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Semantic scope restrictions in complex verb constructions in Dutch

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Abstract: This article addresses the question of how and why verbs combine in complex verb constructions in Dutch. We discuss introspective data reported in reference grammars and add evidence from corpus data to uncover the systematic ways in which Dutch verbs combine. Our analysis shows that verbs expressing meanings such as tense, aspect, modality and evidentiality are organized in a semantic scope hierarchy; that is, some verb meanings systematically have scope over others but not the other way round. We argue that this scope hierarchy reflects hierarchies of functional categories, elaborated in both functional and generative frameworks.

Keywords: Dutch; functional category; selectional restriction; semantic scope; verb construction

1 Introduction

Dutch is known for its ability to combine a wide variety of verbs into complex verb constructions. However, not everything goes. Consider the complex verb construction in (1), marked in bold, found in the children's book *Iep!* written by Joke van Leeuwen.

(1) *Ze **zaten te willen beginnen** met iets, zonder het te durven.*
'They **were wanting to start** [lit. sat to want begin] doing something, without daring to.'
(van Leeuwen 1996: 118)

Syntactically, the example is unremarkable. The three verbs in the complex verb construction are part of the main clause. The first verb *zaten* 'sat' is a finite verb (FIN) placed in verb-second position after the subject *ze* 'they'. The two other verbs *willen*

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'want' and *beginnen* 'begin' are nonfinite (NF) and together form a verb cluster.[1] What makes this example interesting is its semantic oddity. The three verbs in the complex verb construction are organized in a hierarchical scope relationship. The nonfinite verb *willen* 'want' has scope over the main verb *beginnen* 'begin', expressing that it is the wish of the subject to start to do something. The finite verb *zitten* 'sit' is a posture verb used as a progressive marker, which has scope over the entire modal qualification. Adding progressive aspect to a modal qualification is what makes this sentence semantically peculiar. Indeed, it is difficult to conceptualize the wish to do something as an ongoing process in Dutch.

This article addresses the question of what motivates combinatorial restrictions of the type above in Dutch. There is relatively little systematic research into this issue, which is surprising, given the vast literature on complex verb constructions in Dutch, mainly tackling word order variation and special morphosyntax such as *infinitivus pro participio* (for instance, Augustinus 2015; Barbiers et al. 2008; Hendriks 2018, and the many references therein). Nevertheless, there are some studies that do allow us to piece together parts of the puzzle. *Algemene Nederlandse Spraakkunst* (Haeseryn et al. 1997), for instance, does not address combinatorial patterns as such, but touches on the topic indirectly in its discussion of word order in long verb clusters. Byloo and Nuyts (2013) in turn provide corpus data on combinations of modal verbs with tense markers in the context of their study of tense and modality interactions. *Syntax of Dutch* (Broekhuis and Corver 2015) is the only study we know of that focuses on combinatorial patterns in their own right.

Section 2 provides a more in-depth review of these studies. The section will also introduce hierarchies of functional categories as the main theoretical framework of this study. These hierarchies play an important role in both functional and generative theories of grammar. This study will, more specifically, make use of the hierarchy elaborated in Nuyts (2001, 2017), which is rooted in the functionalist tradition and refrains from too much formalization so that it is easily accessible for linguists of all persuasions. Section 3 introduces our case study and presents the empirical data it is based on. The article presents an exploratory investigation of three-verb constructions in a corpus of spoken and written present-day Dutch. Section 4 analyses the combinatorial patterns found in three-verb constructions in our corpus, combining both quantitative and qualitative angles. Section 5

1 Note that the notions 'verb construction' and 'verb cluster' do not include the same group of verbs in the main clause. The complex verb construction in (1) contains three verbs (one finite and two nonfinite) whereas the verb cluster only has two verbs (the nonfinite ones). In subordinate clauses, the finite verb also belongs to the verb cluster, so that the terms 'verb cluster' and 'verb construction' in that syntactic context refer to the same verbs.

summarizes the empirical findings of this study, providing the necessary input for our theoretical discussion of the facts in Section 6. Section 7 wraps up the main findings of this article.

2 Literature review

We start by reviewing observations reported in *Algemene Nederlandse Spraakkunst* (Haeseryn et al. 1997; henceforth ANS), *Syntax of Dutch* (Broekhuis en Corver 2015; henceforth SoD) and Byloo and Nuyts (2013), with an eye to uncovering systematic ways in which verbs combine in complex verb constructions in Dutch.

2.1 Algemene Nederlandse Spraakkunst

One source of information on combinatorial patterns is the discussion in the ANS (1997: Section 18.5.7) on word order in long verb clusters in Dutch. As opposed to verb clusters consisting of two or three verbs, which are known for their intricate verb order variation in Dutch, longer verb clusters show a remarkably fixed word order. Example (2) illustrates an excessively long verb cluster, stacking no fewer than seven verbs on top of the main verb *wachten* 'wait'.

(2) *(Men zegt dat) de directeur de chauffeur* ***kan hebben willen laten blijven staan wachten****.*
'(It is said that) the director **might have wanted to let** the chauffeur **stay around and wait** [lit. can have want let stay stand wait].'
(ANS 1997: 1059)

What is interesting for our purposes is that the ANS (1997: 1057) suggests that the word order in (2) is determined by the "meaning of the sentence"; more specifically, each verb "says something" about the verb immediately to the right of it. Indeed, progressive *staan* 'stand' expresses that the main verb *wachten* 'wait' to the right of it is ongoing, while continuative *blijven* 'stay' adds that this ongoing state remains unchanged. In our terminology, the ANS thus relates the particular ordering of verbs in long verb clusters to their relative semantic scope. We suggest that this relationship is an iconic one, in that word order in long verb clusters iconically reflects the underlying semantic scope relationships of the verbs in this cluster.

Let us have a closer look at the word order restrictions described in the ANS, as a way of coming closer to the underlying scope restrictions. The most rigid word order patterns can be found in a group of verbs called *plaatsgebonden werkwoorden* 'fixed position verbs'. The ANS (1997: Section 18.5.7.2.I) groups these

verbs into seven *plaatscategorieën* 'positional categories' on the basis of their relative placement to the left of the main verb. Table 1 summarizes these seven categories of verbs.[2]

Table 1 can be read as a topological schema with seven positional slots to the left of the main verb. What is of more interest to us, however, are the semantic scope relations that underlie this word order schema. We just mentioned that verbs in long verb clusters have semantic scope over the verbs to the right of them. As such, the verbs in category 3 have scope over the verbs in category 2, but not the other way round. This implies that Table 1 can also be read as a semantic scope hierarchy, specifying which verbs may have scope over the others. The scope hierarchy gives insight into why the combinatorial pattern in sentence (1) was so peculiar. It turns out that progressive *zitten* 'sit' is located at a lower position in the hierarchy than modal *willen* 'want' (categories 2 and 4 respectively) and as such cannot take scope over the modal verb.

Not only can the relative ordering of the verb categories in Table 1 be cast in semantic terms, but the categories themselves also allow for a semantic approach. Closer inspection of the verbs in the different positional categories shows that they form semantically coherent verb classes. Vandeweghe (2014: 20) suggests that each of these verb classes corresponds to one of the functional categories tense, aspect or modality, distinguished in the typological work of, for instance, Bybee et al. (1994). Indeed, the verbs in categories 2 and 3 all express some type of aspect, like the progressive aspect in *stand* 'stand' and the continuative aspect in *blijven*

Table 1: Positional categories of verbs in long verb clusters (based on ANS 1997: 1065).[3]

7	6	5	4	3	2	1
zullen	*blijken*	*hebben*	*zullen*	*blijven*	*liggen*	*worden*
kunnen	*lijken*	*zijn*	*kunnen*	*gaan*	*zitten*	
moeten	*schijnen*		*moeten*	*komen*	*hangen*	
mogen	*heten*		*mogen*		*staan*	
willen	*dunken*		*willen*		*lopen*	
hoeven	*voorkomen*		*hoeven*			
			(be)horen			
			dienen			
			durven			
			weten			

2 The ANS (1997: 1064) stresses that these seven positional categories are abstractions. Typically, no more than two positions are filled at the same time.

3 We refer for glosses of these verbs to our comprehensive list of verbs at the end of the article.

'stay', discussed earlier under Example (2). Vandeweghe (2014: 21, 23) makes a further semantic distinction between the two groups of aspectual verbs, arguing that the verbs in position 2 express "internal aspect", referring to the internal temporal structure of the state of affairs, whereas the verbs in position 3 express "external aspect", denoting the transition from one state into another. The verbs in categories 4 and 7 express some flavor of modality. The ANS (1997: 1065–1066) points out that modal verbs placed to the right of the perfect auxiliary, in position 4, are *oneigenlijk modaal* 'quasi modal', like *willen* 'want' in (2), whereas modal verbs placed to the left of the perfect auxiliary, in position 7 are *eigenlijk modaal* 'actual modal', like *kan* 'can' in (2). The *quasi-modal* verbs in the ANS express meanings such as ability, capacity, necessity, obligation, permission and volition. These meanings are known in the international literature as root modality, deontic modality or dynamic modality (we will use "dynamic modality" for some of these meanings; see below). The *actual modal* verbs discussed in the ANS express meanings such as epistemic modality, evidentiality, counterfactuality, mitigation, concessive and conditional uses (some of which we will not consider to be modal meanings; see below). The verbs in the remaining categories express either tense (category 5) or evidentiality (category 6).

2.2 Syntax of Dutch

Another more direct source on combinatorial patterns in complex verb constructions is the SoD (2015: Section 7.2). This reference grammar explores the combinatorial potential of nine verbs, each representative of a larger group of verbs triggering verb clustering. The nine verbs are listed in Table 2.

Table 2: Sample of verbs in the SoD.

Verb	Gloss	Verb class in SoD
schijnen	'appear'	Subject raising verb
moeten	'must'	Modal verb
hebben/zijn	'have'/'be'	Perfect auxiliary
gaan	'go'	Aspectual verb
zitten	'sit'	Semi-aspectual verb
proberen	'try'	Control verb
zien	'see'	Perception verb
laten	'let'	Causative/permissive verb
worden	'be'	Passive auxiliary

The SoD systematically stacks these verbs in pairs on top of the same main verb in varying configurations. This introspective method gives rise to 81 different three-verb constructions, of the type illustrated in (3) and (4).

(3) **dat Jan dat boek* ***zit te moeten lezen***.
'that Jan **is having to read** [lit. sits to must read] that book.'
(SoD 2015: 1079)

(4) *dat Jan dat boek* ***moet zitten lezen***.
'that Jan **must be reading** [lit. must sit read] that book.'
(SoD 2015: 1080)

The constructed example in (3) represents the same type of verb combination as in (1). The finite verb *zit* 'sits', stacked on top of the nonfinite modal verb *moeten* 'must', is judged in the SoD as an unacceptable reading, marked by an asterisk. The opposite scope relationship, in (4), is however judged fully acceptable.

Table 3 summarizes the acceptability judgments provided in the SoD for all verb combinations. The rows in this data matrix list the finite verbs (FIN) and the columns the nonfinite ones (NF). Every cell thus represents one unique finite - nonfinite verb combination stacked on top of the same main verb. The white cells are judged acceptable, whereas grey cells represent several types of unacceptable or degraded judgements.[4]

Table 3: Acceptability judgments for finite – nonfinite verb combinations in the SoD.

FIN \ NF	*schijnen*	*moeten*	*hebben*	*gaan*	*zitten*	*proberen*	*zien*	*laten*	*worden*
schijnen	$								
moeten	$								
hebben	?		–						%
gaan	*	*	*	–					
zitten	*	*	*	*	–		*	*	
proberen	$		$		$		?		%
zien	$	$	$				?	?	
laten	$	$	$				?	??	%
worden	–	*	–	–	–	*	*	*	–

4 The diacritics *, ?, ?? have their common meanings; $ indicates different types of non-syntactic markedness/degradedness; % indicates varying judgements among speakers. We mark unacceptable combinations which are discussed in the SoD without the help of a constructed example sentence with the symbol '–'.

Presenting the acceptability judgments from the SoD in a matrix reveals an interesting clustering. The white cells are predominantly found in the upper right corner whereas the grey cells seem to cluster in the lower left corner. It is possible to separate most of the white cells from the grey cells, that is, the acceptable verb combinations from the less than acceptable ones, by drawing a diagonal line from the upper left corner to the lower right corner. This asymmetric pattern is most clear for the verbs *schijnen*, *moeten*, *hebben*, *gaan*, *zitten* and *worden*.[5] We isolate these verbs in Table 4 to make the asymmetric pattern more prominent.

Table 4 reveals that each of these verbs shows a rather strict asymmetric combinatorial pattern. The subject raising verb *schijnen* 'appear', on the one hand, appears only as a finite verb with scope over all other verbs, but not the other way round. The passive auxiliary *worden* 'be', on the other hand, is only found as a nonfinite verb in the scope of other verbs. The remaining verbs are in between. Note that the modal verb *moeten* 'must' and the perfect auxiliary *hebben* 'have' show a somewhat divergent pattern. The table suggests that they can be combined in both ways. However, the SoD (2015: 1072) points out that the modal *moeten* gets a "conspicuous difference in interpretation" depending on whether it has scope over perfect *hebben* or falls within its scope. The table does not capture this meaning difference as it only represents combinatorial patterns of verbs and not verb meanings.

Tables 3 and 4, in sum, show that some verbs (and by extension the verb classes they represent) systematically have scope over each other while others do not show such hierarchical scope relationships. What is it, then, that differentiates the verbs in Table 4 from the others in Table 3? It appears that

Table 4: Acceptability judgments for finite – nonfinite verb combinations in the SoD –reduced.

FIN \ NF	*schijnen*	*moeten*	*hebben*	*gaan*	*zitten*	*worden*
schijnen	$					
moeten	$					
hebben	?		–			%
gaan	*	*	*	–		
zitten	*	*	*	*	–	
worden	–	*	–	–	–	–

5 We choose not to clutter the running text with glosses of verbs for which the gloss is already given in Table 2 above. See also our list of verbs at the end of the article for additional guidance.

all of them, except for the passive auxiliary *worden* 'be', are verbs used to express functional meanings within the domain of tense, aspect, modality and evidentiality.[6] This observation echoes the semantic take of Vandeweghe (2014) on the positional categories in the ANS, which he defines in terms of functional categories. Indeed, it seems that functional categories, and, more particularly, hierarchies of functional categories play an important role in the hierarchical scope relationships distilled from the ANS and the SoD. This theoretical connection is also suggested by Vandeweghe (2014: 20), who notices in passing the resemblance between the order of the positional categories in semantic terms and what he calls the "layered structure of the sentence", referring in a footnote to functionalist literature such as Dik (1989), Hengeveld (1989), and Hengeveld and Mackenzie (2010). Let us explore this idea further.

2.3 Hierarchies of functional categories

The insight that functional categories are organized in a hierarchical way is not restricted to one particular framework. Both functional and generative approaches have pointed out that grammatical elements expressing meanings such as tense, aspect or modality differ in their scope over (parts of) the clause. They can therefore be arranged according to their relative scope in a hierarchy of functional categories. Within the functionalist tradition, a so-called layered model of functional categories has been elaborated in Functional Grammar (Dik 1989, 1997; Hengeveld 1989), Role and Reference Grammar (Foley and Van Valin 1984; Van Valin and LaPolla 1997) and Functional Discourse Grammar (Hengeveld and Mackenzie 2008, 2010). In generative grammar, especially in the tradition of Syntactic Cartography, large efforts have been made to spell out fine-grained hierarchical sequences of functional projections (Cinque 1999). We now present in some more detail the hierarchy of functional categories elaborated in Nuyts (2001, 2005, 2008, 2009, 2017) – he himself speaks of "qualificational categories" – which primarily builds on functionalist work but aims to elaborate its cognitive foundation.[7]

6 These verbs are traditionally considered non-main verbs or auxiliaries, as one of the reviewers points out.

7 It goes beyond the purposes of this article to give a full review of all hierarchies presented in the literature. We refer to Narrog (2012) for an in-depth discussion and comparison.

(5) Hierarchy of qualificational categories
> evidentiality
> epistemic modality
> deontic modality
> time
> quantitative aspect/dynamic modality
> phasal aspect
> (parts of the) STATE OF AFFAIRS
(Nuyts 2017: 61)

The categories in the hierarchy in (5) are organized in such a way that categories higher up in the hierarchy have semantic scope over categories lower in the hierarchy, but not the other way round. More specifically, evidentiality in this hierarchy has scope over all other qualificational categories but does not fall under the scope of any of them. 'Phasal aspect', conversely, has very low semantic scope, only qualifying the state of affairs. Climbing up the hierarchy implies a gradual widening of perspective on the state of affairs.

The modal categories in this hierarchy need a proper introduction, as definitions of modality vary widely in the literature. We will make use of Nuyts' terminology in the remainder of the article, for reasons of consistency. Nuyts (2017: 63) makes a principled distinction between three types of modality:

- dynamic modality: "marking ability/possibility/potential or need/necessity/inevitability of/for the first-argument participant or the state of affairs as a whole"
- deontic modality: "marking the degree of moral acceptability of the state of affairs"
- epistemic modality: "marking the degree of likelihood of the state of affairs"

Note that the definition of deontic modality does not include the traditional notions of permission and obligation, which Nuyts subsumes under the label *directivity*. Nuyts (2008) argues that directivity is not a qualificational category but rather an illocutionary one. It is therefore not part of the hierarchy above.

The category of 'evidentiality' in the qualificational hierarchy only pertains to inferential evidentiality. Nuyts (2017: 69) defines

- inferential evidentiality: as "marking that what the speaker is talking about has not been perceived as such, but has been inferred or deduced through logical reasoning", and considers it a qualificational category in its own right rather than a type of modality.

Now, how do the semantic scope hierarchies, distilled from the observations in the ANS and the SoD, relate to the above qualificational hierarchy? Some of the verb categories can easily be mapped onto the qualificational categories in (5).

Aspectual verbs may be subsumed under the category of phasal aspect and evidential verbs link to the category of evidentiality in (5). Other verb categories, however, present us with some challenges. We have already raised the issue that modal verbs have different readings depending on their relative scope to a perfect auxiliary. The perfect auxiliaries themselves also turn out to be compatible with several readings in combination with a modal verb. In this respect, Vandeweghe (2014: 24) notices that perfect auxiliaries not only have scope over quasi modals, as was argued in the ANS and illustrated for *willen* 'want' in (2) but adds that they may also appear in their scope in specific contexts, as in (6) and (7).

(6) *Jullie **moeten hebben gegeten** tegen halfeen.*
'You **should have finished eating** [lit. must have eaten] by half past twelve.'
(Vandeweghe 2014: 24)

(7) *Het schilderij **moet afgewerkt zijn** tegen morgenavond.*
'The painting **should be finished** [lit. must be finished] by tomorrow evening.'
(Vandeweghe 2014: 24)

Vandeweghe does not discuss these examples further. They are interesting as they do not refer to an event in the past but rather indicate that the event needs to be finished by a specific point in time. As such, we can argue that perfect auxiliaries are used to express aspect rather than tense in this context. Both observations indicate that modal verbs and perfect auxiliaries come with multiple readings which interact in complex ways. This raises the more general question of how verbs expressing multiple meanings should be mapped onto the hierarchy of qualificational categories in (5).

2.4 Byloo and Nuyts (2013)

This issue has been explored for a small sample of modal verbs and tense markers in Byloo and Nuyts (2013). This study looks more particularly into the combinatorial behavior of modal verbs and tense markers in a corpus of spoken and written present-day Dutch as a window into the interaction of modality and tense in actual language usage. Their fine-grained semantic analysis shows that modal verbs and tense markers are actually not only used as markers of modality and tense. They find, for instance, that the perfect auxiliary *hebben* 'have' is used as an aspectual marker expressing "completeness", rather than a marker of past tense in contexts similar to the ones in (6) and (7). The future tense marker *zullen* 'will' turns out to be

predominantly used as a marker of counterfactuality when it appears in its preterite form *zou(den)* 'should'. The modal verbs in their study (*moeten* 'must', *mogen* 'may' and *kunnen* 'can'), finally, are not only found with one of the three modal readings in (5), but also express inferential evidentiality and some meanings which Nuyts considers non-qualificational, such as directive (mentioned earlier), conditional and concessive uses. This wide array of qualificational and non-qualificational readings gives rise to a multitude of potential combinatorial patterns. Nevertheless, Byloo and Nuyts (2013: 97) find that these verb meanings on the whole are combined in accordance with the hierarchy of qualificational categories given in (5). The qualificational hierarchy, as such, "shines through" in the scope patterns observed in actual language usage.

Byloo and Nuyts (2013) do report some scope restrictions that cannot be explained by the hierarchy. One such example relates to the combinatorial patterns of modal verbs and perfect auxiliaries we discussed earlier. Byloo and Nuyts (2013) find that modal verbs with a deontic, epistemic and inferential evidential reading may have scope over perfect auxiliaries, as deontic *mogen* in (8) and epistemic inferential *moeten* in (9) illustrate.[8]

(8) *als mensen van El Al komen hier dan zijn ze alles vergeten wat ze hebben gedaan. en je* ***mag*** *alles* ***vergeten zijn****.*
'When El Al people arrive here, then they have forgotten everything they have done. And you **may have forgotten** [lit. may be forgotten] everything.'
(Byloo and Nuyts 2013: 91)

(9) *dat* ***moet*** *toch beangstigend* ***geweest zijn***
'That **must have been** [lit. must be been] frightening.'
(Byloo and Nuyts 2013: 86)

The perfect auxiliary is in principle compatible with its past tense and completive reading in both constellations, as tense and aspect fall under the scope of all three categories of deontic modality, epistemic modality and evidentiality in the hierarchy in (5). However, the corpus data show that the perfect auxiliary only gets an aspectual reading under the deontic modal verb, and only a temporal reading under the scope of an epistemic or evidential verb. Byloo and Nuyts (2013: 96)

8 Byloo and Nuyts (2013: 77) consider *moeten* to be an inferential evidential rather than an epistemic modal, in contrast to the SoD (2015: 884). Nuyts (2001: 173–174, 186) does admit that *moeten* has an element of epistemic probability attached to it but considers it in essence an inferential evidential or "at best mixed epistemic/inferential". We will refer to this meaning of *moeten* as 'epistemic inferential' to highlight its hybrid status.

suggest that in such cases other, more local, elements are at play, such as "the inherent semantic features of singular semantic categories or elements" but leave these elements for future research.

This brings us to the research questions for this study. The literature review has shown that a group of verbs triggering verb clustering systematically have scope over each other. Their semantic scope relationships could be insightfully related to hierarchies of functional categories known from both functional and generative grammar. However, some issues need further investigation. On the empirical side, the hierarchies of semantic scope relations, distilled from the reference grammars ANS and SoD, are at this point not much more than semantic labels given to entire verb categories. We will verify these hierarchies by systematically exploring the potential meanings of individual verbs in context and how these verb meanings are combined in actual language usage. As such, this study expands the corpus study of Byloo and Nuyts (2013) on some combinations of modal verb and tense markers to all verbs triggering verb clustering. On the theoretical side, we will further explore the explanatory value of hierarchies of functional categories, as well as their limits. One open issue in this regard is how the combinatorial behavior of verbs not expressing a qualificational meaning should be accounted for.

3 Data sample

This article presents an exploratory corpus study of combinatorial patterns in complex verb constructions in present-day Dutch. We take a data-driven approach, not restricting our data to a fixed set of verb combinations in advance, but rather casting our net as wide as possible in order to include all complex verb constructions in actual usage. To that purpose, we have made use of two linguistically annotated, present-day Dutch language corpora: the Spoken Dutch Corpus (CGN, Oostdijk 2000) and the Lassy Small Corpus (van Noord et al. 2013). Our choice of these corpora was driven by several considerations: taken together, they represent a wide range of Dutch language in terms of register (from spontaneous informal dialogue to newspaper texts), medium (spoken, written, written to be spoken) and geography (Belgian Dutch and Netherlandic Dutch); they contain manually corrected/annotated information about lemmata, parts-of-speech and syntactic structure; and, finally, they turn out to be of a large enough size to support our investigation into complex verb constructions, at approximately one million tokens each.

We extracted complex verb constructions from the corpora on the basis of the available syntactic annotation. The extracted constructions consist of verbs hierarchically connected by dependency relations (the "verbal complement" relation), such that:

- the high verb is finite,
- all the other verbs are bare infinitives, *te*-infinitives or past participles, and,
- the low verb is such that the construction cannot be extended under these constraints.

The linear order of the verbs in a construction does not matter.

The scope relationships investigated in this article are clause internal relationships, that is, the discussion concerns verbs that form a monoclausal structure together with their verbal complement. This phenomenon is known by various names in the literature. Following the SoD (2015: Section 4.4.3) we will speak of "transparent" complements in the monoclausal case, and "opaque" complements in the biclausal case. The operationalization of verb constructions does not take this distinction into account yet. Take for instance (10), which would qualify as a three-verb construction according to the extraction procedure given above.

(10) *U **wordt aangeraden** demonstraties en andere politieke activiteiten **te mijden**.*
'You **are advised to avoid** demonstrations and other political activities.'
(Lassy WR-P-E-H-0000000049)

In light of the observations in the literature review, the occurrence of a passive auxiliary as the finite verb in a three-verb construction is unexpected. However, *aanraden* 'recommend' selects an opaque *te*-infinitive, which means that this attestation does not really bear on the discussion at hand. We therefore need to restrict the data set to constructions where the finite and nonfinite verbs select transparent complements.

The classification used is taken from the ANS (as summarized in ANS 1997: Section 18.5.8). The data includes verbs that obligatorily select transparent complements (ANS: *verplicht groepsvormend*), but not verbs that only select opaque complements (*niet groepsvormend*), nor those which alternate freely (*niet-verplicht groepsvormend*). In applying the distinctions as the ANS makes them, we cannot solely rely on the verb lemma; we need to take into account verb valency, as there are verbs that vary between taking a transparent bare infinitive and taking an opaque *te*-infinitive, as well as verb semantics, as for some verbs the variation between taking a transparent and an opaque *te*-infinitive complement corresponds to a variation in meaning. As mentioned, when the variation cannot be systematically related to such factors, the verb is excluded from the data set.

The extracted sentence in (11) contains an example of a four-verb construction that satisfies the transparent complement restriction. The relative clause has one of each of the accepted verb forms: the finite verb *leek* 'appeared', the nonfinite *te*-

infinitive *te zullen* 'to will', the nonfinite bare infinitive *worden* 'be' and the past participle *gebruikt* 'used', which is the main verb of the clause.

(11) *Ricardo Oliveira, die als pasmunt **leek te zullen worden gebruikt** in de transfer van Ronaldo, komt uiteindelijk toch niet naar Real Madrid.*
'Ricardo Oliveira, who **by all appearances was going to be used** [lit. appeared to will be used] as currency in the Ronaldo transfer, will not come to Real Madrid after all.' (Lassy dpc-rou-000349-nl-sen)

The data was extracted using the XPath and XQuery facilities provided by the Alpino Corpus library/DACT (van Noord et al. 2013). In addition, the three-verb data that form the focus of this article were manually checked and further annotated with the distinctions needed for the classification of verbs into transparent and opaque complement taking, and into broader verb categories. The data, extraction queries and details of the manual annotations are available as electronic resources accompanying this article.[9] Table 5 gives an overview of the amount of extracted material in the final dataset. The cases with one verb only contain a main verb and are provided to give a more complete picture.

Table 5 shows that the majority of verb combinations only involve two verbs. Three-verb constructions are almost nine times less frequent than these two-verb combinations. Fortunately, the Spoken Dutch Corpus (henceforth CGN) and Lassy Small Corpus taken together are large enough that they still provide us with more than six thousand attestations. The combinatorial patterns in these three-verb constructions are discussed in Section 4. Four-verb constructions are rather infrequent in both corpora and will therefore not be discussed systematically. Note that longer verb constructions (with transparent complements) are not found in our corpora.

We have presented the wide range of data in our corpora as a positive fact. However, we are well aware that this does mean that numbers like the above hide a

Table 5: Final dataset overview.

Size	Frequency
1 verb	139,816
2 verbs	53,941
3 verbs	6,082
4 verbs	218
Total	200,061

9 Available at https://doi.org/10.5281/zenodo.5513893.

very complex picture in terms of the origins of the data, and that one has to be very careful when making (quantitative) generalizations on the basis of them. To name just a few points: there are clear differences in the distribution of construction size between the Lassy Small data (written, written to be spoken) and the CGN data (spoken), and in the frequency of the different types of passives between these two. Similarly, there are pronounced differences in the frequencies of individual verbs between the Belgian and Netherlandic Dutch data. Describing these distributional differences in detail lies beyond the purposes of the current article. The data discussion in the next section aims to describe the inventory of complex verb constructions in the material as a whole. Only when the differences between the subcorpora are relevant for this discussion or otherwise particularly striking will they be highlighted.

4 Quantitative and qualitative corpus observations

The corpora, taken together, provide usage data on thirty-three verbs obligatorily triggering verb clustering. We present this data in a series of tables grouping together verbs which express similar meanings, based on the expectation that verbs expressing related meanings will show similar scoping behavior. Most importantly, the tables present the frequency of verbs used as finite and nonfinite verbs in three-verb constructions. As background information, each table also provides the frequency of verbs used as finite verbs in two-verb constructions. The frequency tables serve as a first orientation to the combinatorial behavior of the verbs in our sample. Below each table, a qualitative analysis is provided of the scope patterns the verbs engage in.

4.1 Evidential verbs

Let us first consider the verbs *blijken*, *lijken* and *schijnen*, which all express nuances of 'appear' or 'seem'. These verbs are part of a larger group of evidential verbs selecting a *te*-infinitive (see ANS 1997: Section 18.5.4.5; Mortelmans 2017; SoD 2015: Section 5.2.2.2.II.A; and references therein). These verbs express both reported evidentiality, also known as 'hearsay' (typically *blijken*, but also *schijnen*), and inferential evidentiality (mainly *lijken*, but also *schijnen*), although in practice these meanings are hard to distinguish. We follow the SoD by also including *dreigen* 'threaten, appear' with a non-thematic subject in this group, as it expresses

related evidential meanings (ANS 1997: Section 18.5.4.19; Cornilie 2014; SoD 2015: Section 5.2.2.2.II.B.2; and references therein).[10]

The literature review shows that evidential verbs have very high scope. Both the ANS and the SoD indicate that they have the potential to have scope over modal

Table 6: Frequency of evidential verbs in three-verb constructions.

Lemma	Gloss	Three-verb construction			Two-verb
		Finite	Nonfinite	Total	Finite
blijken	'appear'	33	3	36	187
lijken	'appear'	32	0	32	139
schijnen	'appear'	14	0	14	34
dreigen	'appear'	12	0	12	51
Total		91	3	94	421

verbs, perfect auxiliaries, (external and internal) aspectual verbs and passive auxiliaries. The SoD shows that they may also have scope over perception verbs and causative verbs. The reference grammars have divergent opinions on the use of evidentials as nonfinite verbs in the scope of other verbs. The SoD claims that evidential verbs in general resist nonfinite use, whereas the ANS allows "actual modal" verbs and the future auxiliary *zullen* (in position 7) to have scope over evidential verbs (in position 6). Now, what combinatorial patterns do the evidential verbs in our corpora show?

The corpus data in Table 6 indicate that evidential verbs are predominantly used as finite verbs in three-verb constructions (the 95% confidence interval for the binomial proportion of finite evidential verbs is 0.90–1.00; a two-sided Fisher test shows no signs of interaction in the three-verb data, $p = 0.307$).[11] They are mainly

10 The other evidential verbs *dunken*, *heten*, *toeschijnen*, *voorkomen* and *beloven* 'appear, seem' are not included in this study. The verbs *toeschijnen* and *voorkomen* 'appear, seem' are not relevant as they are not classified as 'obligatorily transparently combining' by the ANS (see Section 3). The remaining verbs do not occur in three-verb constructions in either corpus.

11 A detailed statistical model of the quantitative observations we present here lies beyond the scope of this paper. To get a sense of which observations are in line with the general trend, and which things stand out, we looked at confidence intervals (CIs) for binomial proportions. In particular, the tendency for a particular verb or a group of verbs to appear as finite or nonfinite verbs in a three-verb construction is of interest, which is captured by the proportion of finite versus nonfinite occurrences for this verb or verb group. The width of a reported CI reflects our uncertainty about this proportion, its range the approximate estimate. A CI can be qualitatively interpreted as it is, or, for instance, in relation to the average proportion of a larger group. We report 95% CIs, but, where indicated, apply Bonferroni corrections for multiple comparisons depending on the number

found to have scope over passive and perfect auxiliaries, as in (12) and (13), and to a lesser extent also over modal verbs, the external aspect verbs *gaan* 'go' and *komen* 'come', and one case each of the causative verb *laten* 'let' and the perception verb *zien* 'see'. The modal verbs seem to be restricted to dynamic and directive readings. We found no evidence of epistemic or deontic modal readings in the scope of evidential verbs.

(12) *Uiteindelijk **bleken** de schrammen **veroorzaakt te zijn** door een tweepotige dinosaurus toen die tegen een sterke stroming in zwom.*
'In the end, the scratches **turned out to be caused** by a two-legged dinosaur as it was swimming against a strong current.'
(Lassy dpc-ind-001635-nl-sen)

(13) *in heel Vlaanderen **schijnen** er zich voor het nieuwe academiejaar slechts eenentwintig studenten tandheelkunde **te hebben ingeschreven**.*
'In the whole of Flanders, only twenty-one students of dentistry **appear to have registered** for the new academic year.'
(CGN fv600529)

The Lassy Small Corpus also provides three examples of nonfinite evidential verbs.

(14) *Tenslotte: het krachtenveld binnen de EU bepaalt voor een belangrijk deel of bovenstaande Nederlandse inzet succesvol **zal blijken te zijn**.*
'Finally, the interests within the EU determine to an important extent whether the above Dutch efforts **will turn out to be** successful.'
(Lassy WR-P-P-J-0000000001)

(15) *Waarom willen jonge Britse mannen (wellicht **zullen** ze uiteindelijk Brits **blijken te zijn**) zoveel mogelijk willekeurige medeburgers om het leven brengen in nachtclubs en luchthavens?*
'Why do young British men (possibly they **will turn out to be** British in the end) want to kill as many random citizens as possible in night clubs and airports?'
(Lassy dpc-ind-001636-nl-sen)

(16) *En **mochten** er dan eens eentje of twee een miskleun **blijken te zijn**, overroepen of tijdens een opwelling, een hype of un moment d'égarement te*

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of verbs in a verb group, which means the actual 'confidence levels' are typically higher. The CIs are so-called Clopper-Pearson intervals, as returned by the default binom.test function in R (R Core Team 2017).

zijn gekozen, je bent er zo weer van af, want je hebt immers nog niets gekocht.
'And **should** one or two **turn out to be** [lit. might turn out to be] a blunder, overrated or chosen on an impulse, during a hype or in a moment of folly, you can get rid of it just like that, since you have not bought anything yet.' (Lassy WR-P-P-I-0000000258)

These examples are in line with the positional schema of the ANS. The evidential verb *blijken* falls under the scope of future *zullen* 'will' in (14) and (15) and under the modal *mogen* 'may' in (16). The modal verb in (16) is used in a conditional context, where it appears in its preterite form *mochten* and is placed sentence-initially in the protasis. The ANS (1997: Section 18.5.4.4.II.D.2a) considers conditional *mocht(en)* as an "actual modal". We prefer to refer to this usage as non-qualificational, to highlight the fact that it is not part of the hierarchy in (5).

Our corpus observations confirm the general picture from the literature that evidential verbs have high scope. They are found to have scope over a wide range of verbs, but hardly ever appear in the scope of other verbs.

4.2 Modal verbs

Let us now look at the modal verbs in our corpora. We include both the core modal verbs *kunnen* 'can', *moeten* 'must', *mogen* 'may', *willen* 'want' and *zullen* 'will', which select a bare infinitive (ANS 1997: Section 18.5.4.4; SoD 2015: Section 5.2.3.2), and other modal verbs *(be)hoeven* 'must', *(be)horen* 'must' and *dienen* 'must', which select a *te*-infinitive (ANS 1997: Section 18.5.4.4, Section 18.5.4.6). In accordance with their name, these verbs express different flavors of modal meaning, but are also compatible with other meanings, as was shown in the literature review. The literature review also revealed that these meanings engage in intricate scope relationships, notably in relation to tense markers. We take a closer look at the interaction between modal verbs and perfect auxiliaries in Section 4.3. This section focuses on the combinatorial potential of the modal verbs themselves when they combine as "double modals". However, before we delve into the data on modal combinations, let us first get a general overview of the combinatorial behavior of modal verbs in our corpora in Table 7.

Table 7 shows that all modal verbs are used as finite and nonfinite verbs in three-verb constructions to varying extents. *Zullen* stands out among the core modal verbs by its almost exclusive use as a finite verb (95% CI for the binomial proportion of finite *zullen*, after Bonferroni correction for 8 comparisons: 0.99–1.00; the point estimate for the overall proportion of finite modal verbs is 0.76). The

Table 7: Frequency of modal verbs in three-verb constructions.

Lemma	Gloss	Three-verb construction			Two-verb
		Finite	Nonfinite	Total	Finite
zullen	'will'	2,012	1	2,013	4,399
kunnen	'can'	1,103	760	1,863	6,332
moeten	'must'	1,225	539	1,764	5,179
willen	'want'	159	185	344	2,269
mogen	'may'	232	48	280	1,071
dienen	'must'	70	3	73	100
(be)hoeven	'must'	28	16	44	272
(be)horen	'must'	2	0	2	17
Total		4,831	1,552	6,383	19,639

only example of nonfinite *zullen* in our data is found in the scope of irrealis *had(den)* 'had' (see also ANS 1997: Section 18.5.4.4.I).

(17) *nee want uh kijk we hebben ook een natuurbeleidsplan in Nederland en uh dat* ***hadden*** *we klaar* ***zullen hebben*** *in uh tweeduizend achttien en als we op dit tempo doorge-gaan is 't in tweeduizend dertig nog niet klaar hoor ik van 't RIVM.*
'no, because, um, look, we also have a nature policy plan in The Netherlands, and, um, we **should have had** [lit. had will have] it ready by 2018, and, if we go on at this rate, it still won't be ready by 2030, I hear from the RIVM'
(CGN fn007353)

Dienen, a formal variant of *moeten* expressing obligation, is also predominantly used as a finite verb (95% CI, 8 comparisons, finite *dienen*: 0.85–1.00). Its usage in three-verb constructions is largely restricted to passive constructions with *worden* 'be' in formal administrative written language.

(18) *De factuur* ***dient te worden opgesteld*** *in EURO.*
'The invoice **has to be drawn up** in euros.'
(Lassy dpc-fsz-000543-nl-sen)

The modal verbs *kunnen* and especially *willen* stand out because of the relatively low frequency with which they are used as finite verbs in three-verb constructions (95% CI, 8 comparisons, finite *kunnen*: 0.56–0.63; finite *willen*: 0.38–0.54).

Now, let us have a closer look at double modals in three-verb constructions. The reference grammars only provide us with broad generalizations. The

positional schema of the ANS predicts that the actual-modal verbs (in position 7) scope over the quasi-modal ones (in position 4). The ANS (1997: 1064) also explicitly mentions that two quasi-modal verbs may be combined. Vandeweghe (2014: 23–24) indicates that in that case volitive and deontic modality, as expressed by *willen* and *moeten* respectively, has scope over facultative modality, expressed by *kunnen*. The SoD (2015: 1088) provides a few more examples of how modal verbs "can co-occur in various kinds of combinations", including epistemic *moeten* having scope over dynamic *kunnen* and the combination of dynamic *moeten* and *kunnen*.

How do these general findings translate into our corpus data? We first explore the combinatorial patterns of the core modals in Table 8. This is a data matrix built following the conventions of Tables 3 and 4. An important difference is that the grey shading of the cells marks the absence of corpus observations rather than degraded acceptability judgements.

Table 8 first of all shows that no modal verb is found selecting itself. One should thus keep in mind that the term "double modal" does not imply the doubling of one and the same modal verb in our corpus but rather involves two different modal verbs stacked on top of a main verb.[12] The table also shows a near-perfect asymmetric scope pattern among the core modals. On the one hand, *zullen*

12 One reviewer suggests that, while these cases do not show up in the corpus data, they cannot be ruled out entirely, providing the following constructed examples (the translations and glosses are ours).

(a) *Ze **wil** het echt **willen**.*
'She really **wants to want** [lit. wants want] it.'

(b) *Hij **kan** het ondertussen **hebben kunnen lezen**.*
'He **could have been able to read** [lit. can have can read] it by now.'

(c) *Hij **zou** het **kunnen kunnen**.*
'He **could be able to do** [lit. should can can] it.'

Interestingly, none of these examples directly corresponds to the double modals under investigation, in which two modal verbs are stacked on top of a main verb in a three-verb construction. This suggests that the constructional context in which two modal verbs are combined is of relevance. The only examples of identical modals stacked in three-verb constructions that we could think of are with conditional *mocht* 'might' and *moest* 'must' as the finite modal:

(d) ***Mocht** je nog wel de auto **mogen lenen**, dan ….*
'**Should** you **be allowed to borrow** [lit. might may borrow] the car, then …'

(e) ***Moest** je nog **moeten verhuizen**, dan ….*
'Should you **have to move** [lit. must move], then …'

These examples relate to the corpus Example (26) discussed below.

Table 8: Frequency of finite – nonfinite verb combinations in double modals.

FIN \ NF	*zullen*	*mogen*	*moeten*	*willen*	*kunnen*	Total
zullen		19	332	124	430	905
mogen			1	2	5	8
moeten		1		4	103	108
willen					4	4
kunnen				1		1
Total	0	20	333	131	542	1,026

only appears as the finite verb in double modal combinations and is never found in the scope of another modal. On the other hand, *kunnen* and *willen* are predominantly found as nonfinite verbs, except for a few cases where they have scope over each other, illustrated in (28) and (29) below. The remaining core modals, *mogen* and *moeten*, take an in-between position. Finally, the table reveals that not all modal combinations are equally frequent.

Double modals headed by finite *zullen* are the most frequent overall, constituting 905 out of 1,026 cases (Table 8). Byloo and Nuyts (2013) have scrutinized a small sample of these patterns to find out how future tense interacts with modality.[13] They find that only the present tense form of *zullen* is routinely used to express future tense (with varying degrees of epistemic overtones, they admit). Its preterite form *zou(den)* rarely denotes future in the past but rather expresses non-temporal functions such as counterfactuality or mitigation. Harmes (2014: 369–370, 374) similarly finds that *zou(den)* predominantly expresses hypotheticality (which includes counterfactuality) and to a less extent mitigation, temporality or reported evidentiality when having scope over other modal verbs. All these non-temporal meanings are non-qualificational, that is, they are not part of the hierarchy of qualificational categories (recall that only inferential evidentiality is part of the hierarchy – not reported evidentiality). Given these large differences in meaning, we differentiate between finite *zullen* in its present tense form (represented by the singular form *zal*) and in its preterite form (represented by the singular form *zou*) in Table 9.

Table 9 shows that finite *zal* mainly has scope over *moeten* and *kunnen*, when it takes scope over another modal (163 out of 177 cases). Byloo and Nuyts (2013) find

13 Byloo and Nuyts (2013: 83) report 21 cases of present tense *zullen* plus a modal (their "Pattern E") and 44 cases of past tense *zullen* plus a modal ("Pattern F") in their Table 3.4. Note that Byloo and Nuyts (2013) do not include *willen* in their study.

that the modals in this context are used to express dynamic modality and directivity. This seems to be confirmed by our corpus data. The following examples illustrate the two most frequent combinations, that is, *zal kunnen* in (19), which here expresses future ability, and *zal moeten* in (20), expressing future necessity.

(19) *Ook nog in 2008* ***zullen*** *individuele geneesheren online hun accrediteringsdossier* ***kunnen opvolgen****.*
'Even in 2008, individual doctors **will be able to monitor** [lit. will can monitor] their accreditation dossier online.'
(Lassy dpc-riz-001057-nl-sen)

(20) *In 2005* ***zullen*** *de Europese Raad en het Europees Parlement hierin een beslissing* ***moeten nemen****.*
'In 2005, the European Council and the European Parliament **will need to take** [lit. will must take] a decision on this.'
(Lassy WR-P-P-K-0000000019)

The examples show an interesting difference in the epistemic evaluation of the future event. Whereas (19) is a fairly neutral statement of future ability, (20) contains an element of personal assessment on the degree of likelihood of the future necessity. Examples like (20) are typical of journalistic prose where an expert is asked to give an opinion on future events. The difference in epistemic strength between *zal kunnen* and *zal moeten* suggests that the reading of finite *zal* is affected by the type of modal qualification it has scope over.

The modals in the scope of finite *zou* are compatible with a wide range of readings. Byloo and Nuyts (2013) report not only dynamic and directive readings but also deontic and epistemic modality. The frequent pattern *zou kunnen* (388 out of 728 cases with *zou*, Table 8) has been identified by Nuyts (2001: 201) as a context that "clearly improves the chances for an epistemic reading of *kunnen*, even if it does not exclude a dynamic reading". This finding has been confirmed in corpus research by Van Ostaeyen and Nuyts (2004), Byloo and Nuyts (2013), and Harmes (2014, 2017), and our data likewise contain cases of epistemic *kunnen* in the scope

Table 9: Frequency of finite *zullen* – nonfinite modal verb combinations.

FIN \ NF	*mogen*	*moeten*	*willen*	*kunnen*	Total
zal	6	121	8	42	177
zou	13	211	116	388	728
Total	19	332	124	430	905

of *zou*, as illustrated in (21). Mortelmans et al. (2009) point out that such cases provide an exception to the observation that epistemic modals tend to resist nonfinite usage in Germanic languages; also known as the "epistemic nonfiniteness gap" (Abraham 2001).

(21) *En die munt **zou** wel eens erg waardevol **kunnen worden**.*
'And that coin **might** very well **become** [lit. should can become] very valuable.'
(Lassy dpc-rou-000993-nl-sen)

Notice that *zou* in this example expresses mitigation, and as such "does not have a specific meaning but serves as a hedging device in order to weaken the illocutionary force of the utterance" (Harmes 2017: 154). This is also the meaning of *zou* in Example (22), illustrating the frequent combination *zou willen* (211 out of 728 cases with *zou*, Table 8).

(22) *maar ik **zou** toch uh **willen relativeren** wat u zegt over de betrouwheid van de tolken.*
'but I **would like to relativize** [lit. should want relativize] a little what you say about the reliability of the interpreters.'
(CGN fv601128)

In this example, not only the meaning of finite *zou* but also of nonfinite *willen* seems to be watered down. The combination *zou willen* as a whole serves here to hedge the following statement as part of a politeness strategy. This ties in with the observation of Harmes (2014: 374) that mitigating *zou* typically combines with other modal verbs (in particular *kunnen* and *willen*) and as such tends to occur in fixed expressions. Indeed, one gets the impression that mitigating *zou* forms a construction with the nonfinite modal, especially in (22), where the meaning of the whole does not fully correspond to the sum of the parts.

We now come into less well-charted waters as we turn to the remaining double modal combinations in Table 8. *Moeten* is shown to be the second most frequent finite modal after *zullen*. It is predominantly used in its present tense form (103 of 108 cases, not tabulated) and mostly has scope over *kunnen* (103 out of 108 cases, Table 8). Finite *moeten* is used with its full meaning range (as described in Nuyts et al. 2010) in combination with *kunnen*, including both dynamic and deontic modality, as illustrated in (23) and (24).

(23) *HONDEN **moeten** af en toe eens een spel van hun baas **kunnen winnen** om zich dominant te voelen.*
'Dogs **need to (be able to) win** [lit. must can win] a game over their boss from time to time in order to feel dominant.'
(Lassy WR-P-P-I-0000000233)

(24) *VROM vindt dat iedereen in Nederland gezond en veilig **moet kunnen wonen**.*
'VROM thinks that everyone in The Netherlands **should (have the opportunity to) live** [lit. must can live] healthily and safely.'
(Lassy WR-P-P-C-0000000008)

In both examples, *moeten* adds a layer of need/necessity onto *kunnen*, expressing ability/opportunity in a rather straightforward way. Yet the combination of these two modal verbs is not fully compositional, as the meaning contribution of *kunnen* seems to be attenuated in this context, especially in (23).

The rest of the modal verbs only appear rarely as the finite verb in double modals (only 13 out of 1026 cases, Table 8). What sets these verbs apart from finite *zullen* and *moeten* is that they are not used with their full meaning potential. Finite *mogen*, for instance, is found in a conditional construction, as in (25), and as a marker of a concessive clause, as in (26), two minor non-qualificational usages of this modal verb (ANS 1997: Section 18.5.4.4.II.D; Byloo and Nuyts 2011).

(25) ***Mocht** u na een uur **moeten overgeven**, dan is een keer extra slikken niet nodig.*
'**Should** you **have to vomit** [lit. might must vomit] after 1 h, then it is not necessary to take one extra.'
(Lassy WR-P-P-C-0000000050)

(26) *dan **mag** je nog zo goed met mekaar **kunnen opschieten** uh.*
'even if you **can get along** [lit. may can get along] so well with each other'
(CGN fv400073)

The only instance of finite *kunnen* in double modals, given in (27), appears in a similar concessive context, which is unusual for this modal verb (ANS 1997: Section 18.5.4.4.II.A). Likewise, two of the four attestations of finite *willen* are found in conditional constructions of the type illustrated in (28) (ANS 1997: Section 18.5.4.4.II.E).

(27) *Dus voorzitter Joustra en zijn vervanger **kunnen** wel niet **willen aftreden**, de minister zal ze uiterlijk morgen dwingen op te stappen.*
'Although Chairman Joustra and his substitute **do** not **want to resign** [lit. can want resign], the minister will force them to step down by tomorrow.'
(Lassy WS-U-E-A-0000000046)

(28) *je moet eigenlijk wel heilig zijn* ***wil*** *je daarover* ***kunnen beslissen***.
'You almost need to be a saint, if you **want to decide** [lit. want can decide] about that'
(CGN fn008036)

Our discussion of double modals confirms the general picture from the literature that modal verbs and their meanings are combined in various ways. An intriguing finding that emerges from our corpus survey is that some of the finite modals in double modals are predominantly used with non-qualificational meanings, in particular *zou* (which has few other uses in general), but also *kunnen*, *mogen* and *willen* (which do have a wider meaning potential). As such, a considerable proportion of the double modal constructions in our sample do not stack modal meanings on top of each other, but rather a non-qualificational meaning on top of a modal meaning. All finite modal verbs predominantly have scope over dynamic modal verbs or modal verbs with directive uses, except for *zou*, which was also found to have scope over deontic and epistemic modal verbs.

4.3 Perfect auxiliaries

The next verbs up for discussion are the perfect auxiliaries *hebben* 'have' and *zijn* 'be' (ANS 1997: Section 18.5.2.1; SoD 2015: Section 6.2.1). Perfect auxiliaries take an in-between position in terms of their scope relationships with other verbs. Both the ANS and SoD show that perfect auxiliaries may have scope over modal verbs, (external and internal) aspectual verbs and passive auxiliaries, whereas they appear in the scope of evidential and modal verbs. The SoD moreover indicates

Table 10: Frequency of perfect auxiliaries in three-verb constructions.[14]

Lemma	Gloss	Three-verb construction			Two-verb
		Finite	Nonfinite	Total	Finite
hebben	'have'	748	306	1,054	9,717
zijn	'be'	263	191	454	4,341.5
Total		1,011	497	1,508	14,058.5

14 The two-verb frequency of perfect *zijn* is an estimation (hence the frequency with a decimal place). We refer to the electronic resources accompanying this article (see Footnote 9) for an explanation of the estimation procedure.

that perfect auxiliaries have scope over perception verbs and causative verbs. Table 10 gives the frequency of perfect auxiliaries in our corpora.

Table 10 shows that both perfect auxiliaries are commonly used as finite and nonfinite verbs in three-verb constructions, although not quite with the same tendencies (95% CI, 2 comparisons, finite *hebben*: 0.67–0.75; finite *zijn*: 0.52–0.64). As a finite verb, perfect auxiliary *hebben* mainly has scope over modal verbs, perception verbs, causative verbs and internal aspect verbs. Perfect auxiliary *zijn* has scope over a much smaller range of verbs, mainly external aspect verbs, which translates into a lower overall frequency. The largely complementary distribution of these two verbs follows, by and large, their selection restrictions in two-verb constructions (ANS 1997: Section 2.3.2.8.IV.E). As nonfinite verb, the perfect auxiliaries *hebben* and *zijn* are found in the scope of evidential verbs, modal verbs and *gaan* 'go'. The scoping properties of the perfect auxiliaries correspond closely with the patterns found in previous research, except for their use in the scope of *gaan* 'go'. This unexpected pattern will be discussed in more detail in Section 4.4 on aspectual verbs.

Note that perfect auxiliaries may both take scope over modal verbs and appear in their scope. The literature review shows that these varying scope relationships come with a difference in meaning of both the modal verb and the perfect auxiliary. The ANS points out that a modal verb taking scope over a perfect auxiliary is actual modal whereas a modal verb in the scope of a perfect auxiliary is quasi modal. The SoD (2015: 1072) likewise points out that the two combinatorial patterns "exhibit a conspicuous difference in interpretation" of the modal verb. Byloo and Nuyts (2013) go beyond this broad characterization and provide a detailed semantic analysis of a small sample of modal verbs and perfect auxiliaries combined in actual usage data.[15]

Let us first consider the patterns in which the perfect auxiliary *hebben* has scope over a modal verb (leaving aside the few cases of *zijn* having scope over a modal). Byloo and Nuyts (2013) show that the meaning of the perfect auxiliary in this context largely depends on its tense marking. In its present tense form, the perfect auxiliary primarily functions as a tense marker situating the state of affairs in the past. The preterite form *had(den)* only rarely expresses the temporal function of a past in the past but, rather, predominantly acts as a marker of counterfactuality. Recall from our discussion of counterfactual *zou* that this is a nonqualificational meaning. In the light of these large meaning differences, we

15 Byloo and Nuyts (2013: 83) report 28 cases of a perfect auxiliary having scope over a modal verb (their patterns C + D) and 10 cases of a modal verb having scope over a perfect auxiliary (their patterns A + B) in their Table 3.4. Note that Byloo and Nuyts (2013) do not include *willen* in their study.

differentiate between the present tense form of *hebben* (represented by the third person singular form *heeft*) and its preterite form (represented by the singular form *had*) in Table 11.

Table 11 shows that finite *heeft* mainly has scope over *moeten* and *kunnen*, when it takes scope over a modal (169 out of 200 cases). Byloo and Nuyts (2013: 88–91) report that perfect auxiliaries in the present tense only take scope over modal verbs expressing dynamic modality (but not inherent dynamic modality) and directivity. This observation is corroborated by our corpus data. Examples (29) to (31) illustrate dynamic *mogen*, *moeten* and *kunnen* in the scope of finite *heeft*.

(29) *dus de de de impact is enorm alleen **heeft** de beste man het zelf niet **mogen meemaken**.*
'So, the impact is enormous, it's just that the good man **has** not **been able to experience** [lit. has may experience] it himself.'
(CGN fn000063)

(30) *De sport **heeft** door bezuinigingen meer dan een kwart van z'n subsidies **moeten inleveren**.*
'The sport **has been forced to return** [lit. has must return] more than a quarter of its subsidies as a result of downsizing.'
(Lassy WS-U-E-A-0000000231)

(31) *De Italiaanse kustwacht **heeft** elf vluchtelingen **kunnen redden**.*
'The Italian coastguard **has been able to rescue** [lit. has can rescue] eleven refugees.'
(Lassy WS-U-E-A-0000000010)

The modal verbs under the scope of counterfactual *had* come with a wider range of meanings. Byloo and Nuyts (2013) find modal verbs expressing dynamic and deontic modality as well as directive readings in this context. They do not come across epistemic readings, and also judge such readings to be "intuitively impossible" (2013: 92). This dismissive judgement does not fit with a corpus

Table 11: Frequency of finite perfect auxiliary – nonfinite modal verb combinations.

FIN \ NF	*zullen*	*mogen*	*moeten*	*willen*	*kunnen*	**Total**
heeft	0	15	76	16	93	200
had	1	11	103	33	102	250
Total	1	26	181	49	195	450

example such as (32), which, in our opinion, does allow for an epistemic reading, in which the speaker judges the proposition that 'things turned out differently' to be likely but counter to the fact. The ANS (1997: Section 18.5.4.4.II.A) likewise provides an example of epistemic *kunnen* in the scope of counterfactual *had* in (33).

(32) *uh dat **had** dus ook anders **kunnen uitvallen**.*
'um that **could have turned out** [lit. had can turn out] differently.'
(CGN fn000008)

(33) *Ik **had** al veel eerder thuis **kunnen zijn**, (als er niet weer een file gestaan had).*
'I **could have been** [lit. had can be] home much earlier, if there had not been a traffic jam.'
(ANS 1997: 988)

These examples of nonfinite epistemic *kunnen* provide an additional exception to the epistemic nonfiniteness gap, introduced earlier in our discussion of double modals. A similar exception has been observed for epistemic (inferential) modals in the scope of subjective *hätte* 'have' in German (Mortelmans 2008; Mortelmans and Smirnova 2010; Reis 2001).

Let us now turn to the inverse pattern, with a modal verb taking scope over a perfect auxiliary. Table 12 provides the combinatorial patterns of the five core modals with scope over the perfect auxiliaries *hebben* and *zijn*.

The frequency distribution of finite modals having scope over perfect auxiliaries is very similar to that of finite modals in double modal constructions. Finite *zullen* is by far the most frequent among the finite modals, with 326 out of 432 cases (Table 12). In this subset, the preterite form *zou(den)* is far more frequent than the present tense forms (that is, 277 cases of *zou hebben/zijn* versus 49 cases of *zal hebben/zijn* – not tabulated). Byloo and Nuyts (2013) do not cover this pattern, but Harmes (2017: 162) points out that *zou* having scope over a perfect auxiliary is only

Table 12: Frequency of finite modal verb – nonfinite perfect auxiliary combinations.

FIN \ NF	*hebben*	*zijn*	Total
zullen	213	113	326
mogen	7	1	8
moeten	36	37	73
willen	7	0	7
kunnen	9	9	18
Total	272	160	432

found with temporal, hypothetical (including counterfactuality) and reported evidential meanings. This implies that the mitigation meaning of *zou* associated with double modals is absent here. Harmes (2017) argues that, instead, the evidential reading of *zou* is particularly associated with perfect auxiliaries. The following Example (34) illustrates the reported evidential meaning of *zou* in this context, with an explicit marking of the source of information (*naar verluid* 'reportedly').

(34) *In 1983 verscheen er een beruchte pornografische parodie rond Suske en Wiske waar Vandersteen naar verluid ook een exemplaar van* ***gekocht zou hebben****.*
'In 1983, an infamous pornographic parody of "Suske en Wiske" came out, of which Vandersteen **has reportedly bought** [lit. should have bought] a copy too.'
(Lassy wiki-9843)

Finite *zal* quite straightforwardly expresses the future of a perfect, as illustrated in (35). Such a neutral expression of future, however, is difficult to come by in this context. Finite *zal* more commonly has a strong epistemic connotation, which may even come without a future reading altogether, as in (36).

(35) *Als gevestigde ondernemers aan jongeren de zin om te ondernemen overbrengen en volgens hun maatstaven trachten om deze TEA een duwtje te geven, dan* ***zullen*** *wij een bescheiden bijdrage* ***hebben geleverd*** *aan de herontplooiing van onze gewesten.*
'If the established entrepreneurs want to pass on an entrepreneurial mindset to young people and want to boost this TEA in accordance with their standards, then we **will have made** [lit. will have made] a modest contribution to the redevelopment of our regions.'
(Lassy dpc-qty-000936-nl-sen)

(36) *Veel werk* ***zal*** *de toenmalige predikant, Lambertus Latonius, niet* ***gehad hebben****, want in Wolder woonden maar een viertal hervormde families.*
'The former minister Lambertus Latonius **will** not **have had** [lit. will have had] much work, as only four reformed families lived in Wolder.'
(Lassy WR-P-E-I-0000050381)

A similar preference for an epistemic reading is also observable for present tense *moeten* and *kunnen*, as illustrated in (37) and (38).[16]

16 Note that epistemic *kunnen* is not found in double modals, but then again, the overall frequency of finite *kunnen* in this context proved to be exceedingly low.

(37) *Door het binnenkrijgen van water **kan** eventueel schade aan hart of longen **zijn ontstaan**.*
'By the ingestion of water, damage to the heart and lungs **may** possibly **have arisen** [lit. can be arisen].'
(Lassy WR-P-P-C-0000000049)

(38) *Het **moet** voor Angela Merkel een merkwaardig gevoel **zijn geweest**, dat ze plotseling te licht werd bevonden.*
'It **must have been** [lit. must be been] a remarkable feeling for Angela Merkel that she was suddenly found wanting.'
(Lassy WR-P-P-I-0000000033)

Byloo and Nuyts (2013) report that other readings are not ruled out for present tense modals with scope over perfect auxiliaries (except for participant-internal dynamic modality), but that dynamic and deontic modality, as well as directivity, are restricted or marked. What is more, these meanings also seem to trigger an aspectual reading of the perfect auxiliary. Take Example (39). The perfect auxiliary in the scope of deontic *moeten* is not used with its ordinary past tense reading but to express completeness before a reference point. This particular aspectual interpretation is highlighted by the time adverbial *eerst* 'first'.

(39) *"Een reclameman vergeet nooit dat je eerst een juiste analyse **gemaakt moet hebben** voor je je product kunt promoten", zegt hij.*
'"An advertising man never forgets that you first **need to have** [lit. must have made] the right analysis in place before you can advertise your product", he says.'
(Lassy dpc-ind-001649-nl-sen)

This observation ties in with the finding of Byloo and Nuyts (2013: 95–96), reported earlier in the literature review, that dynamic and deontic modal verbs trigger an aspectual reading of the perfect auxiliary in their scope, whereas epistemic modal verbs only allow a temporal reading of such a perfect auxiliary.

We also want to draw attention to the fact that some finite modals are found with meanings that are put aside as "other" by Byloo and Nuyts (2013). This includes concessive *mogen* and conditional *mocht* and *moest* (the latter is a regional variant based on the preterite form of *moeten*), two types of non-qualificational meaning that we also came across in double modals.

Our discussion shows that we need to take into account the various meanings of perfect auxiliaries to accurately describe their scope relations with modal verbs. Only as tense markers do perfect auxiliaries take a genuine in-between position, having scope as finite verbs over dynamic modal verbs and modal verbs with

directive use, and appearing as nonfinite verbs in the scope of modal verbs with epistemic and non-qualificational meanings. As aspectual markers, perfect auxiliaries are restricted to nonfinite use in the scope of dynamic and deontic modals, pointing to a much lower semantic scope. As a counterfactual marker, *had* is restricted to finite use, with scope over a wide range of modal meanings, including deontic modality and arguably even epistemic modality.

4.4 Aspectual verbs

We now turn to two groups of verbs which express aspectual meanings. The first group consists of *gaan* 'go' and *komen* 'come', expressing inchoative aspect, and *blijven* 'stay', denoting continuative aspect. We have been calling them external aspect verbs, following Vandeweghe (2014), to differentiate them from internal aspect verbs, which we will discuss below. The ANS (1997: Section 18.5.4.3) argues that *gaan* may also be used as a future auxiliary, especially in spoken Belgian Dutch. All three verbs select a bare infinitive. Inchoative *komen* also has an alternative selection pattern with a *te*-infinitive (ANS 1997: Section 18.5.4.3.IV; SoD 2015: Section 6.6.2.IV). The literature review shows that this group of verbs has a low position on the semantic scope hierarchy, only systematically having scope over internal aspect verbs and passive auxiliaries. The SoD also reports that *gaan* may have scope over causative and perception verbs.

Table 13 shows that the three aspectual verbs are primarily used as nonfinite verbs in the scope of another verb in three-verb constructions. In fact, only *gaan* appears to be easily used as a finite verb in this context (95% CI, 3 comparisons; finite *gaan*: 0.12–0.19; finite *blijven*: 0.00–0.08; finite *komen* 0.00–0.06).

The nonfinite aspectual verbs appear mainly in the scope of modal verbs and the perfect auxiliary *zijn* 'be', as illustrated in (40) and (41) respectively.

Table 13: Frequency of external aspect verbs in three-verb constructions.

Lemma	Gloss	Three-verb construction			Two-verb
		Finite	Nonfinite	Total	Finite
gaan	'go'	130	726	856	2,474
blijven	'stay'	3	131	134	354
komen	'come'	0	89	89	270
Total		133	946	1,079	3,098

(40) *'k heb uh n*a ben nu door de eerste schrik heen dat ik iets anders* ***moet gaan doen*** *maar nu ga 'k 'ns even kijken wat is 't eigenlijk precies.*
'I have um have passed the initial shock now that I **need to be doing** [lit. must go do] something else, but now I am going find out what that is exactly.'
(CGN fn009146)

(41) *Maar de man heeft vermoedelijk argwaan gekregen en* ***is*** *niet* ***komen opdagen*** *voor zijn vlucht van Parijs naar Los Angeles.*
'But the man probably got suspicious and **has** not **showed up** [lit. is come show up] for his flight from Paris to Los Angeles.'
(Lassy WS-U-E-A-0000000007)

As mentioned, *gaan* is also readily used as the finite verb in three-verb constructions. Finite *gaan* is typical of spoken language (127 out of 136 instances are found in the Spoken Dutch Corpus, not tabulated), and particularly of spoken Belgian Dutch (89 out these 127 instances are produced by Belgian speakers, not tabulated). This can be related to the fact that finite *gaan* is used with a wider scope by Belgian speakers (B) in comparison to speakers from the Netherlands (NL), confirming earlier observations of the ANS (1997: Section 18.5.4.3.III.4a) and Colleman (2000). NL speakers predominantly use finite *gaan* with scope over internal aspect verbs, causative verbs and passive *worden* 'be', illustrated in (42) to (44).

(42) *maar ik* ***ga*** *toch echt niet 's avonds bier* ***zitten drinken*** *dat moet overdag een keer als je warm is.*
'But really, I **am** not **going to (sit around and) drink** [lit. go sit drink] beer in the evening. You need to do that during the day some time when it is hot.'
(CGN fn000602)

(43) *wat we in de toekomst gaan doen dan* ***gaan*** *we we first line op* ***laten lossen*** *door MBO'ers.*
'What we are going to do in the future, is that we **are going to get** it **fixed** [lit. go let fix] first line by MBO graduates.'
(CGN fn000510)

(44) *dit is de corner van de Fransen die* ***genomen gaat worden*** *van de rechterkant van 't veld door Johan Micoud.*
'this is the corner kick of the French that **is going to be taken** [lit. goes to be taken] from the right side of the field by Johan Micoud.'
(CGN fn007446)

This scoping behavior corresponds neatly to the pattern described in the ANS and the SoD for external aspect verbs in general. The B speakers likewise use finite *gaan* with scope over causative verbs and passive auxiliaries, but also over external aspect verbs (especially *gaan*, which implies a "doubling" of *gaan*), perfect auxiliaries and modal verbs, illustrated in (45) to (47).

(45) *uh ik **ga** vanavond een pint **gaan pakken** maar uh da's nog niet voor direct.*
'Um, I **am going to grab** [lit. go go take] a beer tonight, but, um, that is not for now yet.'
(CGN fv701011)

(46) *ja maar 'k weet nog niet precies wat dat 'k allemaal **ga moeten doen**.*
'Yes, but I don't know exactly yet what kind of things I **will have to do** [lit. go must do].'
(CGN fv700066)

(47) *maar ja anders **gingen** we nog wel iets anders **gevonden hebben** hè.*
'But yes, otherwise we surely **would have found** [lit. went have found] something else, wouldn't we?'
(CGN fv400205)

This wider scope poses a challenge to the low position of *gaan* as an aspectual verb on the semantic scope hierarchies discussed in the literature review. The question is whether *gaan* is to be considered an aspectual verb with this wide scope use. The ANS suggests that finite *gaan* in spoken Belgian Dutch is a future auxiliary rather than an aspectual verb (but see the SoD 2015: Section 6.4.1 for an alternative view). As a future auxiliary, it is expected to have a wider scope, in line with other tense auxiliaries such as perfect *hebben* 'have' or future *zullen* 'will'.

The second group of aspectual verbs are posture and motion verbs which are used with a progressive meaning (ANS 1997: Section 18.8.4.2; SoD 2015: Section 6.3.1). We call them progressive verbs but also refer to them as internal aspect verbs in order to be able to differentiate them from external aspect verbs. The progressive verbs include the posture verbs *zitten* 'sit', *liggen* 'lie', *staan* 'stand', *hangen* 'hang' and the motion verb *lopen* 'go'. All of these verbs select a *te*-infinitive. The literature review revealed that these verbs are situated at the low end of the semantic scope hierarchy. The ANS (1997: 1061) mentions that progressive verbs (in position 2) and passive auxiliaries (in position 1) are hardly ever combined. Vandeweghe (2014: 22) and the SoD (2015: 1069), seemingly independently, do conjure up a few constructed examples of progressive verbs having scope over passive *worden* 'be', but admit that these examples are rare and farfetched. Anthonissen et al. (2019:

Section 4) provide us with more details on the semantics of progressive verbs in the scope of other verbs. Their corpus data reveal that progressive verbs are used in the scope of modal verbs, perfect auxiliaries or *gaan* 'go'. These contexts are argued to reinforce the inherent tendency of progressive verbs to express (inter)subjective meanings such as surprise, irritation and intensity.

Table 14: Frequency of internal aspect verbs in three-verb constructions.

Lemma	Gloss	Three-verb construction			Two-verb
		Finite	Nonfinite	Total	Finite
zitten	'sit'	0	59	59	289
staan	'stand'	0	24	24	111
lopen	'run'	0	7	7	20
liggen	'lie'	0	2	2	27
Total		0	92	92	447

As shown in Table 14, progressive verbs in three-verb constructions are predominantly found in the Spoken Dutch Corpus (87 out of 93 instances, not tabulated). This is consistent with the observation of the ANS (1997: Section 18.8.4.2) that the progressive use of these verbs is typical of spoken language. The progressive verbs are never used as the finite verbs in three-verb constructions in our data. This finding confirms the observations of previous research that, while progressive verbs in principle may have scope over passive auxiliaries, this scoping pattern is rarely found in actual language. Progressive verbs mainly appear in our data under the scope of the perfect auxiliary *hebben* 'have', as in (48), modal verbs, as in (49), and the external aspect verbs *gaan* 'go and *blijven* 'stay'.

(48) *uh hij ging studeren en ik stond ik **heb** hier een uur **staan afwassen**.*
'Um, he went studying, and I did, I **have been doing the washing-up** [lit. have stand wash-up] for an hour.
(CGN fv400216)

(49) *oftewel houdt houdt dat echt wel niet veel in dat ze hele dagen naar Friends **kan zitten kijken**.*
'Or it really doesn't matter all that much that she **can be watching** [lit. can sit watch] Friends all day long.'
(CGN fv400499)

These findings are perfectly in line with Anthonissen et al. (2019).

4.5 Perception and causative verbs

We now discuss two groups of verbs which are not included in the semantic scope hierarchy. Perception verbs express different types of sensory perception (ANS 1997: Section 18.5.4.8; SoD 2015: Section 5.2.3.3). They include *zien* 'see', *horen* 'hear', *voelen* 'feel'. The causative verbs *laten* 'let' and *doen* 'do' express causative and permissive meanings (ANS 1997: Section 18.5.4.10; SoD 2015: Section 5.2.3.4). Both groups of verbs select a bare infinitive. The literature review shows that both types of verbs may appear in the scope of evidential verbs, modal verbs, perfect auxiliaries and external aspect verbs. They have the potential to take scope over external aspect verbs, internal aspect verbs and passive auxiliaries. Note that causative verbs and perception verbs in the introspective data of SoD engage in a symmetric scope pattern with external aspect verbs, rather than an asymmetric one, since they may both have scope over and appear in the scope of them.

Table 15: Frequency of perception and causative verbs in three-verb constructions.

Lemma	Gloss	Three-verb construction			Two-verb
		Finite	Nonfinite	Total	Finite
zien	'see'	7	45	52	266
horen	'hear'	0	21	21	42
voelen	'feel'	0	1	1	13
laten	'let'	8	270	278	665
doen	'do'	1	24	25	108
Total		16	361	377	1,094

Our corpus data (Table 15) show that perception and causative verbs are overwhelmingly used as nonfinite verbs in three-verb constructions (point estimate proportion for finite perception/causative verbs 0.04; 95% CI, 5 comparisons, finite *zien:* 0.04–0.30, which means that *zien* is somewhat more commonly finite than the other perception/causative verbs, according to our data). We found them mainly in the scope of modal verbs, as in (50) and (51), and under the perfect auxiliary *hebben* 'have', as in (52).

(50) *dat betekent dat je op twee of drie plaatsen ze langs **kan zien komen**.*
'that means that you **can see** them **pass by** [lit. can see pass by] in two or three places.'
(CGN fn008010)

(51) *had je zelf een gefrustreerde moeder die je kind uh haar kind **wilde laten schaatsen** maar haar ineens **zag gaan studeren**?*
'Did you have a frustrated mother yourself, who **wanted to let** her child **do ice-skating** [lit. wanted let skate] but **saw** her **going to college** [lit. saw go study] all of a sudden?
(CGN fn007109)

(52) *ik **heb** u wel een paar keer heel hard **horen lachen** meneer Van Royen.*
'I **have heard** you **laugh** really loudly a couple of times, Mr. Van Royen.'
(CGN fn007285)

The more frequent verbs *zien* and *laten* also show a minor usage pattern as finite verbs with scope over the external aspect verbs *gaan* 'go' and *komen* 'come', illustrated in (51), and over passive *worden* 'be' and *zijn* 'be'. This pattern is in line with the observations in the literature.

4.6 Passive auxiliaries

The last group of verbs left for discussion are the passive auxiliaries *worden* 'be', *zijn* 'be' (ANS 1997: Section 18.5.2.2; SoD 2015: Section 6.2.2) and the semi-passive auxiliaries *krijgen* 'get' and *zien* 'see' (ANS 1997: Section 18.5.2.4.II), which all select a past participle. The ANS and the SoD both indicate that passive auxiliaries do not have scope over other verbs.

Table 16: Frequency of passive auxiliaries in three-verb constructions.[17]

Lemma	Gloss	Three-verb construction			Two-verb
		Finite	Nonfinite	Total	Finite
worden	'be'	0	2,348	2,348	9,028
zijn	'be'	0	147	147	4,411.5
krijgen	'get'	0	10	10	77
zien	'see'	0	1	1	16
Total		0	2,506	2,506	13,532.5

The corpus counts for the passive auxiliaries are in in Table 16. Passive auxiliaries are exclusively used as nonfinite verbs in three-verb constructions in our material. Passive *worden* is the most frequent verb in three-verb constructions on

17 The two-verb frequency for passive *zijn* is an estimation. See Footnote 14.

the whole (found in 2,348 out of 6,082 three-verb constructions in the corpus). It is almost exclusively selected by a modal verb, as illustrated in (53) to (54).

(53) *Pas bij daglicht **kon** later **worden vastgesteld** dat het vuur was aangestoken.*
'Only later, in daylight, **could** it **be established** that the fire was started.'
(Lassy WS-U-E-A-0000000219)

(54) *Om dit soort sabotage tegen te gaan **moet** daarom een advocaat **worden toegewezen**.*
'In order to prevent this sort of sabotage, a lawyer therefore **must be assigned**.'
(Lassy WS-U-E-A-0000000242)

Passive *zijn* is strikingly less frequent in three-verb constructions, despite its relatively high frequency in two-verb constructions (147 out of 2,506 cases, or 6%, of the three-verb data contain passive *zijn*, whereas as many as 4,411.5 out of 13,532.5 cases, or 33%, in the two-verb data do, Table 16). Although it predominantly appears in the scope of modal verbs, these modals appear to have a more restricted meaning potential, quite along the lines of the modals with scope over perfect auxiliaries (Section 4.3). The present tense form of the modal verbs *kunnen* 'can', *moeten* 'must' and *zullen* 'will' typically comes with an epistemic reading, as illustrated for *kunnen* in (55).

(55) *De aanval **kan** bijvoorbeeld door bepaalde omstandigheden **zijn uitgelokt**.*
'The attack **could have been provoked** [lit. can be provoked] for instance by certain circumstances.'
(Lassy WR-P-P-C-0000000049)

Non-epistemic modals do occur with passive *zijn* but usually with time adverbials indicating the time point before which the event needs to be completed, such as *vóór half tien* 'before half past nine' in (56).

(56) *Het vier kilometer lange strand **moet** vóór half tien **opgeruimd zijn**, vóórdat de badgasten komen.*
'The four-kilometer-long beach **must be cleaned up** before half past nine, before the first bathers arrive.'
(Lassy WS-U-E-A-0000000213)

This particular context is reminiscent of the aspectual use of perfect auxiliaries in the scope of dynamic and deontic modal verbs, illustrated in (40).

4.7 Other verbs

Our sample of three-verb constructions also contains a number of verbs which cannot straightforwardly be classified in the above verb classes in terms of meaning and the verbal complement they select. These verbs are listed in Table 17. Their scope behavior has not been described in the literature yet, except for the verbs *weten* 'know' and *durven* 'dare', which the ANS puts in position 4, together with the quasi-modal verbs. We will not dwell on these verbs too long but provide their combinatorial patterns for the sake of completeness.

Table 17: Frequency of other verbs in three-verb constructions.

Lemma	Gloss	Selects	Three-verb construction			Two-verb
			Finite	Nonfinite	Total	Finite
weten	'know'	*te*-INF	0	22	22	126
durven	'dare'	INF/*te*-INF	0	12/3	15	26/44
leren	'learn'	INF	0	34	34	35
helpen	'help'	INF	0	7	7	5
zijn	'be'	*te*-INF	0	21	21	597
hebben	'have'	*te*-INF/INF	0	10/3	13	169/196
krijgen	'get'	*te*-INF	0	8	8	62
vallen	'fall'	*te*-INF	0	1	1	85
staan	'stand'	PP	0	5	5	68
zitten	'sit'	PP	0	1	1	37
Total			0	127	127	1,460

Despite their differences in meaning and complementation, all of these verbs show very similar scope patterns in three-verb constructions. They turn out to be exclusively used as nonfinite verbs, and thus pattern with the verbs discussed earlier in Tables 14–16.

5 Summary of empirical findings

Now that we have explored the combinatorial patterns of three-verb constructions, it is time to relate our observations to the research questions presented at the end of the literature review. The present section focuses on summarizing our empirical findings, while the next section goes deeper into theoretical issues.

Let us first consider the frequency tables that formed the backbone of the result section. It turns out that the verbs in these tables are used as finite or nonfinite verbs in three-verb constructions to varying degrees. At the extreme ends are the verbs which are predominantly used as either finite or nonfinite verbs. We have to keep in mind that quite a number of these verbs are rather infrequent, so the absence of finite or nonfinite usage may be the result of a lack of data. In between these extreme ends are verbs which are used both as finite and nonfinite verbs in three-verb constructions. Table 18 groups all of the verbs in our corpus study according to their relative usage patterns.[18]

Table 18: Relative usage as finite and nonfinite verbs in three-verb constructions.

Usage pattern	Verb	Verb class	Reference
Predominantly as finite verb	*schijnen, blijken, lijken, dreigen*	Evidential verbs	Table 6
	zullen, dienen	Modal verbs	Table 7
Both as finite and nonfinite verbs	*moeten, kunnen, mogen, willen, (be)hoeven, ((be)horen)*	Modal verbs	Table 7
	hebben, zijn	Perfect auxiliaries	Table 10
	gaan	Aspectual verbs	Table 13
Predominantly as nonfinite verbs	*blijven, komen*	Aspectual verbs	Table 13
	zitten, staan, (lopen, liggen)	Aspectual verbs	Table 14
	zien, horen, (voelen)	Perception verbs	Table 15
	laten, doen	Causative verbs	Table 15
	worden, zijn, krijgen	Passive auxiliaries	Table 16
	weten, durven, leren, hebben, zijn, (helpen, krijgen, vallen)	Other verbs	Table 17

Table 18 shows that most of the verbs have the same usage patterns as other verbs in their verb classes. Our first grouping of verbs does not take into account the fact that some of these verbs, in particular modal verbs and perfect auxiliaries, but also *gaan*, come with multiple interpretations which fundamentally affect their scope behavior. Interestingly, these are the verbs which are used both as finite and nonfinite verbs in three-verb constructions. We take a closer look at the qualitative analysis of these verbs in order to refine the above table with information on their meaning in context.

18 Verbs with a frequency <10 are grouped together with the more frequent verbs of their verb class and are put in brackets. We do not provide glosses for all of these verbs but refer back to the tables they were presented in and/or the list of verbs at the end of the article.

Closer inspection of the modal verbs shows that only dynamic modals and modals with directive use are found as both finite and nonfinite verbs in three-verb constructions. As finite verbs, they were argued to have scope over other dynamic modal verbs and over perfect auxiliaries with an aspectual reading. As nonfinite verbs, they were found in the scope of modals with non-qualificational meanings and of perfect auxiliaries with perfect and counterfactual readings. All other meanings are associated with finite use. Epistemic modals generally resist nonfinite use, a tendency known as the epistemic nonfiniteness gap. The same tendency also shows in our corpus data for deontic modals. Note that this nonfiniteness gap is not absolute, as we found evidence of nonfinite epistemic and deontic modals in the scope of mitigating *zou* and counterfactual *had*. The non-qualificational meanings of modal verbs in this study (we distinguished conditional, concessive, counterfactual, mitigating and reported evidential uses) also turn out to resist nonfinite use. We suggest that, in particular, counterfactual, mitigating and reported evidential *zou* and conditional *mocht* are structurally excluded from nonfinite position, as these verb meanings are restricted to the preterite (and thus, finite) form of the verb. We call this phenomenon a *structural nonfiniteness gap*.

The qualitative analysis of perfect auxiliaries shows that they can only appear as both finite and nonfinite verbs when they function as past tense markers. They were, for instance, found to have scope over dynamic modals but appear within the scope of epistemic modals and modals with non-qualificational meanings. As aspectual markers of completeness, they are restricted to nonfinite use in the scope of a dynamic or directive modal verb. As counterfactual markers, they are exclusively found as finite verbs with scope over a wide range of verb meanings, including deontic and epistemic modality. Counterfactual *had* can be argued to show a structural non-finiteness gap as a result of its preterite verb form.

A last verb that requires some extra discussion is *gaan*. As an aspectual marker, it differs from other external aspect verbs, in that it is frequently used as a finite verb with scope over internal aspect verbs, causative verbs and passive auxiliaries. In spoken Belgian Dutch, finite *gaan* has even wider scope, including external aspect verbs, perfect auxiliaries and modal verbs. We suggest that finite *gaan* in such a context is a future auxiliary rather than an aspectual marker.

Table 19 incorporates the semantic distinctions discussed above and adds the semantic labels of the other verbs. As such, this table moves away from scope patterns of verbs to scope patterns of verb meanings. The table also includes the insight that some verb meanings are structurally restricted to finite use due to their preterite verb forms. Setting apart these verb meanings on structural grounds raises the question of whether we also have some way of isolating verb meanings which are restricted to nonfinite use. Recall that absence of observations alone does not allow us to make such a decision, but in combination with introspective findings, we do have firmer ground to stand on. In this light, we set apart the

Table 19: Relative usage as finite and nonfinite verbs in three-verb constructions – semantic take.[19]

#	Usage pattern	Verb meaning	Scope level
1	Restricted to finite use	Counterfactual *had* Counterfactual, mitigating, reportative *zou* Conditional *mocht*	Highest
2	Predominantly used as finite verb	Concessive *mogen, kunnen* Evidential *blijken, lijken, schijnen, dreigen* Epistemic (inferential) *kunnen, moeten, zullen* Deontic *mogen, moeten* Future *zullen, gaan* Directive *dienen*	High
3	Used both as finite and nonfinite verb	Past *hebben, zijn* ≫ Dynamic/directive *mogen, moeten, kunnen*	Intermediate
4	Predominantly used as nonfinite verb	Completive *hebben, zijn* Inchoative/continuative *gaan, blijven, komen* Perceptive *zien, horen* Causative *laten, doen* Other *weten, durven, leren, zijn, hebben*	Low
5	Restricted to nonfinite use	Progressive *zitten, staan* Passive *worden, zijn, krijgen*	Lowest

progressive verbs and passive auxiliaries from the other verbs which are predominantly used as nonfinite verbs. Not only are these verbs never observed in finite position in our corpus, they are also judged in both the ANS and the SoD to have no (or at best very little) capacity to take scope over other verbs.

Table 19 reveals a pattern that is strikingly similar to the word order patterns in long verb clusters described in the ANS (summarized in the positional schema in Table 1) and the combinatorial patterns of nine reference verbs scrutinized in the SoD (summarized in the data matrix in Table 4). We argued in the literature review that the patterns found in the ANS and SoD reflect semantic scope relations and could be interpreted as a semantic scope hierarchy. We argue that the grouping of verb meanings in Table 19 can also be read as a scope hierarchy, in which the verb

19 Verbs with a frequency of <10 are left out of the table in order to streamline the overall presentation.

meanings in one particular group can be found to have scope over meanings in the groups below, but not the other way round. We spell out these semantic scope relations in full detail below, using the index in the first column of Table 19 as shorthand for the five groups of verbs.

Verb meanings which are restricted to finite use are in group 1. Their scope properties have mainly been investigated in relation to modal verbs and perfect auxiliaries. The verb meanings in group 1 are found to have scope over verb meanings in the two groups below (2 and 3) and never appear in the scope of other verbs in our corpus data. Counterfactual *had* was argued to have scope over modal verbs with epistemic and deontic readings (group 2) and dynamic and directive meanings (group 3). The same wide scope behavior was observed for the various meanings of *zou* differentiated in this study, including mitigating *zou* with scope over epistemic *kunnen*. Conditional *mocht* were reported to take scope over dynamic and directive modal verbs (group 3) and we also found one instance of conditional *mocht* with scope over evidential *blijken* (group 2). All of the verb meanings in the first group, except for mitigating *zou*, can take scope over perfect auxiliaries with past tense reference (group 3).

The verb meanings which are predominantly used as finite verbs (group 2) are found with scope over verb meanings in all of the groups below (group 3–5), but only appear in the scope of verb meanings in the group above (see our discussion of group 1 for more details). Our qualitative analysis of the evidential verbs *blijken, lijken, schijnen* and *dreigen* shows that they take scope over perfect auxiliaries and modal verbs (group 3), external aspect verbs, perception verbs and causative verbs (group 4), and passive auxiliaries (group 5). Most of the other verb meanings in group 2 are expressed by modal verbs, notably concessive *mogen* and *kunnen*, epistemic (inferential) *kunnen, moeten* and *zullen*, deontic *mogen, moeten* and *kunnen*, and future *zullen*. Their scope properties have only been systematically discussed in relation to other modal verbs and perfect auxiliaries. Our discussion of double modals revealed that all of these verb meanings are found with scope over modal verbs with dynamic and directive meanings. When taking scope over a perfect auxiliary, they trigger past tense reference (group 3), except for deontic modal verbs, which trigger an aspectual reading (group 4). This suggests that deontic modals have lower semantic scope than the rest of the verb meanings in their group. Future *gaan* in spoken Belgian Dutch follows the general pattern in group 2, having scope over both perfect auxiliaries and modal verbs (group 3). The modal verb *dienen* is the odd one out in group 2 as it only has scope over the passive auxiliary *worden* (group 5). Its restricted, almost idiomatic or construction-like use in three-verb constructions does not allow us to fully assess its scope properties. We will therefore discard this usage pattern in the remainder of the article.

Verb meanings which are used as both finite and nonfinite verbs (group 3) are found with scope over verb meanings in the same group and in all of the groups below (group 3–5) and appear in the scope of those in the groups above (for details, see our discussion of group 1 and 2). The perfect auxiliaries *hebben* and *zijn*, with past tense reference, take scope over a wide range of verbs, including modal verbs with dynamic or directive readings (group 3), external aspect verbs, perception and causative verbs (group 4), and internal aspect verbs (group 5). The modal verbs *mogen, moeten* and *kunnen*, used with dynamic or directive readings, are found to have scope over external aspect verbs, perception verbs and causative verbs (group 4), an internal aspect verbs and passive auxiliaries (group 5). When a dynamic/directive modal takes scope over a perfect auxiliary, it triggers an aspectual meaning (group 4). Dynamic modals can also combine: we found cases of dynamic *moeten* taking scope over dynamic *kunnen* (group 3).

Verb meanings which are predominantly used as nonfinite verbs (group 4) are found in the scope of verb meanings in all of the groups above (see our discussion of groups 1–3 for more details). Some of the more frequent verb meanings in this group also take scope over verb meanings within the same group and the group below (group 4 and 5). Aspectual *gaan* takes scope over causative verbs (group 4) and internal aspect verbs and passive auxiliaries (group 5). Our corpus data do not allow us to fully assess the scoping potential of causative *laten* and the perception verb *zien*, as they are only rarely used with scope over other verbs. At any rate, they are found with scope over external aspect verbs (group 4) and passive auxiliaries (group 5).

The verb meanings which are restricted to nonfinite use (group 5), finally, are found in the scope of meanings in all of the groups above (for details, see our discussion of groups 1–5), but not the other way round.

Some of the verb meanings discussed do not only take scope over meanings in lower groups but also over meanings within their own group. This is the case in groups 3 and 4. Within group 3, perfect auxiliaries with past tense reference take scope over modal verbs with dynamic and directive readings. Within the group of dynamic modal verbs, we also discerned a minor pattern, where *moeten* takes scope over *kunnen*. These two patterns are asymmetric, as the inverse scope relations are not found, and they can as such be incorporated into our scope hierarchy. We signal this by adding '≫' between the perfect auxiliaries and modal verbs in Table 19. Within group 4, external aspect *gaan* takes scope over causative verbs, while causative *laten* and perceptive *zien* are found with scope over external aspect verbs. The corpus data does not fully reproduce the symmetric scope pattern emerging from the introspective observations in the SoD, but again, this may be an effect of the lack of sufficient data, especially for the relatively infrequent perception verbs.

Note that we have not reported combinations of verb meanings within group 2, although some of these meanings are occasionally used in the scope of other verbs, and thus have the potential to combine with each other. Nuyts (2009) finds, in a dedicated corpus study of evidential, epistemic and deontic markers in Dutch, that such combinations are exceedingly rare in actual language. He argues that these meanings are concerned with expressing different types of speaker commitment, and as a speaker is "not concerned with his/her commitment to a SoA in several different ways at the same time", they have no communicative need to combine such meanings, something Nuyts coins the "one-commitment-per-clause principle" (2009: 158).

In sum, the relative usage patterns of verbs in three-verb constructions in Table 19 correspond to a five-level scope hierarchy, in which verb meanings which are restricted to either finite or nonfinite use have the highest and lowest semantic scope respectively. Verb meanings with varying degrees of finite and nonfinite usage take an in-between position. We mark their scope levels as high, intermediate and low in the last column of Table 19.

6 Theoretical discussion

This section goes deeper into the question of how the scope hierarchy uncovered in Section 5 can be insightfully related to hierarchies of functional categories found in the literature. As argued in the literature review, we more specifically focus on the functional-cognitive version of such a hierarchy, as elaborated in the work of Nuyts (2001, 2017).

Let us first consider the verb meanings in our scope hierarchy which express qualificational categories. Table 20 isolates these verb meanings and their scope

Table 20: Qualificational verb meanings (based on Table 19).

Verb meaning	Scope level	Qualificational categories
Evidential *blijken, lijken, schijnen, dreigen*	High	Evidentiality
Epistemic (inferential) *kunnen, moeten, zullen*		Epistemic modality
Deontic *mogen, moeten, kunnen*		Deontic modality
Future *zullen, gaan*		Time
Past *hebben, zijn*	Intermediate	Time
Dynamic *mogen, moeten, kunnen*		Dynamic modality
Completive *hebben, zijn*	Low	Phasal aspect
Inchoative/continuative *gaan, blijven, komen*		Phasal aspect
Progressive *zitten, staan*	Lowest	Phasal aspect

properties from Table 19 and matches them with their corresponding labels in the hierarchy of qualificational categories given in (5), in Section 2.3. Note that the directive reading of the modal verbs *mogen*, *moeten* and *kunnen* is not included in the table, as it is not considered a qualificational category by Nuyts.

Table 20 shows that the relative scope properties of the qualificational meanings in our study correspond well to the relative ordering of qualificational categories in the hierarchy given in (5). The high scope meanings in Table 20 express the qualificational notions of evidentiality, epistemic modality, deontic modality and time, all of which are situated in the upper part of the qualificational hierarchy. The low scope meanings, conversely, which also include progressive verb meanings with the lowest scope, all express different flavors of phasal aspect, which is the lowest category in the qualificational hierarchy, situated right above the state of affairs. The intermediate scope meanings in our study express the qualificational notions of time and dynamic modality, which are located in the middle of the qualificational hierarchy.

The overlap between our scope hierarchy and Nuyts' qualificational hierarchy suggests that the relative ordering of qualificational categories is mirrored by or – to use again the wording of Byloo and Nuyts (2013: 97) – "shines through" in the scope behavior of verbs expressing qualificational notions in Dutch. However, there are several mismatches if we consider the finer levels of both hierarchies.

First, whereas our scope hierarchy groups evidential, epistemic, deontic and future meanings into one level on the basis of their shared scope behavior, the qualificational hierarchy spells out a relative ordering between these qualificational categories. As such, Nuyts' qualificational hierarchy makes more fine-grained distinctions than we are able to observe in our corpus data. Nuyts (2017: 68) admits in a footnote that the relative ordering of evidentiality, epistemic modality and deontic modality in his hierarchy is not based on observations of their relative scope (recall Nuyts' 2009 study showing that these categories hardly combine in actual usage), but rather on conceptual grounds. This relates to the fact that the hierarchy is intended to represent "much more than just a 'linguistic phenomenon': it constitutes a very basic dimension of our cognitive system for conceptualizing 'the world'", as Nuyts (2017: 61) has it.

Second, the various aspectual verb meanings in our study are situated on different scope levels, whereas phasal aspect is undifferentiated in the qualificational hierarchy. As such, our scope hierarchy makes a more fine-grained distinction in the low scope range than the qualificational hierarchy. The scoping properties of aspectual verbs suggest that aspect has an internal structure that might be spelled out in the qualificational hierarchy. This relates to Vandeweghe's (2014) suggestion of a differentiation between internal and external aspect in the positional schema of the ANS. Our progressive verbs, situated at the lowest scope

level, thus express "internal" aspect, referring to the internal temporal structure of the state of affairs, whereas inchoative and continuative verb meanings, at the low scope level, express "external" aspect, denoting the transition from one state into another. Relating increasing scope to a distinction between internal and external aspect is consistent with the fact that the qualification hierarchy reflects an increasingly wider perspective on the state of affairs.

Third, past and future tense meanings are situated on different levels of our scope hierarchy, whereas time is undifferentiated in the qualificational hierarchy. Looking back at the scope properties of past and future auxiliaries, there is good reason to assume an internal structure in the category of time, as we also suggested for aspect. More specifically, future auxiliaries are found to have scope over perfect auxiliaries and dynamic modal verbs, whereas perfect auxiliaries only have scope over dynamic modals. This asymmetric scope pattern suggests that future tense has systematic scope over past tense. One issue that requires further investigation is the question of why future auxiliaries, as opposed to perfect auxiliaries, rarely appear in the scope of other verbs. As tense markers, both future and perfect auxiliaries fall within the scope of higher qualificational meanings such as epistemic modality and evidentiality, yet future auxiliaries (and in particular future *zullen*) rarely do so in actual language. It is not clear whether this tendency relates to the specific nature of future tense (for instance, the fact that it presents the state of affairs as nonfactual) or whether it is an effect of the specific properties of the future auxiliaries themselves. The fact that *zullen* in general resists being in the scope of other verbs points to the latter alternative.

The above mismatches between our scope hierarchy and Nuyts' qualificational hierarchy highlight the fact that the two hierarchies have a different status, that is, our scope hierarchy is a direct reflection of the scope behavior of verb meanings in actual usage, whereas the qualificational hierarchy is intended to reflect the ordering of qualificational notions in our cognitive representation of the world. We argued that some of the mismatches call for a refinement of the qualitative categories on empirical grounds, particularly in the case of aspect and time.

We now turn to the non-qualificational meanings in our scope hierarchy, listed with their scope properties in Table 21 for convenience.

Table 21 shows that these meanings either have a very high or low semantic scope. How should we account for these particular scope properties in relation to the qualificational hierarchy? Nuyts does not provide a systematic account of non-qualificational meanings, as his main research interest is in modality and related qualificational notions, but we do find some leads on high scope meanings in his more recent work.

Byloo and Nuyts (2014) as well as Nuyts and Byloo (2015) take up conditional and concessive meanings in modal verbs, two high scope meanings in our table,

Table 21: Non-qualificational verb meanings (based on Table 19).

Verb meaning	Scope level
Counterfactual *had* Counterfactual, mitigating, reportative *zou* Conditional *mocht*	Highest
Concessive *mogen, kunnen*	High
Perceptive *zien, horen* Causative *laten, doen* Other *weten, durven, leren, zijn, hebben*	Low
Passive *worden, zijn, krijgen*	Lowest

from a historical perspective, arguing that they developed as the result of intersubjectification, that is, "the process whereby a linguistic element "leaves" the conceptual qualificational hierarchy […] to assume a function in the realm of interaction and discourse planning and management, e.g., as an illocutionary marker, a politeness marker, a clause connector, etc." (Byloo and Nuyts 2014: 93). The conditional and concessive use of modals thus represents a "post-modal" stage in their development, as has been argued by van der Auwera and Plungian (1998).

Nuyts (2017) in turn reflects on the cognitive status of reported evidentiality, one of the meanings of *zou* in our table, in relation to other subtypes of evidentiality, arguing that it is not a qualificational category (unlike inferential evidentiality) as it does not express the speaker's attitude towards a proposition but merely reports on it. He suggests that reported evidentiality, together with other subtypes of non-qualificational evidentiality, should be thought of as part of "a separate conceptual system surrounding or 'sitting over' the qualificational hierarchy" or "as some kind of a 'shell' around the state of affairs and […] any qualifications of it" (Nuyts 2017: 79).

Both accounts suggest that non-qualificational verb meanings such as conditional, concessive and reported evidentiality are either "beyond" the qualificational hierarchy in a historical perspective or "above" it in a cognitive perspective. These temporal-spatial metaphors are consistent with our finding that these verb meanings have high scope in three-verb constructions. The question now is whether other high scope meanings such as counterfactuality and mitigation can be analyzed along the same lines. Historically, these meanings cannot be considered post-modal in the strict sense. This is obvious for counterfactual *had*,

which does not have any modal roots whatsoever, but counterfactual and mitigating *zou* also did not develop straight out of a modal source meaning, as Harmes (2017) argues. All high scope meanings, however, do share the fact that they developed out of verbs expressing modality and tense and as such can be considered the result of advanced (secondary) grammaticalization. Their conceptual status is yet to be explored in the framework of Nuyts, but given their high scope properties in verb constructions, we also expect them to be "beyond" or "above" the hierarchy of qualificational categories in some way.

This leaves us with the non-qualificational low scope meanings. Table 21 shows that these are expressed by a mixed bag of verbs, such as passive auxiliaries, perception verbs, causative verbs and the unclassified verbs *weten, durven, leren, zijn* (combined with *te*-infinitive) and *hebben* (combined with *te*-infinitive and a bare infinitive). What most of these verbs share is that they are valency-changing in one way or another. Passive auxiliaries, on the one hand, serve to demote the agent of the predicate. Perception verbs, causative verbs and *leren*, on the other hand, introduce an additional participant to the state of affairs. Reconsider Example (51), here repeated as (57), which illustrates a three-verb construction with the causative verb *laten* and one with the perception verb *zien* in one sentence.

(57) *had je zelf een gefrustreerde moeder die je kind uh haar kind* ***wilde laten schaatsen*** *maar haar ineens* ***zag gaan studeren****?*
'Did you have a frustrated mother yourself, who **wanted to let** her child **do ice-skating** [lit. wanted let skate] but **saw** her **going to college** [lit. saw go study] all of a sudden?
(CGN fn007109)

Both verbs introduce 'a frustrated mother' as an additional participant to the intransitive activities of 'ice-skating' and 'going to college', performed by 'her child'. The verb *leren* in (58) likewise introduces a first-person participant to the intransitive activity of 'swimming', performed by 'my small children'.

(58) *'k* ***heb*** *mijn kleine kinderen daar ook* ***leren zwemmen****.*
'I **have taught** my small children **to swim** [lit. have teach swim] there too.'
(CGN fv400659)

As such, these verbs affect the argument structure of the state of affairs, rather than qualifying it. We therefore propose to situate these meanings at the level of the state of affairs itself, that is, "below" the qualificational categories in (5).

7 Conclusions

We set out to explore combinatorial patterns in complex verb constructions in Dutch, looking for systematic ways in which verbs combine, and the motivations which underlie these combinations.

Our review of the ANS and SoD reference grammars revealed that a group of verbs, mainly expressing meanings like tense, aspect, modality and evidentiality, may be organized in a semantic scope hierarchy, that is, some verbs systematically take scope over others, but not the other way round. As these findings are based on introspective data, we conducted a corpus study exploring the combinatorial patterns of verbs (obligatorily) triggering verb clustering with a focus on how their meanings are combined in actual usage. Our empirical results confirmed the fact that verb meanings engage in a semantic scope hierarchy. We found that verb meanings can be grouped into five scope levels on the basis of their relative usage as finite and nonfinite verbs. Some verb meanings turned out to be structurally restricted to finite usage due to their preterite verb forms. For this phenomenon we coined the term *structural nonfiniteness gap*, echoing the *epistemic nonfiniteness gap* previously observed in the literature.

Our literature review also showed that the systematic scope relations between verbs overlap with the hierarchies of functional categories proposed in both the functional and generative tradition. We further explored the explanatory value of the hierarchy of qualificational categories developed in the work of Nuyts (2001, 2017) in relation to our empirical findings. We observed that the verb meanings and their relative ordering in our scope hierarchy correspond well with Nuyts' qualificational hierarchy. Our study thus confirms and expands the corpus study of Byloo and Nuyts (2013) into combinations of modal verbs and tense markers. It also feeds back into the qualificational hierarchy by suggesting an internal diversification of the qualificational categories of time and aspect on the basis of their scope properties in our corpus.

Our study also revealed that verbs expressing non-qualificational meanings demonstrate systematic scope behavior: they exhibit either very high or low semantic scope in actual usage. Their relationship to qualificational meanings is still poorly understood, as they usually play only a peripheral role in studies on tense, aspect, modality and evidentiality. Their systematic scope behavior in three-verb constructions calls for a more dedicated study of these meanings, in relation to each other and to qualificational meanings, both in a historical and in a conceptual-cognitive perspective.

A topic that was only touched upon in passing in this article, and which deserves proper treatment of its own, is the observation that some verb meanings

are affected in one way or another by their use in complex verb constructions. We think of combinations such as *moet kunnen* 'must be able to' and *zou willen* 'would like to', where one or both verb meanings are attenuated. We also found that some verb meanings were stimulated in certain constructions, such as the epistemic reading of *kunnen* in the combination *zou kunnen* 'would be possible to'. These observations challenge the basic assumption of this article (and, by extension, the research it builds on) that verb meanings take scope over each other in a predictable compositional way, or, to use the wording of the ANS (1997: 1057), that the higher scope verb "says something" about lower scope one. Future research of such cases calls for a theoretical perspective on complex verb constructions that goes beyond semantic scope relationships.

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Appendix: List of verbs

Lemma	Gloss	Selects	Meanings (discussed in the article)
(be)horen	'must', 'should'	*te*-INF	–
behoeven	'must', 'have to'	*te*-INF	–
blijken	'appear', 'turn out'	*te*-INF	Evidentiality
blijven	'stay', 'continue'	INF	Continuative aspect
dienen	'must', 'have to'	*te*-INF	Obligation
doen	'do'	INF	Causativity
dreigen	'appear', 'threaten'	*te*-INF	Evidentiality
dunken	'appear'	*te*-INF	Evidentiality
durven	'dare'	INF/*te*-INF	–
gaan	'go, begin'	INF	Inchoative aspect

(continued)

Lemma	Gloss	Selects	Meanings (discussed in the article)
hebben,	'have'	PP	Past tense, completive aspect
PRET *had*	'had'	PP	Counterfactuality
hebben	'have'	*te*-INF/ INF	–
helpen	'help'	INF	–
heten	'appear'	*te*-INF	Evidentiality
hoeven	'must'	*te*-INF	–
horen	'hear'	INF	Perception
komen	'come, go'	INF/*te*-INF	Inchoative aspect
krijgen	'get'	PP	Passive voice
krijgen	'get'	*te*-INF	–
kunnen	'can'	INF	Concessivity, epistemic/deontic/dynamic modality, directivity
laten	'let, make'	INF	Causativity
leren	'Learn, teach'	INF	–
liggen	'lie'	*te*-INF	Progressive aspect
lijken	'appear, seem'	*te*-INF	Evidentiality
lopen	'run	*te*-INF	Progressive aspect
moeten,	'must, have to'	INF	Epistemic/deontic/dynamic modality, directivity
PRET *moest*	'should'	INF	Conditionality
mogen,	'may'	INF	Concessivity, epistemic/deontic/dynamic modality, directivity
PRET *mocht*	'should'	INF	Conditionality
schijnen	'appear, seem'	*te*-INF	Evidentiality
staan	'stand'	*te*-INF	Progressive aspect
staan	'stand'	PP	–
vallen	'fall'	*te*-INF	–
voelen	'feel'	INF	Perception
voorkomen	'appear'	*te*-INF	Evidentiality
weten	'know'	*te*-INF	–
willen	'want to'	INF	Conditionality, volition
worden	'be'	PP	Passive voice
zien	'see'	INF	Perception
zien	'see'	PP	Passive voice
zijn	'be'	PP	Past tense, completive aspect, passive voice
zijn	'be'	*te*-INF	–
zitten	'sit'	*te*-INF	Progressive aspect
zitten	'sit'	*te*-INF	Progressive aspect
zullen,	'will, shall'	INF	Future tense, epistemic modality
PRET *zou*	'should'	INF	Counterfactuality, mitigation, reported evidentiality

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