevolg zijn van eigenschappen van de grammatica. Zo wordt betoogd dat volgordes die niet voorkomen niet door het taalsysteem kunnen worden afgeleid. Dit leidt tot de voorspelling dat sprekers in staat zullen zijn om volgordes die ongrammaticaal zijn te onderscheiden van volgordes die wel grammaticaal zijn, maar geen onderdeel uitmaken van hun eigen taalvariëteit. Deze voorspelling is uitgekomen. Sprekers lijken zich bewust te zijn van de mate waarin talen van elkaar kunnen verschillen. Dit maakt het eenvoudiger om te verklaren hoe kinderen elke menselijke taal met schijnbaar gemak kunnen verwerven. Als het kind gebruik maakt van zijn/haar grammaticale systeem, weet hij/zij bij voorbaat dat de mogelijke eigenschappen van zijn/haar moedertaal niet onbeperkt zijn. Het menselijke taalsysteem biedt grenzen aan de wijze waarop talen van elkaar kunnen variëren.

Curriculum Vitae

Lotte Dros-Hendriks was born on March 26, 1986 in Arnhem, the Netherlands. After completing her secondary education at Het Nieuwe Eemland College (Amersfoort, 2004), she started working as a secretary in her father's company. In 2005, she began her studies at the HU University of Applied Sciences (Utrecht), where she enrolled in a Dutch language Teacher Education study. After receiving her *propaedeutic* diploma in 2006, she went on to study Dutch Language and Literature at the University of Utrecht, specializing in linguistics. During this time, she spent a term at Macquarie University (Sydney, Australia) on a student exchange program.

In 2009, she received her bachelor's degree and subsequently spent a year abroad, traveling through Australia and New Zealand. Thereafter, she began studying Dutch Language and Culture at the University of Amsterdam. During this study, she did an internship at the Meertens Institute, under the supervision of Sjef Barbiers. Inspired by research of Sjef Barbiers and Marjo van Koppen, she transferred to the research master Linguistics at the University of Utrecht, specializing in syntax. In the summer of 2013, she graduated (cum laude) with a thesis entitled *Verbal breakups and the interaction between syntactic structure and processing.*

Since September 1, 2013 she has worked as a PhD student at the Meertens Institute. During this time, she spent three months at the University of Pennsylvania (Philadelphia), and she taught courses on Dutch linguistics and general linguistics at the University of Utrecht. This dissertation is the result of her PhD research.