UvA-DARE (Digital Academic Repository)

Cracking the cluster: The acquisition of verb raising in Dutch

Meyer, C.; Weerman, F.

DOI

[10.5117/NEDTAA2016.2.MEYE](https://doi.org/10.5117/NEDTAA2016.2.MEYE)

Publication date

2016

Document Version

Final published version

Published in

Nederlandse Taalkunde

[Link to publication](#)

Citation for published version (APA):

Meyer, C., & Weerman, F. (2016). Cracking the cluster: The acquisition of verb raising in Dutch. *Nederlandse Taalkunde*, 21(2), 181-212.
<https://doi.org/10.5117/NEDTAA2016.2.MEYE>

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

Cracking the cluster

*The acquisition of verb raising in Dutch*¹

Caitlin Meyer & Fred Weerman

NT 21 (2): 181–212

DOI: 10.5117/NEDTAA2016.2.MEYE

Abstract

In this paper, we argue that ascending verb cluster orders (1-2 and 1-2-3, e.g. *moet eten* ‘must eat’ and *moet hebben gegeten* ‘must have eaten’) are not only the default verb cluster orders in Standard Dutch as spoken in the Netherlands, but also play a crucial role in the acquisition of verb clusters. We administered a series of three sentence repetition tasks (SRTs) to a total of 120 children (2;8–5;6), and found that children, in contrast to what previous literature might predict, are much more likely to produce 1-2 orders than 2-1 orders. We propose an acquisition pathway in which we assume an *OV stage* (V_{FIN} -final) and a *1-2 stage* before children completely fine-tune their preferences toward adult-like behavior. We further argue that this pathway first applies to bipartite modal-infinitive clusters but is quickly expanded to include all cluster types. We believe our proposal has three advantages: it answers an important learnability question, explains the differences attested between the way children of different ages handle verb clusters, and strongly suggests that verb clusters follow one general rule, rather than several separate construction-specific ones.

Keywords: verb clusters, verb raising, Dutch, L1 acquisition

¹ Our deepest thanks and appreciation go out to Sabine van Reijen for her tremendously valuable contributions of various kinds throughout the course of this project, including the data from her graduate thesis project. We would also like to thank Simone Buijs, for her help with our experiments and for her critical suggestions and feedback, Sible Andringa for his statistical advice, various conference audiences for comments and discussion during earlier presentations of this work, and all of those involved in the experiments. It goes without saying that all remaining shortcomings are our own.

1 Introduction

In the past three or four decades, the syntactic phenomenon of verb clusters has caught many linguists' attention. These impenetrable groups of verbs at the end of (West-) Germanic subordinate clauses have been the focus of theoretical discussions as well as of more descriptive and functionalist papers (most famously Evers 1975, but more recently Arfs 2007, Barbiers 2005, 2008, Coussé 2008, Coussé et al. 2008, De Sutter 2005, De Sutter et al. 2005, Wurmbrand 2005). However, a question that has largely remained unanswered is how exactly these verb clusters are acquired. This study not only attempts to fill that gap, but aims to make an insightful contribution to the aforementioned theoretical discussion as well. We do so by discussing data from a series of sentence repetition tasks in which a total of 120 monolingual Dutch children participated. The main claim of this paper is that the ascending verb cluster orders (1-2 and 1-2-3, e.g. *moet eten* 'must eat' and *moet hebben gegeten* 'must have eaten') are the default orders in Standard Dutch and, crucially, also provide an important trigger for the acquisition of verb clusters.²

In what follows, we first provide a brief overview of the relevant literature and present a fundamental learnability problem that would follow from other studies on verb clusters. In section 3, we present our complete hypothesis and suggest a pathway via which verb clusters could be acquired. Section 4 is dedicated to the methodology of the three experiments we carried out, the results of which are presented in section 5. Finally, section 6 contains a discussion and concludes this paper.

2 Existing perspectives on verb clusters

As mentioned above, a verb cluster is traditionally described as a group of verbs at the end of the subordinate clause, and is characterized by a number of properties. For example, this verbal end group is (generally) impenetrable by any type of phrasal material and the word order within a verb cluster can be variable (e.g. Barbiers 2008, Evers 1975, among many others). These properties are demonstrated in (1), in which inserting an adverb like *snel* 'quickly' between two verbs is ungrammatical in Standard Dutch, irrelevant of the order in which the verbs appear. The order in (1a), in which the modal precedes the infinitive, is known as the 1-2 order (or ascending

² All claims and discussion of Dutch pertain to Standard Dutch as spoken in The Netherlands.

order, or sometimes the red order in the traditional Dutch literature on verbal clusters), whereas the order in (1b), in which the verbs are reversed, is referred to as the 2-1 order (or descending order, or the green order). The number terminology refers to the embedding of the verbs in the structure: the higher the number, the deeper the verb is embedded in the clausal spine. Both of these orders are semantically identical alternatives.

- (1) a. (...) dat ik deze koekjes **wil** (*snel) **eten**. (1-2)
 (...) that I these cookies want (quickly) eat.INF
 b. (...) dat ik deze koekjes **eten** (*snel) **wil**. (2-1)
 (...) that I these cookies eat.INF (quickly) want
 Both: '(...) that I want to (quickly) eat these cookies.'

Though the examples above contain clusters with just two verbs, namely a modal and an infinitive (a MOD-INF cluster), the terminology and reasoning can be extended to clusters containing more and different kinds of verbs as well. In (2), examples are given of clusters containing an auxiliary and a participle (AUX-PART clusters); the sentences in (3) and (4) contain three and five verbs, respectively.

- (2) a. (...) dat ik deze koekjes **heb** **gegeten**. (1-2)
 (...) that I these cookies have eaten
 b. (...) dat ik deze koekjes **gegeten** **heb**. (2-1)
 (...) that I these cookies eaten have.
 Both: '(...) that I have eaten these cookies.'
- (3) a. (...) dat ik deze koekjes **wil kunnen bakken**. (1-2-3)
 (...) that I these cookies want can.INF bake.INF
 b. (...) dat ik deze koekjes **bakken kunnen wil**. (3-2-1)
 (...) that I these cookies bake.INF can.INF want
 Both: '(...) that I want to be able to bake these cookies.'
- (4) (...) dat ik koekjes **zou moeten kunnen leren bakken**. (1-2-3-4-5)
 (...) that I cookies should must.INF can.INF learn.INF bake.INF
 '(...) that I ought to be able to learn to bake cookies.'

Interestingly, though all logical orders are possible for clusters containing two verbs (henceforth: bipartite clusters), this does not hold true for three-verb (tripartite) ones. In Standard Dutch, two out of six logically possible orders are universally accepted (1-2-3 and 3-1-2), two are universally re-

jected (2-1-3 and 2-3-1) and two are accepted by some but not all speakers, namely 1-3-2 and 3-2-1 (Barbiers et al. 2008, Wurmbrand 2005, Zwart 1996, Zwart 2011).³ As the length of the cluster grows, the verb order variation becomes increasingly restricted: the order given for the sentence in (4) is the only generally accepted one.

One explanation postulated for (the properties of) verb clusters is that verb clusters are a product of verb raising, as can be seen in Figure 1 below (in the spirit of Evers 1975).

Figure 1 Cluster formation: structures before and after raising

Figure 1 shows an example in Dutch according to Evers' traditional analysis.⁴ We start with the situation before raising in Figure 1a. This shows the underlying structure in Dutch subordinate clauses, in which the inflected verb appears at the end of the clause. To form a verb cluster, the main verb *eten* 'to eat' is raised out of its initial position and attaches to the governing verb *wil* 'want'. This raised verb can adjoin to either the right or the left of the higher verb. If *eten* adjoins to the right, this results in the impenetrable cluster in Figure 1b: a 1-2 ordered cluster. If it adjoins to the left, the end result is the opposite (i.e. 2-1) order, as illustrated in Figure 1c. Thus, verb raising can result in both a 1-2 and a 2-1 ordered cluster in Dutch, though note that the surface order of the 2-1 cluster and the potential situation without raising (the V_{FIN} -final analysis) are identical, namely *eten wil* 'eat want'. This means that the movement in Figure 1c is essentially vacuous, which, as we demonstrate shortly, is a crucial observation for the present study.

First, however, we would like to note that the account above is certainly

3 Note that in completely non-finite clusters the 2-1 order is excluded when the cluster consists of an infinitival lexical verb and an infinitival modal (e.g. Wurmbrand 2005). We do not go into those clusters here.

4 This is an example of a bipartite cluster. Larger verb clusters obviously require multiple instances of movement, which (as mentioned) determine the (im)possibility of certain cluster orders, but the general idea is the same.

not the only approach to verb clusters. In fact, there is a vast collection of different analyses that have been put forward to derive verb clusters, and account for the possibility (and impossibility!) of certain orders (or at least: why certain orders are unattested, and why others are more frequent). Some of these proposals involve verb projection raising rather than verb raising, in which the VP-projection (partially or completely) adjoins to the higher verb; some argue for leftward rather than rightward movement, some even combine different types of movement and directionality. These ongoing discussions are not the main focus of this paper, however, and the outcome of the theoretical debate does not have any fundamental consequences for our goal. As with the account described above, there is always a discrepancy between the surface forms in the child's input and the actual underlying structure. We refer the reader to Wurmbrand (2005) for an overview and discussion of such proposals, and e.g. Barbiers (2008) for a more recent analysis of verb clusters.

One question that remains central in the verb cluster literature, and that is central in the present study, revolves around which of these orders is the default one (or, if the reader prefers, unmarked, basic or most economical – we take a neutral stand here), and which is derived. Besides generative work, we can also turn to studies from a more functionalist perspective, in which it has been argued that the word order variability within the cluster is not completely ad hoc, but can be captured by different generalizations and by assuming that various (extra-syntactic) factors play a role when it comes to word order preference. For example, speakers may be sensitive to rhythmic or prosodic factors (with speakers preferring balanced stress patterns), discourse effects (e.g. the measure of interaction, adapting order preferences to the preferences of one's interlocutor), or the semantic dimension of the cluster (whether the cluster is adjective-like), to name a few (cf. Arfs 2007, Coussé, Arfs & De Sutter 2008, De Sutter 2005).

By far the most reiterated and striking observation regarding the use of verb clusters in Dutch, however, is that there is an asymmetry in use. See Table 1.

Table 1 Percentage of 1-2 and 2-1 orders in AUX-PART clusters in the Netherlands, as reported in Arfs (2007), De Sutter (2005) and Stroop (2009)

Order	Arfs 2007	De Sutter 2005	Stroop 2009	De Sutter 2005
	written Dutch	"low production pressure"	spoken Dutch	"high production pressure"
% 1-2	72.08%	~85%	37.35%	~47%
% 2-1	27.92%	~15%	62.65%	~53%

For Arfs (2007) and Stroop (2009), this asymmetry is found between written and spoken Dutch.⁵ They show that there is a preference for the 1-2 (ascending) order in written Dutch, whereas this preference is reversed in spoken Dutch. De Sutter (2005) shows that it is not necessarily the difference between spoken and written Dutch that is relevant here, but (among an intricate interplay of other factors) the difference in production pressure. Well-prepared, edited spoken texts (such as speeches or news reports) attract more 1-2 orders, whereas online chat sessions, internet fora, dialogues and spontaneous conversation are characterized by a higher number of 2-1 orders, though this preference is not always equally strong.⁶ This asymmetry might yield the prediction that, in Dutch, the standard or default verb cluster order is the descending (2-1) order, since this is the more frequent order in the input (child-directed speech is inherently spoken and normally informal) and also the order speakers generally prefer when under (time) pressure or when producing language in dialogue (as opposed to monologue) settings (De Sutter 2005).

This is also what Zuckerman (2001) seems to have found. He used both a production task and a sentence repetition task to test three-year-olds, five-year-olds, and adults (teachers and parents of the child participants), and showed that three-year-old Dutch monolinguals prefer the 2-1 order, though older, five-year-old children prefer the exact opposite. From this, Zuckerman concluded that 2-1 must be the default order in Dutch, since the general assumption is that young language learners opt for the most economical or more standard option. The older learners resemble the adults: most of Zuckerman's adults prefer 1-2 verb clusters, and use (almost) solely this order. Only a minority group shows the opposite preference. These adult preferences seem contradictory to Stroop (2009) but are in line with De Sutter (2005), and could be explained by extra-grammatical and/or task-induced factors. For example, the 1-2 order has been claimed to be the more prestigious or formal order (see also Coussé, Arfs & De Sutter 2008). Thus, it could be that Zuckerman's adult participants felt the experiment was a more formal setting and/or wanted to perform well on the task and therefore opted for 1-2 more often. There is, however, one question to

5 These studies discuss AUX-PART clusters only. To our knowledge, comparable data for modal clusters have not been reported in the literature.

6 Of course, this division is also subject to influences by factors such as the ones mentioned earlier. Clusters in 2-1 order are found in nearly 70% of private dialogues and IRC files, around 70% of interviews, classroom settings and negotiations, in 59.2% of clusters produced in circumstances where editing opportunities are great, and in 59.1% of situations with two-way communication.

which the literature does not provide an immediate answer, which is how the language learner is able to distill verb clusters from the input in the first place. We will go into this now.

To acquire verb clusters, a child needs positive evidence. But what kind of evidence does the child have? First, the characteristics used to describe clusters either have something circular to them (e.g. the motivation for verb clusters is attributed to verb raising, and the evidence for verb raising is the verb cluster itself) or amount to negative evidence (e.g. the *no interruption rule*). Second, to make matters more complicated, the most frequent orders in the input can actually be accounted for very easily without assuming any verb movement at all. As mentioned, and as demonstrated in Figure 1, an observation crucial to the current study is that the surface order of the 2-1 cluster and the situation before raising is identical. The reason for this is that Dutch is an (underlying) OV-language, which means that finite verbs generally appear at the end of the subordinate clause. Therefore, for the language learning child, there needs to be evidence for verb raising in these descending (2-1) orders: why resort to (vacuous) movement if the input can be analyzed without it? We would like to argue that this evidence comes from the alternative verb cluster orders (such as the ascending orders 1-2 and 1-2-3): these orders are *not* predicted by OV (i.e. V_{FIN} -final) word order, and when encountered in the input, they must eventually be reanalyzed in order to leave the existing word order rule intact.⁷

There is also another factor that plays a role here, and that is the potentially ambiguous status of participles as verbs. Compare (5) and (6).

- (5) a. (...) dat die gestolen fiets **groen was**. b. (...) ***was groen**.
 (...) that that stolen bike green was (...) was green
 ‘(...) that that stolen bike was green.’

7 Again, note that while we describe this learnability problem in terms of the standard analysis proposed by Evers (1975), nothing hinges on this analysis: this learnability issue holds for all other analyses of verb clusters as well. Most approaches to verb clusters require construction-specific assumptions to account for cluster phenomena, which means that, regardless of the underlying analysis, the child must still differentiate between standard word order behavior in the subordinate clause and a verb cluster, and he must conclude that a verb cluster is not counterevidence for that standard word order. Even an approach that makes use of more general principles only (e.g. Barbiers 2008) would still require the child to figure out the difference between when regular OV and when the other general principle (in Barbiers' case, VP intraposition) applies.

- (6) a. (...) dat die groene fiets gestolen was b. (...) was gestolen.
 (...) that that green bike stolen was (...) was stolen
 ‘(...) that that green bike was stolen.’

Both clauses discuss a stolen green bike. In the a-versions, both clauses end identically, with the finite verb at the end of the clause (as mandated by OV), each verb preceded by what is seemingly an adjective (note they can modify *fiets* ‘bike’ in these sentences), or at the very least something that expresses a result or a state rather than an action or event. Based on such input, how is the child supposed to see that the sentence in (6a) contains a verb cluster (in 2-1 order)? First, the child could assume that both sentences contain one verb only, and hence there is nothing to cluster. More importantly, though, even when the child assumes there are two verbs in (6), there is still no direct motivation for verb raising, since the facts in such sentences can be accounted for in the same, straightforward way as in (5a), namely by assuming that both are a product of OV word order, a robust word order rule that has been shown to be acquired very early on (e.g. Wijnen 1997, who shows that children produce root infinitives to the right of objects from the beginning; Van Kampen 2010, who shows that finite verbs in early subordinate clauses also appear in predicate-final position).

However, the b-sentences tell us a different story. The order in (5)b never appears in the input, so the child never receives conflicting evidence for the OV analysis for sentences like these. The order in (6)b, on the other hand, does appear in the input, and this would entail a blatant violation of OV word order. Since such violations are too frequent to ignore (e.g. De Sutter 2005, Stroop 2009, see also Table 1), the child must reanalyze these data in such a way that the OV analysis remains intact and still leaves room to account for both the orders in the input. It should be unsurprising that we take this reanalysis to involve verb raising and cluster formation.

In summary, 2-1 verb clusters do not provide clear-cut evidence to the language learning child that there is such a thing as verb raising, and therefore, verb clusterhood. The child needs the conflicting 1-2 ordered verb cluster to reanalyze 2-1 ordered clusters as being actual clusters, instead of simple OV word orders. Thus, we believe it is undesirable to assume that 2-1 orders are the default verb cluster order in Dutch. Moreover, it does not readily explain the difference Zuckerman (2001) finds: why would his kindergartners suddenly prefer the 1-2 order, which neither reflects his assumed default, nor the adult-like tendencies found elsewhere in spoken Dutch? Instead, we would like to argue that Zuckerman’s data need to be reinterpreted.

3 Stages in cluster acquisition: hypotheses and predictions

It should be clear by this point that we would like to claim that 1-2(-3) orders are the default verb cluster order in Dutch. This section elaborates on what this exactly entails and what the sequence of acquisition looks like. We propose a multi-staged pathway in verb cluster acquisition.

The first stage of verb cluster acquisition starts when children are able to string clusters containing at least two verbs together in a subordinate clause. In this stage, children should produce (almost) only what seem to be 2-1 orders (in line with the data in Zuckerman 2001). However, we do not take these groups of verbs to be products of verb raising (and thus actual clusters), but as products of OV word order. These are thus *pseudo-clusters*. In the following stages, children use their input to piece together cluster principles in a construction-based fashion. Here, the 1-2 orders, which seem to go against the robust OV (or V_{FIN} -final) evidence, trigger the notion of clusterhood. This notion should sink in first with modal-infinitive (henceforth: MOD-INF or modal) clusters, which are more clearly verbal than (some) auxiliary-participle (henceforth: AUX-PART or auxiliary) clusters (cf. the discussion around (5)-(6)), but quickly expand to include all cluster types. This entails that children apply a general rule to verb clusters from the start, rather than creating and maintaining multiple construction-specific rules. When all configurations of order and cluster type are acquired, adult-like preferences may start to set in, eventually restoring (part of) the gap between what the literature assumes to be the most frequent order in spoken adult Dutch (2-1) and the preferred order in child Dutch (1-2).

We can investigate whether this pathway is correct by asking children of different ages to repeat sentences containing various kinds of verb clusters. If the aforementioned pathway is correct, we expect children who have yet to acquire verb raising to repeat fewer clusters successfully in general, since clusters do not exist in their grammars: what seem like clusters are constructions that can be meshed into an OV-analysis. Therefore, when they do produce something clusteresque, we expect it to follow OV word order and thus be in 2-1 order. Hence, when asked to repeat a 2-1 order they should do this correctly more often than when offered a 1-2 order. Children who have acquired clusters, on the other hand, should prefer the 1-2 order, repeating this order correctly more often and even converting 2-1 orders from the stimuli to 1-2 orders. Another prediction that follows from this line of reasoning is that these children should respond differently to auxiliary clusters than to the modal clusters. The reason is that the MOD-INF clusters are clearly more verbal in nature, and

should therefore be more recognizable as verb clusters. Once children have analyzed both modal and auxiliary constructions as clusters, they should treat them in the same way, showing no differences in order preference between the two.

4 Method

We administered three sentence repetition tasks (SRTs) to a total of 120 typically developing (TD) Standard Dutch monolingual preschoolers and kindergartners, and 30 adult controls. Child participants were tested at their day care center or elementary school in the province of North-Holland. None of the participants were dialect speakers. Table 2 shows the exact distribution of participants between the experiments.

Table 2 Number of participants in each sentence repetition task, including mean ages and age ranges

Participants	Bipartite		Tripartite
	A	B	
Preschoolers	31 (2;8 – 4;0, M= 3;7)	N/A	N/A
Kindergartners	25 (4;0 – 5;5, M= 4;9)	40 (4;0 – 6;7, M= 5;6)	24 (4;0 – 6;2, M= 4;9)

The reason for choosing for a repetition task over other kinds of production tasks is that eliciting verb clusters can be quite tricky, as the meanings in sentences with clusters can be expressed in other ways. Therefore, we conducted three Sentence Repetition Tasks (SRTs), in which the child hears a sentence (which is accompanied by a picture, to offer visual and contextual support and to make the task more interesting so the children would stay engaged) and is asked to repeat exactly what he/she has heard. The idea is that the carefully constructed sentences are too long for the child to be able to repeat them using memory alone, and so he must use his own grammar to produce a sentence. The response to the stimulus is therefore taken to reflect the child's grammar. Since correct repetitions of the stimulus could be considered ambiguous (between a product of the grammar, a product of memory, or an effect of priming), the most telling responses in such a task are cases in which the child produces an utterance that does not match the stimulus: here, the child's grammar overrides whatever construction or prime that was offered, and produces a construction that is (more readily) available.

Bipartite Task A looked at AUX-PART clusters with *hebben* and different lexical verbs, as well as MOD-INF clusters with the modals *mogen*, *zullen* and *kunnen*, 'may', 'will' and 'can', with different lexical verbs. Every test item differed minimally from other test items with respect to cluster type (modal or auxiliary), finiteness (whether the cluster contained a finite verb or not) and order (whether the verbs were in 1-2 or 2-1 order). An example is given in (7). Bipartite Task B focused on finite clusters only, and instead included *zijn* 'to be' for AUX-PART clusters and *gaan* 'to go', as well as the modals *kunnen* 'can' and *moeten* 'must' as clusters containing an infinitive. Again, each item was minimally different from others with respect to order and cluster type. An example is in (8). This design allows us to look at cluster acquisition more precisely, and determine whether cluster acquisition (and order preference) is sensitive to the modal and auxiliary verbs used in the cluster or whether children seem to apply a more general (syntactic) rule.

- (7) Paula zegt dat juf Lies een boek gelezen heeft.
 Paula says that miss Lisa a book read.PART has
 'Paula says that miss Lisa has read a book.'
- (8) Oma zegt dat opa in de vijver gaat springen.
 Grandma says that Grandpa in the pond goes jump.inf
 'Grandma says that Grandpa is going to jump in the pond.'

cf. (7)

cf. (8)

The tripartite task tested clusters containing the modal *moeten* 'must', the infinitive *hebben* 'to have', and a participle, such as in (9). A total of 24 children were confronted with all six logical orders twice. As mentioned above, two of these are considered grammatical (1-2-3 and 3-1-2), two are

accepted by some but not all speakers of Standard Dutch (1-3-2 and 3-2-1) and two are ungrammatical (2-1-3 and 2-3-1).

- (9) Opa denkt dat Els zijn bril moet hebben verstopt.
Grandpa thinks that Els his glasses must have hidden
'Grandpa thinks that Els must have hidden his glasses.'

cf. (9)

For each SRT, the order in which the stimuli were presented was counter-balanced. Every task consisted of 36 stimuli per kindergarten participant and 18 stimuli per preschool participant and had a 3:1 item-to-filler ratio, in which all fillers and all items were sentences of the same length (9-10 words and 10-14 syllables, following recommendations in Hamayan, Sae-gert & Larudee 1977; Montgomery, Montgomery & Stephens 1978; Santel-mann et al. 2002).⁸ All test sentences were pre-recorded by the same fe-male native Dutch speaker, using neutral intonation in order to prevent intonation effects from influencing the results.

Before each session, participants were given a short introduction and instruction about the task, in which the experimenters made sure that the child understood what was expected. During the task, two experimenters were present: one who interacted with the child, and one who scored the answers. These scores were later checked by two additional judges, based on audio recordings of the sessions. In nearly all cases, the judges agreed with the initial scores. In the few remaining cases, a third person's judg-ment was decisive for how to score a given utterance.

8 The filler items from the present study were used in two studies which focused on verbal inflection errors. In exchange, some of test items from the present study served as fillers in their experiments on verbal inflection errors, namely all of the tripartite clusters (for Buijs et al. 2013) and extra bipartite items (for Buijs 2013).

5 Results

The results of the tasks show an interesting pattern in the acquisition of verb clusters that is in line with our expectations: not only do we find significant differences between how children of different ages react to verb clusters, but we also find clear evidence for ascending orders as default verb clusters in children. First, let us look at Figure 2, which shows preschoolers' (3-year-olds) and kindergartners' (4-and-5-year-olds) responses to finite bipartite stimuli in both orders.⁹ The bottom part of the bars indicate correct responses, i.e. exact repetitions of the stimuli, the light gray area immediately above indicates instances in which children reversed the order of the verbs in the stimulus (in other words, they produced a 2-1 order such as *eten wil* 'eat want' after hearing a 1-2 order as *wil eten* 'want eat' in the stimulus, or the other way around), medium gray areas indicate doubling errors (e.g. *wil eten wil*, 1-2-1, in response to *eten wil*, 2-1) and the black part of the bars indicate all other errors, including utterances containing only one verb in the subordinate clause, or the utterances in which only a main clause was produced.

Figure 2 Preschoolers' and kindergartners' responses to 1-2 and 2-1 ordered stimuli (Task A & B)

Figure 2 illustrates the difference in general performance between preschoolers and kindergartners. The former group correctly repeats the sti-

9 Here, we only discuss child data on clusters in which one of the verbs is finite; performance on non-finite verb clusters was too poor to distill any preferences. Only Task A contained non-finite items. The data discussed here are based on the remaining 139 of the preschoolers' uttered clusters, and 1020 bipartite clusters (300 in Task A and 720 in Task B) produced by kindergartners. Performance in adult controls was at ceiling in all conditions.

mulus in 44.90% and 32.90% percent of the cases, whereas the older group does so in response to 80.60% of the 1-2 ordered stimuli and 55.15% of the 2-1 ordered stimuli. Moreover, the percentage of errors that cannot be considered any kind of cluster is greater in preschoolers than in kindergarten children overall (46.40% and 40.00% versus just 16.30% and 16.90%, respectively). This indicates that kindergartners are better at producing verb clusters than three-year-olds, but that both groups respond differently to 1-2 stimuli than 2-1 stimuli. We return to this below.

The most telling responses in this task are reversed-order responses and the clusters containing doubling errors. In the former error type, children repeat the order opposite of the one they heard. This type of response may reveal a preference or default behavior, as they are using their grammars to override the stimulus order. We see that kindergarten children produce these reversed orders more often in response to 2-1 ordered stimuli than in response to 1-2 ordered stimuli. This indicates (on top of the overall better performance on 1-2 stimuli) a preference for 1-2 orders. The doubling errors are even more interesting: these errors only occur in response to 2-1 ordered stimuli, and only entail doubling of the finite verb. Thus, children hear a cluster like *eten wil* 'eat want', and then produce *wil eten wil* 'want eat want'. We take these utterances to indicate a preference for 1-2 orders as well: the child's grammar produces the first part of the cluster (*wil eten*, in this example, a 1-2 order) and then repetition of the finite verb follows as a reflex of the child's memory, since the final word in the stimulus is the last thing the child heard and is most likely to be remembered. Other types of doubling errors, such as *eten wil eten* 'eat want eat', (2-1-2, see also Zuckerman 2001) in response to either bipartite order or *wil eten wil* 'want eat want', (1-2-1) in response to *wil eten* 'want eat', (1-2) do not occur.¹⁰

Figure 3 zooms in on preschoolers' performance on different cluster types; Figure 4 does this for kindergarten children.

10 Doubling errors of various kinds have also been argued to show the movement path of the doubled element (see e.g. Crain and Nakayama 1987, Guasti et al. 1995, Thornton 1990, Zuckerman 2001). However, if that were the case here, that would mean the examples we found would show movement of the finite verb, indicating an entirely different analysis of verb clusters altogether (in which both verbs must move, or in which the finite verb is lowered, or in which head-directionality is reversed, for example). Regardless of the strengths and weaknesses of any other analyses, they would all predict other kinds of doubling errors as well, and no such other doubling errors were attested, nor here nor in Zuckerman (2001).

Figure 3 Preschoolers' responses to AUX-PART and MOD-INF clusters, both orders (Task A)

Figure 4 Kindergartners' performance on auxiliary and modal clusters, both orders (Task A & B)

These figures illustrate in a different way that children show more conversions to 1-2 than vice versa, and show doubling errors as discussed above. In response to auxiliary stimuli, preschoolers (Figure 3) shows that three-year-olds do not do well on verb clusters in general, and show different behavior on modal clusters as compared to auxiliary clusters. Preschoolers seem somewhat less hesitant to convert 1-2 orders to 2-1 orders and do relatively well on 2-1 auxiliary stimuli as opposed to the modal condition; doubling errors still only occur in response to 2-1 orders. Figure 4 (kindergartners' performance) indicates the previously observed preference for 1-2 orders for both cluster types, with more correct responses showing up in response to 1-2 ordered stimuli, and 2-1 ordered stimuli evoking reversed orders and doubling errors.

We used R (R Core Team 2015) and *lme4* (Bates et al. 2015) to fit a generalized linear mixed-effects logistic regression model to the data described above. We entered exact repetitions of the stimulus as the dependent variable (exact repetition or non-repetition) and had intercepts for participants and items as random effects. The final model was created via leave-one-out model comparisons. Main effects of the verb cluster order in the stimulus (2-1 or 1-2), the finite verb in the stimulus (modal or auxiliary), and the participant's age in months were included. Additionally, we included interactions between order and verb, as well as interactions between age and verb. Though our two tasks (A and B) by design consisted of different types of clusters, the final model would not converge when task was included as a factor. The same applied to children's gender. Therefore, gender and task were left out as factors and data from both tasks were analyzed together within this model (1159 verb clusters total). The ages were centered before analysis; all other factors were dummy coded and centered.¹¹ Visual inspection of the data did not indicate any outliers to be removed, and did not reveal obvious deviations from normality. Table 3 summarizes the results of the model; interaction effects are plotted in Figures 5 and 6.

Table 3 Result summary for exact repetitions: odds ratio, confidence interval, coefficient estimates, standard errors, associated Wald's z-score and significance level (p) for all predictors in the analysis

Predictors	OR	CI (95%)	Coef. β	SE β	z	p
Intercept	3.62	2.04–6.43	1.28781	0.29213	4.408	<0.00001
Age in Months	1.06	1.02–1.10	0.05690	0.01778	3.200	<0.0015
(2-1) Order	0.42	0.21–0.84	-0.86779	0.35398	-2.452	<0.015
(Modal) Verb	2.33	1.21–4.48	0.84512	0.33358	2.533	<0.015
Order * Verb	0.27	0.11–0.64	-1.32680	0.44745	-2.965	<0.004
Age in Months * Verb	1.06	1.02–1.10	0.06030	0.01812	3.187	<0.002

Table 3 shows main effects of age, stimulus order and the type of verb. Overall, older children are more likely to produce exact repetitions than younger children, more exact repetitions occur in response to stimuli in 1-2 order than in 2-1 order and more often in response to MOD-INF clusters than AUX-PART clusters. An interaction between verb type and cluster order shows that 1-2 ordered clusters are more likely to be repeated correctly if the finite verb is a modal rather than an auxiliary, while clusters in 2-1 order

11 For age in months: $M = 59.67$, $SD = 10.16$, range = 32–79.

Figure 5

Figure 6

fare better with auxiliaries (Figure 5). Again, 2-1 orders are less likely to be repeated correctly overall. The interaction between children's age and the finite verb used in the stimulus shows that while younger children are more likely to repeat the cluster correctly if it contains an auxiliary, older children provide more exact repetitions overall but especially in response to clusters containing a modal verb (Figure 6). This shows that children's reactions to verb cluster types changes with age, somewhat after their fourth birthday: we see a relatively sharp rise in the predicted probability of an exact repetition of MOD-INF clusters, with this cluster type eliciting more exact repetitions than AUX-PART clusters from around age 5;9 on.

Since the most telling responses in a sentence repetition paradigm are those where the child's grammar overrules what was heard in the stimulus, we also ran models to analyze the errors children made: the factors that predict an exact repetition are not necessarily the same factors that predict any given error type. Though we found three types of errors (reversed orders, doubling errors and errors that cannot be seen as clusters), our model focuses on the reversed orders, as the number of doubling orders is too small for a model to converge. The data and the random effects are exactly the same as in the model above, but the dependent variable is the error type, namely whether the response was a reversed order or not. Note that we are not modeling the mirror image of the analysis we ran above, but are focusing on one error type in particular when pitted against the other three response types. We again made leave-one-out comparisons to determine the fit. This time, we found main effects of finite verb and cluster order, and an interaction between order and verb, as summarized in Table 4.

Table 4 Result summary for reversed orders: odds ratio, confidence interval, coefficient estimates, standard errors, associated Wald's z-score and significance level (p) for all predictors in the analysis

Predictors	OR	CI	Coef. β	SE β	z	p
Intercept	0.07	0.04–0.14	-2.60464	0.32231	-8.081	<0.0001
Age in Months	0.98	0.95–1.01	-0.01924	0.01375	-1.400	0.162
(2-1) Order	2.88	1.40–5.92	1.05663	0.36710	2.871	<0.004
(Modal) Verb	0.04	0.01–0.20	-3.12639	0.77529	-4.033	<0.0001
Order * Verb	21.91	4.35–110.23	3.08677	0.82440	3.744	<0.0001

Figure 7

These data show a few things. The first observation is that though children may seem less likely to make such reversed orders as they grow older, this trend is not significant (unlike in the fit described for predicting exact repetitions). When children do make a conversion error, they are more likely to respond with a 1-2 order when given a 2-1 order than vice versa, and they are more likely to provide the opposite order in response to AUX-PART stimuli rather than clusters containing a modal verb. This effect of verb type is stronger in 1-2 ordered clusters than 2-1 ordered clusters: children are about as likely to convert 2-1 clusters to 1-2 orders, regardless of the finite verb in the cluster, but for 1-2 ordered stimuli, the probability of a conversion is greater for AUX-PART clusters (Figure 7). Clusters containing a modal are hardly ever converted to 2-1.

Though we were unable to include effects of specific auxiliary and modal verbs in our model due to convergence issues, the patterns described above seems to remain intact when all the tested auxiliary and modal verbs are compared, both those in Task A and in Task B. Figure 8 zooms in on clusters with an auxiliary and a participle (*hebben* in Task A, *zijn* in Task B), and clusters with a modal and an infinitive (*kunnen*, *mogen* and *zullen* in Task A; *kunnen*, *moeten* and *gaan* in Task B).¹²

Figure 8 Kindergarteners' performance on different auxiliary and modal verbs, both orders

The 1-2 preference appears across the board: the percentage of correct responses in 1-2 conditions and the percentage of reversed orders and

12 The modals *zullen* 'will' and *moeten* 'must' in Task A occurred much less frequently than the other modals and were therefore not analyzed separately, but within Task A as a whole.

doubling errors in 2-1 conditions indicate that children prefer 1-2 orders in all the cluster types we tested.

This brings us to the final sentence repetition task we carried out. This task focusses on a small set of tripartite clusters. Since these items were included as fillers in Buijs, Van Reijen & Weerman (2013), the number of responses is much smaller than in the other two tasks. (As mentioned above, we tested 24 children on all six cluster orders. Since each order was tested twice, we collected a total of 288 responses here.) Moreover, the responses are far more varied. Because of this, we deemed the data represented in Figure 9 and Table 5 unsuitable for statistical testing. Nevertheless, the data do fall in line with the pattern we saw in the previous two tasks.

Figure 9 Kindergartners' responses to tripartite clusters

Table 5 Kindergartners' responses to tripartite clusters by stimulus order

Response	Stimulus order						Total
	1-2-3	?1-3-2	*2-1-3	*2-3-1	3-1-2	?3-2-1	
1-2-3	11	6	8	0	6	2	33
?1-3-2	3	13	4	3	7	5	35
*2-1-3	6	0	5	3	1	2	17
*2-3-1	1	0	0	8	1	4	14
3-1-2	0	4	1	0	4	2	11
?3-2-1	0	0	0	2	0	1	3
1-2	22	13	22	12	19	18	106
2-1	0	6	4	15	4	8	37
Error	5	6	4	5	6	6	32
Total	48	48	48	48	48	48	288

The first important observation is that children are only able to produce a tripartite cluster about 40% of the time, indicating children have some difficulty in this area. When children do produce an exact repetition of

the stimulus (indicated by the shaded cells in Table 5, they do so mostly in response to 1-2-3 clusters and 1-3-2 clusters. Thus, children also show a preference for ascending orders in tripartite clusters. The preference for ascending orders is also reflected in their two-verb responses, which account for 49.65% of the data (the sum of the bipartite responses in Figure 9). Of these bipartite clusters, 1-2 orders dominate the picture by far: 36.81% of the total dataset (or nearly three-quarters of the bipartite clusters produced in this task) are 1-2 orders.

Note that our child data above do not differ crucially from the results in Zuckerman (2001). Here, too, the older children show a preference for 1-2 orders, where younger children do not. Zuckerman argues that his data show that 2-1 orders are the default verb cluster order, on the assumption that younger children produce utterances that are syntactically more economical. However, this raises the question why older children would prefer the less economical order and show behavior that is still different from that of adults. Moreover, it is unclear what motivates the transition to that adult-like stage. Our analysis accounts for all of these facts: early 2-1 preferences are the result of OV word order, preferences for 1-2 order in kindergarteners is motivated by the application of a general syntactic rule, and adult-like behavior (as described in e.g. Coussé, Arfs & De Sutter 2008) follows after extra-grammatical factors are acquired.

6 Discussion and conclusion

The above results reveal a clear trend in the acquisition of verb clusters, confirming our hypotheses and predictions. The data support the plausibility of an acquisition pathway in which children move through an *OV stage*, a *1-2 stage*, in which 1-2 orders are preferred but children's preferences increasingly become more adult-like, and then finally reach the adult grammar. Before discussing the consequences of this analysis, let us first review the proposed stages in acquisition.

In the first stage, children initially do not recognize verb clusters as such. Instead, their intake and production can simply be accounted for by the underlying OV (V_{FIN} -final) word order in Dutch. Therefore, 2-1 orders found in early child utterances, like those in Zuckerman (2001), should not be seen as clusters. At some point, however, children must do something with the 1-2 orders they encounter in the input, which could be seen as counterevidence for OV. In order to save their OV analysis, they can analyze 1-2 orders as verb clusters (in which the cluster as a unit adheres to

OV). Children then first apply this analysis to clusters that are clearly verbal, i.e. clusters consisting of a modal verb and an infinitive. The less clear-cut candidates, the clusters containing an auxiliary and a participle, follow slightly later, taking the child's analysis from a construction-specific rule to a general one, in which 1-2 is the preferred order for all verb clusters. This does not mean, however, that children show completely adult-like behavior at this point: adults are sensitive to various extra-grammatical factors that may influence order preferences, which we did not account for in our experiment. In this stage, both orders are clearly present, but are not yet subject to (all) the same factors as clusters in adults: children's order preferences require some fine-tuning, and align more neatly with those of adults over time. The observed pattern in child data is that the cluster order that is found to be more dominant in spoken adult Dutch (see Table 1, and cf. Coussé, Arfs & De Sutter 2008, De Sutter 2005, Stroop 2009), is actually acquired last, not first. Thus, frequency in the input seems of little importance here.

How children get from their 1-2 preference to an adult-like distribution of cluster orders remains somewhat an open question. Our suggestion is that the answer lies in extra-syntactic factors such as those mentioned in Coussé, Arfs & De Sutter (2008) and De Sutter (2005). For one, children may not be able to apply such factors if they do not know what types of constructions need to be sensitive to these factors. For another, it might be that children have to acquire some of these factors, and that these perhaps non-essential linguistic nuances are a form of late acquisition. Another explanation might be found in the domain of language change: we do not know if these children will display the same type of order preferences as today's adults (Coussé 2008), and it might even be that the preferences reported in the literature do not reflect the total picture (as different studies report preferences for different types of clusters, and data from different sources show slightly different patterns). Further research should at least be able to show if and when children show a change in order preference, and if and when these preferences are influenced by the same factors and in the same way as adults.

Additional research is also needed to explore the acquisition of clusters of different types and sizes. Clusters containing passives, for example, could be such a focus, as order preferences for these clusters are different from those for active clusters in adult Dutch. Additionally, more attention in acquisition could be directed to clusters containing more than two verbs. Larger clusters go hand in hand with a stricter verb order, and are also less frequent and inherently involve more complicated raising situa-

tions than the relatively small and frequent bipartite clusters. Finally, but perhaps most importantly, questions arise when it comes to languages that have been deemed to have verb clusters, but do not show order variation, at least in bipartite clusters. Examples of such languages are Frisian and German. Our analysis might entail that such languages may not have clusters after all, which has been proposed for Frisian before (cf. Wurmbrand 2005) or that they may have hybrid clusters (Koenenman & Postma 2006, Hoekstra & Versloot 2015). It might also be that the acquisition of clusters in these languages relies on the order differences in larger clusters, or hinge on some other property of clusters altogether.

However, though our proposal raises a few questions of its own, we believe it offers a meaningful contribution to the existing literature, especially relating to the acquisition of verb clusters. Our claim that 1-2 orders are the default verb cluster order in Dutch offers a number of advantages. First and foremost, it allows us to answer the (pressing) learnability question of verb clusters. Second, it gives us means to explain the differences we find between the way preschoolers handle verb clusters and the way kindergartners do, by drawing an acquisition pathway based on positive evidence alone. Lastly, we show that this 1-2 order appears as a default order all across the board, which means that a general rule is at play in child verbal clusters, as opposed to several construction-specific ones.

References

- Arfs, M. (2007). *Rood of groen? De interne woordvolgorde in tweeledige werkwoordelijke eindgroepen met een voltooid deelwoord en een hulpwerkwoord in bijzinnen in het hedendaags Nederlands*. Göteborg: Acta Universitatis Gothoburgensis.
- Barbiers, S. (2005). Word order variation in three-verb clusters and the division of labour between generative linguistics and sociolinguistics. In: L. Cornips & K. Corrigan (eds.), *Syntax and variation: reconciling the biological and the social*. Amsterdam: John Benjamins, 233-264.
- Barbiers, S. (2008). Werkwoordclusters en de grammatica van de rechterperiferie. *Nederlandse Taalkunde* 13, 160-187.
- Barbiers, S., J. van der Auwera, H.J. Bennis, E. Boef, G. De Vogelaer & M.H. van der Ham (2008). *Syntactische Atlas van de Nederlandse Dialecten Deel II / Syntactic Atlas of the Dutch Dialects Volume II*. Amsterdam: Amsterdam University Press.
- Bates, D., M. Maechler, B. Bolker & S. Walker (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software* 67, 1-48.
- Buijs, S.J.M. (2013). *Sentence position effects on Dutch verbal inflection*. MA Linguistics Thesis, University of Amsterdam.
- Buijs, S.J.M., S.B. van Reijen & F.P. Weerman (2013). Verbal inflection errors in main and subordinate clauses: phonology or syntax? *Linguistics in the Netherlands* 30, 61-72.

- Coussé, E. (2008). *Motivaties voor volgordevariatie. Een diachrone studie van werkwoordsvolgorde in het Nederlands*. PhD dissertation, Ghent University.
- Coussé, E., M. Arfs & G. De Sutter (2008). Variabele werkwoordsvolgorde in de Nederlandse werkwoordelijke eindgroep. Een taalgebruiksgebaseerd perspectief op de synchronie en diachronie van de zgn. rode en groene woordvolgorde. In: G. Rawoens (ed.), *Taal aan den lijve. Het gebruik van corpora in taalkundig onderzoek en taalonderwijs*. Gent: Academia Press, 29-47.
- Crain, S. & M. Nakayama (1987). Structure dependence in grammar formation. *Language* 63, 523-543.
- Evers, A. (1975). *The transformational cycle in Dutch and German*. PhD dissertation, Utrecht University.
- Guasti M.T., R. Thornton & K. Wexler (1995). Negation in children's questions: the case of English. In: D. MacLaughlin & S. McEwen (eds.), *Proceedings of the 19th annual Boston University Conference on Language Development*. Somerville, Mass: Cascadilla Press, 228-239.
- Hamayan, E., J. Saegert & P. Larudee (1977). Elicited imitation in second language learners. *Language and Speech* 20, 86-97.
- Hoekstra, E. & A. Versloot (2015). Three-verb clusters in Interference Frisian: a stochastic model. *Language and Speech* 58. <<http://dx.doi.org/10.1177/0023830915577009>>
- Kampen, J. van (2010). Typological guidance in the acquisition of V2 Dutch. *Lingua* 120, 264-283.
- Koenenman, O. & E. Postma (2006). Veranderingen in Friese werkwoordclusters. *Nederlandse Taalkunde* 11, 124-145.
- Montgomery, M.M., A.A. Montgomery & M.I. Stephens (1978). Sentence repetition in preschoolers: Effects of length, complexity and word familiarity. *Journal of Psycholinguistic Research* 7, 435-452.
- R Core Team (2015). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. <<https://www.R-project.org/>>
- Santelmann, L., S. Berk, J. Austin, S. Someshakar, K. Lambert & B. Lust (2002). Continuity and development in the acquisition of inversion in yes/no questions. *Journal of Child Language* 29, 813-840.
- Stroop, J. (2009). Twee- en meerledige werkwoordsgroepen in gesproken Nederlands. In: E. Beijck, L. Colman, M. Göbel, F. Heyvaert, T. Schoonheimd, R. Tempelaarsen & V. Waszink (eds.), *Fons Verborum. Feestbundel Fons Moerdijk*. Leiden/Amsterdam: Instituut voor Nederlandse Lexicologie/Gopher, 459-469.
- Sutter, G. de (2005). *Rood, groen, corpus! Een taalgebruiksgebaseerde analyse van woordvolgordevariatie in tweeledige werkwoordelijke eindgroepen*. PhD dissertation Katholieke Universiteit Leuven.
- Sutter, G. de, D. Speelman & D. Geeraerts (2005). Regionale en stilistische effecten op de woordvolgorde in werkwoordelijke eindgroepen. *Nederlandse Taalkunde* 10, 97-128.
- Thornton R. (1990). *Adventures in long-distance moving: the acquisition of wh-questions*. PhD dissertation, University of Connecticut.
- Wijnen, F. (1997). Functionele categorieën in taalverwerving en taalgebruik. *Nederlandse Taalkunde* 2, 178-198.
- Wurmbrand, S. (2005). Verb clusters, verb raising, and restructuring. In: M. Everaert & H. van Riemsdijk (eds.), *The Blackwell Companion to Syntax Volume V*. Oxford: Blackwell, 227-341.
- Zuckerman, S. (2001). *The acquisition of "optional" movement*. PhD dissertation, University of Groningen (Groningen: Grodil).
- Zwart, J.-W. (1996). Verb clusters in continental West Germanic dialects. In: J.R. Black & V. Motapanyane (eds.), *Microparametric Syntax and Dialect Variation*. Amsterdam/Philadelphia: John Benjamins, 229-258.
- Zwart, J.-W. (2011). *The Syntax of Dutch*. Cambridge: Cambridge University Press.

About the authors

Caitlin Meyer, Department of Dutch Linguistics, University of Amsterdam
E-mail: c.m.meyer@uva.nl

Fred Weerman, Department of Dutch Linguistics, University of Amsterdam
E-mail: f.p.weerman@uva.nl

Appendix

Bipartite Task A – all critical items								
#	Sentence	Lexical verb	Aux / Mod verb	Type	Words	Syll.	Finite-ness	Order
1	Kleine Tim was bang heel eng te hebben gedroomd.	dromen	hebben	AUX	9	12	Non-fin	1–2
2	Kleine Tim was bang heel eng gedroomd te hebben.	dromen	hebben	AUX	9	12	Non-fin	2–1
3	Jan zegt dat kleine Tim heel erg eng zal dromen.	dromen	zullen	MOD	10	12	Finite	1–2
4	Jan zegt dat kleine Tim heel erg eng dromen zal.	dromen	zullen	MOD	10	12	Finite	2–1
5	Kleine Tim was bang heel eng te zullen dromen.	dromen	zullen	MOD	9	12	Non-fin	1–2
6	Kleine Tim was bang heel eng dromen te zullen.	dromen	zullen	MOD	9	12	Non-fin	2–1
7	Loes is erg trots Tim taart te hebben gegeven.	geven	hebben	AUX	9	12	Non-fin	1–2
8	Loes is erg trots Tim taart gegeven te hebben.	geven	hebben	AUX	9	12	Non-fin	2–1
9	De beer zegt dat Loes Tim taart mag geven.	geven	mogen	MOD	9	10	Finite	1–2
10	De beer zegt dat Loes Tim taart geven mag.	geven	mogen	MOD	9	10	Finite	2–1
11	Loes is erg trots Tim taart te mogen geven.	geven	mogen	MOD	9	11	Non-fin	1–2
12	Loes is erg trots Tim taart geven te mogen.	geven	mogen	MOD	9	11	Non-fin	2–1
13	Henk zegt dat Roos de groene rups mooi heeft geknipt.	knippen	hebben	AUX	10	12	Finite	1–2

Bipartite Task A – all critical items								
#	Sentence	Lexical verb	Aux / Mod verb	Type	Words	Syll.	Finite-ness	Order
14	Henk zegt dat Roos de groene rups mooi geknipt heeft.	knippen	hebben	AUX	10	12	Finite	2–1
15	Henk zegt dat Roos de groene rups mooi kan knippen.	knippen	kunnen	MOD	10	12	Finite	1–2
16	Henk zegt dat Roos de groene rups mooi knippen kan.	knippen	kunnen	MOD	10	12	Finite	2–1
17	Roos was trots de rups mooi te kunnen knippen.	knippen	kunnen	MOD	9	11	Non-fin	1–2
18	Roos was trots de rups mooi knippen te kunnen.	knippen	kunnen	MOD	9	11	Non-fin	2–1
19	Joost denkt dat Piet heel erg hard heeft gelachen.	lachen	hebben	AUX	9	11	Finite	1–2
20	Joost denkt dat Piet heel erg hard gelachen heeft.	lachen	hebben	AUX	9	11	Finite	2–1
21	Piet deed zijn best om hard te hebben gelachen.	lachen	hebben	AUX	9	12	Non-fin	1–2
22	Piet deed zijn best om hard gelachen te hebben.	lachen	hebben	AUX	9	12	Non-fin	2–1
23	Joost denkt dat Piet heel erg hard kan lachen.	lachen	kunnen	MOD	9	10	Finite	1–2
24	Joost denkt dat Piet heel erg hard lachen kan.	lachen	kunnen	MOD	9	10	Finite	2–1
25	Paula zegt dat juf Lies een boek heeft gelezen.	lezen	hebben	AUX	9	12	Finite	1–2
26	Paula zegt dat juf Lies een boek gelezen heeft.	lezen	hebben	AUX	9	12	Finite	2–1
27	Paula zegt dat juf Lies een boek mag lezen.	lezen	mogen	MOD	9	11	Finite	1–2
28	Paula zegt dat juf Lies een boek lezen mag.	lezen	mogen	MOD	9	11	Finite	2–1
29	Juf Lies was blij een boek te mogen lezen.	lezen	mogen	MOD	9	11	Non-fin	1–2
30	Juf Lies was blij een boek lezen te mogen.	lezen	mogen	MOD	9	11	Non-fin	2–1
31	Mama vindt het leuk dat Roos heel braaf heeft gespeeld.	spelen	hebben	AUX	10	12	Finite	1–2
32	Mama vindt het leuk dat Roos heel braaf gespeeld heeft.	spelen	hebben	AUX	10	12	Finite	2–1

Bipartite Task A – all critical items								
#	Sentence	Lexical verb	Aux / Mod verb	Type	Words	Syll.	Finite-ness	Order
33	Roos vindt het leuk heel braaf te hebben gespeeld.	spelen	hebben	AUX	9	11	Non-fin	1–2
34	Roos vindt het leuk braaf gespeeld te hebben.	spelen	hebben	AUX	9	11	Non-fin	2–1
35	Roos vindt het leuk heel braaf te kunnen spelen.	spelen	kunnen	MOD	9	11	Non-fin	1–2
36	Roos vindt het leuk heel braaf spelen te kunnen.	spelen	kunnen	MOD	9	11	Non-fin	2–1
37	Henk zegt dat Jan de beer iets heeft verteld.	vertellen	hebben	AUX	9	10	Finite	1–2
38	Henk zegt dat Jan de beer iets verteld heeft.	vertellen	hebben	AUX	9	10	Finite	2–1
39	Jan vond het leuk de beer iets te hebben verteld.	vertellen	hebben	AUX	10	12	Non-fin	1–2
40	Jan vond het leuk de beer iets verteld te hebben.	vertellen	hebben	AUX	10	12	Non-fin	2–1
41	Henk zegt dat Jan de beer iets kan vertellen.	vertellen	kunnen	MOD	9	11	Finite	1–2
42	Henk zegt dat Jan de beer iets vertellen kan.	vertellen	kunnen	MOD	9	11	Finite	2–1
43	Jan zegt dat Tim heel erg goed heeft gezwommen.	zwemmen	hebben	AUX	9	11	Finite	1–2
44	Jan zegt dat Tim heel erg goed gezwommen heeft.	zwemmen	hebben	AUX	9	11	Finite	2–1
45	Tim is blij heel erg goed te hebben gezwommen.	zwemmen	hebben	AUX	9	12	Non-fin	1–2
46	Tim is blij heel erg goed gezwommen te hebben.	zwemmen	hebben	AUX	9	12	Non-fin	2–1
47	Tim is blij heel erg goed te kunnen zwemmen.	zwemmen	kunnen	MOD	9	11	Non-fin	1–2
48	Tim is blij heel erg goed zwemmen te kunnen.	zwemmen	kunnen	MOD	9	11	Non-fin	2–1

Bipartite Task B – all critical items							
#	Sentence	Lexical verb	Aux/Mod verb	Type	Words	Syll.	Order
1	Oma zegt dat mama door het bos is gefietst.	fietsen	zijn	AUX	9	12	1–2
2	Oma zegt dat mama door het bos gefietst is.	fietsen	zijn	AUX	9	12	2–1
3	Oma zegt dat mama door het bos gaat fietsen.	fietsen	gaan	MOD	9	12	1–2
4	Oma zegt dat mama door het bos fietsen gaat.	fietsen	gaan	MOD	9	12	2–1
5	Oma zegt dat mama door het bos kan fietsen.	fietsen	kunnen	MOD	9	12	1–2
6	Oma zegt dat mama door het bos fietsen kan.	fietsen	kunnen	MOD	9	12	2–1
7	Oma zegt dat mama door het bos moet fietsen.	fietsen	moeten	MOD	9	12	1–2
8	Oma zegt dat mama door het bos fietsen moet.	fietsen	moeten	MOD	9	12	2–1
9	Mama zegt dat papa snel naar boven is geklommen.	klimmen	zijn	AUX	9	14	1–2
10	Mama zegt dat papa snel naar boven geklommen is.	klimmen	zijn	AUX	9	14	2–1
11	Mama zegt dat papa snel naar boven gaat klimmen.	klimmen	gaan	MOD	9	13	1–2
12	Mama zegt dat papa snel naar boven klimmen gaat.	klimmen	gaan	MOD	9	13	2–1
13	Mama zegt dat papa snel naar boven kan klimmen.	klimmen	kunnen	MOD	9	13	1–2
14	Mama zegt dat papa snel naar boven klimmen kan.	klimmen	kunnen	MOD	9	13	2–1
15	Mama zegt dat papa snel naar boven moet klimmen.	klimmen	moeten	MOD	9	13	1–2
16	Mama zegt dat papa snel naar boven klimmen moet.	klimmen	moeten	MOD	9	13	2–1
17	Papa zegt dat opa snel naar huis is gelopen.	lopen	zijn	AUX	9	13	1–2
18	Papa zegt dat opa snel naar huis gelopen is.	lopen	zijn	AUX	9	13	2–1
19	Papa zegt dat opa snel naar huis gaat lopen.	lopen	gaan	MOD	9	12	1–2

Bipartite Task B – all critical items							
#	Sentence	Lexical verb	Aux/Mod verb	Type	Words	Syll.	Order
20	Papa zegt dat opa snel naar huis lopen gaat.	lopen	gaan	MOD	9	12	2–1
21	Papa zegt dat opa snel naar huis kan lopen.	lopen	kunnen	MOD	9	12	1–2
22	Papa zegt dat opa snel naar huis lopen kan.	lopen	kunnen	MOD	9	12	2–1
23	Papa zegt dat opa snel naar huis moet lopen.	lopen	moeten	MOD	9	12	1–2
24	Papa zegt dat opa snel naar huis lopen moet.	lopen	moeten	MOD	9	12	2–1
25	Papa zegt dat de hond over de brug is gerend.	rennen	zijn	AUX	10	13	1–2
26	Papa zegt dat de hond over de brug gerend is.	rennen	zijn	AUX	10	13	2–1
27	Papa zegt dat de hond over de brug gaat rennen.	rennen	gaan	MOD	10	13	1–2
28	Papa zegt dat de hond over de brug rennen gaat.	rennen	gaan	MOD	10	13	2–1
29	Papa zegt dat de hond over de brug kan rennen.	rennen	kunnen	MOD	10	13	1–2
30	Papa zegt dat de hond over de brug rennen kan.	rennen	kunnen	MOD	10	13	2–1
31	Papa zegt dat de hond over de brug moet rennen.	rennen	moeten	MOD	10	13	1–2
32	Papa zegt dat de hond over de brug rennen moet.	rennen	moeten	MOD	10	13	2–1
33	Opa zegt dat papa over de stoep is gereden.	rijden	zijn	AUX	9	14	1–2
34	Opa zegt dat papa over de stoep gereden is.	rijden	zijn	AUX	9	14	2–1
35	Opa zegt dat papa over de stoep gaat rijden.	rijden	gaan	MOD	9	13	1–2
36	Opa zegt dat papa over de stoep rijden gaat.	rijden	gaan	MOD	9	13	2–1
37	Opa zegt dat papa over de stoep kan rijden.	rijden	kunnen	MOD	9	13	1–2
38	Opa zegt dat papa over de stoep rijden kan.	rijden	kunnen	MOD	9	13	2–1

Bipartite Task B – all critical items							
#	Sentence	Lexical verb	Aux/Mod verb	Type	Words	Syll.	Order
39	Opa zegt dat papa over de stoep moet rijden.	rijden	moeten	MOD	9	13	1–2
40	Opa zegt dat papa over de stoep rijden moet.	rijden	moeten	MOD	9	13	2–1
41	Oma zegt dat opa in de vijver is gesprongen.	spring-en	zijn	AUX	9	14	1–2
42	Oma zegt dat opa in de vijver gesprongen is.	spring-en	zijn	AUX	9	14	2–1
43	Oma zegt dat opa in de vijver gaat springen.	spring-en	gaan	MOD	9	13	1–2
44	Oma zegt dat opa in de vijver springen gaat.	spring-en	gaan	MOD	9	13	2–1
45	Oma zegt dat opa in de vijver kan springen.	spring-en	kunnen	MOD	9	13	1–2
46	Oma zegt dat opa in de vijver springen kan.	spring-en	kunnen	MOD	9	13	2–1
47	Oma zegt dat opa in de vijver moet springen.	spring-en	moeten	MOD	9	13	1–2
48	Oma zegt dat opa in de vijver springen moet.	spring-en	moeten	MOD	9	13	2–1
49	Mama zegt dat de appel uit de boom is gevallen.	vallen	zijn	AUX	10	14	1–2
50	Mama zegt dat de appel uit de boom gevallen is.	vallen	zijn	AUX	10	14	2–1
51	Mama zegt dat de appel uit de boom gaat vallen.	vallen	gaan	MOD	10	13	1–2
52	Mama zegt dat de appel uit de boom vallen gaat.	vallen	gaan	MOD	10	13	2–1
53	Mama zegt dat de appel uit de boom kan vallen.	vallen	kunnen	MOD	10	13	1–2
54	Mama zegt dat de appel uit de boom vallen kan.	vallen	kunnen	MOD	10	13	2–1
55	Mama zegt dat de appel uit de boom moet vallen.	vallen	moeten	MOD	10	13	1–2
56	Mama zegt dat de appel uit de boom vallen moet.	vallen	moeten	MOD	10	13	2–1
57	Oma zegt dat de heks naar huis is gevlogen.	vliegen	zijn	AUX	9	12	1–2

Bipartite Task B – all critical items							
#	Sentence	Lexical verb	Aux/Mod verb	Type	Words	Syll.	Order
58	Oma zegt dat de heks naar huis gevlogen is.	vliegen	zijn	AUX	9	12	2–1
59	Oma zegt dat de heks naar huis gaat vliegen.	vliegen	gaan	MOD	9	11	1–2
60	Oma zegt dat de heks naar huis vliegen gaat.	vliegen	gaan	MOD	9	11	2–1
61	Oma zegt dat de heks naar huis kan vliegen.	vliegen	kunnen	MOD	9	11	1–2
62	Oma zegt dat de heks naar huis vliegen kan.	vliegen	kunnen	MOD	9	11	2–1
63	Oma zegt dat de heks naar huis moet vliegen.	vliegen	moeten	MOD	9	11	1–2
64	Oma zegt dat de heks naar huis vliegen moet.	vliegen	moeten	MOD	9	11	2–1
65	Oma zegt dat papa naar de kant is gezwommen.	zwemmen	zijn	AUX	9	13	1–2
66	Oma zegt dat papa naar de kant gezwommen is.	zwemmen	zijn	AUX	9	13	2–1
67	Oma zegt dat papa naar de kant gaat zwemmen.	zwemmen	gaan	MOD	9	12	1–2
68	Oma zegt dat papa naar de kant zwemmen gaat.	zwemmen	gaan	MOD	9	12	2–1
69	Oma zegt dat papa naar de kant kan zwemmen.	zwemmen	kunnen	MOD	9	12	1–2
70	Oma zegt dat papa naar de kant zwemmen kan.	zwemmen	kunnen	MOD	9	12	2–1
71	Oma zegt dat papa naar de kant moet zwemmen.	zwemmen	moeten	MOD	9	12	1–2
72	Oma zegt dat papa naar de kant zwemmen moet.	zwemmen	moeten	MOD	9	12	2–1

Tripartite Task – all critical items			
#	Sentence	Lexical verb	Order
1	Opa denkt dat Els zijn bril moet hebben verstopt.	verstoppen	1–2–3
2	Opa denkt dat Els zijn bril moet verstopt hebben.	verstoppen	1–3–2
3	Opa denkt dat Els zijn bril hebben moet verstopt.	verstoppen	2–1–3
4	Opa denkt dat Els zijn bril hebben verstopt moet.	verstoppen	2–3–1
5	Opa denkt dat Els zijn bril verstopt moet hebben.	verstoppen	3–1–2
6	Opa denkt dat Els zijn bril verstopt hebben moet.	verstoppen	3–2–1
7	Loes denkt dat de beer taart moet hebben gegeten.	eten	1–2–3
8	Loes denkt dat de beer taart moet gegeten hebben.	eten	1–3–2
9	Loes denkt dat de beer taart hebben moet gegeten.	eten	2–1–3
10	Loes denkt dat de beer taart hebben gegeten moet.	eten	2–3–1
11	Loes denkt dat de beer taart gegeten moet hebben.	eten	3–1–2
12	Loes denkt dat de beer taart gegeten hebben moet.	eten	3–2–1
13	Juf weet dat Tim de schoolbel moet hebben gehoord.	horen	1–2–3
14	Juf weet dat Tim de schoolbel moet gehoord hebben.	horen	1–3–2
15	Juf weet dat Tim de schoolbel hebben moet gehoord.	horen	2–1–3
16	Juf weet dat Tim de schoolbel hebben gehoord moet.	horen	2–3–1
17	Juf weet dat Tim de schoolbel gehoord moet hebben.	horen	3–1–2
18	Juf weet dat Tim de schoolbel gehoord hebben moet.	horen	3–2–1
19	Jan zegt dat mama zijn tas moet hebben gepakt.	pakken	1–2–3
20	Jan zegt dat mama zijn tas moet gepakt hebben.	pakken	1–3–2
21	Jan zegt dat mama zijn tas hebben moet gepakt.	pakken	2–1–3
22	Jan zegt dat mama zijn tas hebben gepakt moet.	pakken	2–3–1
23	Jan zegt dat mama zijn tas gepakt moet hebben.	pakken	3–1–2
24	Jan zegt dat mama zijn tas gepakt hebben moet.	pakken	3–2–1