

Modal verbs in Dutch first language acquisition

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Abstract

Modal verbs are polysemous: they express epistemic and several non-epistemic meanings, differing in modal force (necessity versus possibility) and modal source (dynamic, deontic, and situational). In the acquisition of language, it has been claimed that dynamic modality (e.g., volition, ability) occurs before deontic (e.g., permission, obligation). However, this claim has not been supported by much (comprehension) data, nor has the role of modal force been studied. I conducted a truth-value-judgment task in which 67 Dutch speaking children and 18 adult controls assessed correct and incorrect interpretations of *moeten* ('must') and *kunnen* ('can') in different modal source and modal force conditions. The results show that the children performed non-adult-like in all conditions and that performance increases with age. Children have a more liberal interpretation of the modals, especially *moeten* ('must'): not only correct, but also incorrect meanings were accepted. *Kunnen* ('can'), too, was interpreted non-adult-like by the children, but in a more ambivalent way. The results also show an influence of modal force (in contrast to modal source): possibility is interpreted less adult-like than necessity. Preschoolers are thus still in the process of acquiring the differences between various non-epistemic meanings. I argue that *moeten* ('must') is 'semantically underspecified', merely indicating some general notion of modality. The development into a more restricted interpretation may be triggered by a changing sensitivity to the semantic nuances of modal verbs in the input. The more adult-like interpretation of necessity than possibility can be explained through developing cognitive abilities of children: possibility is cognitively more complex than necessity. This role of modal force has already been suggested to explain acquisitional differences in the domain of epistemic modality. However, the importance of modal force – in contrast to modal source – in the acquisition of non-epistemic modality has not been established before.

1. Introduction

Modal verbs are complex, as they have remarkable semantic, morphological, and syntactic characteristics compared to other verbs. A semantic characteristic of modal verbs is their polysemy: they express a variety of modal meanings, indicating different kinds of non-factuality. Therefore, one could expect that modals occur only rarely in early child language. Surprisingly however, children as young as 2 years old already use modal verbs frequently in their spontaneous speech (see e.g., Jonkers 2014). The question then arises with which meanings these modal verbs are used in child language. This paper investigates the interpretation of the modal verbs *moeten* ('must') and *kunnen* ('can') by Dutch children. In the following, I will present the categorization of modal meanings I used, and put forward some hypotheses about the acquisition of modal meanings. Then, the experiment will be explained, and the results will be discussed in the light of developing cognitive abilities.

2. Categorization of modal meanings

I distinguish between epistemic and non-epistemic modality (see, e.g., Palmer 2001; van der Auwera & Plungian 1998; and – with differences – Nuyts 2006). Further categorization is done by modal force, i.e., necessity versus possibility (see, e.g., Kratzer 1991; van der Auwera & Plungian 1998). Non-epistemic modality is subdivided by modal source, i.e., the origin of the modifying elements. Participant-internal modal source is called dynamic; participant-external modal source can either be deontic (the speaker or social/ethical norms as modal source) or situational (the modal source lies in the circumstances). This categorization of modal meanings is presented in Table 1.

		necessity	possibility
epistemic		certainty	probability
non-epistemic	dynamic	volition, intention	ability, capacity
	deontic	obligation	permission
	situational	requirement, inevitability	possibility, opportunity

Table 1: Categorization of modality used

In the examples (1)-(8), these modal meanings are illustrated for the modal verbs *moeten* ('must') and *kunnen* ('can'), immediately demonstrating the polysemy of modal verbs (see, e.g., Nuyts 2006; van der Auwera & Plungian 1998).

- (1) Miriam **kan** ziek zijn.
'Miriam may be ill.'
epistemic possibility: speaker is not certain about the truth
- (2) Mensen **kunnen** niet vliegen.
'People cannot fly.'
dynamic possibility: physical inability is internal to the participants
- (3) Dat **kan** weg.
'That can (go) away.'
deontic possibility: source of permission is external to the participant
- (4) Je **kan** dat hier zien.
'You can see it here.'
situational possibility: source of possibility lies in the circumstances
- (5) Bart **moet** gisteren aangekomen zijn.
'Bart must have arrived yesterday.'
epistemic necessity: speaker is certain about the truth of his statement
- (6) Ik **moet** ontbijten om de dag door te komen.
'I need to have breakfast in order to get through the day'
dynamic necessity: the need is internal to the participant
- (7) Jullie **moeten** zwijgen in de les.
'You have to be silent during class.'
deontic necessity: source of obligation is external to the participant
- (8) Het is laat, je **moet** je haasten om op tijd te zijn.
'It is late, you have to hurry to be in time.'
situational necessity: source of requirement lies in the circumstances

3. Acquisition of modality

A recurrent topic in the research on the acquisition of modality is the order in which modal meanings are acquired. The research mostly focuses on the later acquisition of epistemic modality than non-epistemic modality (Bassano 1996; Choi 2006; Hickmann & Bassano 2013; Papafragou 1998; Shatz & Wilcox 1991; Stephany 1986, 1993). However, as my study concentrates on the earliest – and hence non-epistemic – modal meanings, I will not discuss the specifics of the later acquisition of epistemic modality any further. Compared to the acquisition of epistemic modality, the acquisition of the different non-epistemic meanings

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has received less attention. There are studies that provide evidence that dynamic modality occurs before deontic modality. Stephany (1993) observes that modal verbs with a subject-internal source of modality (*will/can* in English, *wollen/können* in German) occur early and frequently, whereas modals with a subject-external source of modality such as *shall/should* and *müssen/sollen* appear later. Shatz and Wilcox (1991) conclude that the first modal meanings are mostly intention, volition, and ability and only later does the number of meanings expressed by the modal verbs increase. In sum, this research indicates that dynamic modal meanings come before deontic ones. An important remark is that the reported meanings are directly deduced from the appearance of specific modals: early appearance of *can* and *will* indicates early appearance of ability and volition and later appearance of *must* and *shall* indicates later appearance of permission and obligation (see, e.g., Adamzik 1985; Stephany 1986, 1993; Wells 1985). This suggested link between modal verbs and modal meanings might be too straightforward, however, as modal verbs express a variety of meanings. In the abovementioned literature, only the polysemy between epistemic and non-epistemic meanings has been problematized, neglecting the different non-epistemic meanings of a particular modal verb.

4. Methodology

In order to investigate the meanings of modal verbs in child language, a truth-value-judgment-task was conducted. The aim of the truth-value-judgment-task is to test which interpretations children accept for the modals. The procedure is as follows: first a meaning, embedded in a story, is presented and then a hand puppet utters a sentence about the story. The task for the children is to assess whether the sentence fits the story or not (see, e.g., Gordon 1996; Schmitt & Miller 2010). 67 Dutch speaking children between 3 years and 4 months and 6 years and 2 months (mean age 4 years and 10 months) participated in the experiment. 18 Dutch speaking adults were tested as a control group.

The experiment concentrated on *moeten* ('must') and *kunnen* ('can'), as these are the most frequent modals in early child language (see e.g., Jonkers 2014). Different modal meanings were tested, varying in modal source and modal force. Both adult-like and non-adult-like interpretations of *moeten* and *kunnen* were included. The tested mismatch meanings were both modal and non-modal. The mismatch modal meanings for each verb were the match modal meanings for the other verb, as *moeten* and *kunnen* are counterparts based on modal force. *Moeten* expresses necessity and *kunnen* possibility, so possibility meanings are incorrect for *moeten* and necessity meanings are incorrect for

kunnen. The mismatch non-modal meanings that were tested were ongoingness and future. Ongoingness in Dutch is normally expressed by the structure *aan het* + infinitive ('be V-ing'); near future by the auxiliary *gaan* + infinitive ('going to'). Both ongoingness and future are incorrect interpretations of *moeten* and *kunnen*. However, it should be noted that it was not always possible to test an incorrect meaning without inevitably implying a correct one. This was especially the case for *kunnen* ('can'), since a dynamic reading ('ability') is difficult to exclude. Due to this ability interpretation no mismatch non-modal meanings could be tested for *kunnen*. This leads to an imbalance in test items between *moeten* (20 items) and *kunnen* (15 items). Finally, in order to ensure that the incorrect and less frequent meanings were interpreted as intended, control items for these interpretations were included (8 items).

I presented the modal meanings in animated movies in which a short story was told (see, e.g., Schmitt & Miller 2010). In these introductory stories, no modals appeared. After the movie was shown, a hand puppet said what happened by uttering a sentence with a modal verb (or without, in the case of the control items). The children assessed whether the hand puppet gave the correct description of the movie or not. Movies were used twice (divided over two test sessions); once with a match sentence and once with a mismatch one. In Figure 1, two examples of movies are provided, with for each a match and a mismatch test sentence.

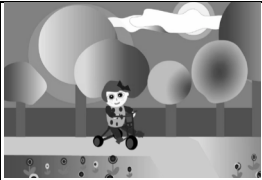

	<p>story: dynamic possibility <i>Dit is Emma. Ze heeft een fiets. Emma fietst in de tuin. Emma fietst heel goed!</i> ('This is Emma. She has a bike. Emma is riding the bike in the yard. Emma rides the bike very well!')</p> <p>match sentence: <i>Emma kan goed fietsen.</i> ('Emma can ride the bike very well.')</p> <p>mismatch sentence: <i>Emma moet goed fietsen.</i> ('Emma must ride the bike very well.')</p>
	<p>story: deontic possibility <i>Hier is Sven. Hij speelt buiten. Daar is de oma van Sven. Ze zegt: 'Kom maar binnen, als je zin hebt.'</i> ('Here is Sven. He is playing outside. There is Sven's grandmother. She says: 'Come inside, if you want to.')</p> <p>match sentence: <i>Sven kan naar binnen gaan.</i> ('Sven can go inside.')</p> <p>mismatch sentence: <i>Sven moet naar binnen gaan.</i> ('Sven must go inside.')</p>

Figure 1: 4 test items: 2 stories + for each 2 sentences (match and mismatch)

I calculated the mean performances for the conditions separately. As these percentages were distributed non-normally, I used non-parametric tests for the statistical analysis (see, e.g., Quené 2010). The difference between groups was calculated with the Mann-Whitney U test and the significance of the correlation between performance and age was assessed with Spearman's Rho rank correlation test. For the comparison of variables within groups, Friedman's test was conducted, followed by Wilcoxon post-hoc tests. However, in order to calculate the interaction of conditions and group performance, no suitable non-parametric alternative is available. Therefore, I used repeated measures ANOVA instead (with Greenhouse-Geisser correction). As the p-values are clearly beneath or above significance level, the results indicate clear tendencies, although they should be handled carefully.

5. Results

A first result is that children performed the truth-value-judgment-task differently than the adults. With a general performance of 70.6%, children clearly gave the expected response less often than adults did (94.4%). This difference in mean performance is statistically significant ($U = 39.0$, $z = -6.1$, $p < .001$, $r = -.66$). For the modal force/source/verb conditions separately, this difference was attested as well. Moreover, the mean performance of the children correlated with age ($Q = .62$, $p < .001$, illustrated in Figure 2); children perform more adult-like when they get older; or: the youngest children interpret the modals most non-adult-like.

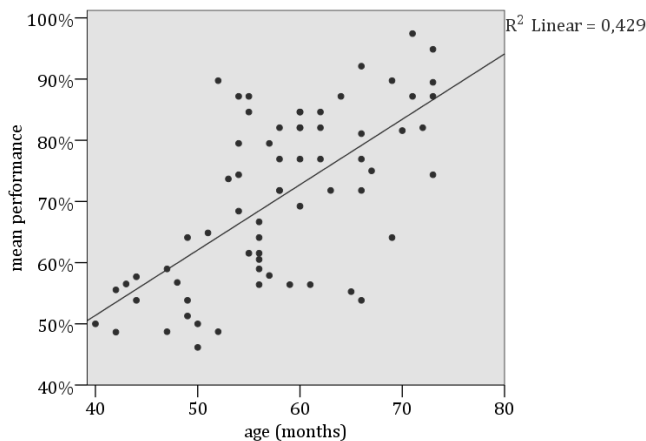


Figure 1: 4 test items: 2 stories + for each 2 sentences (match and mismatch)

The correlation of the mean performance and age indicates that children acquire the meanings of modal verbs during the tested age range. The non-epistemic modal meanings of *moeten* and *kunnen* thus seem to develop further between the age of 3 years and 4 months and 6 years and 2 months. This is somewhat unexpected since modal verbs are already frequent at the age of 3 (see e.g., Adamzik 1985; Jonkers 2014; Shatz & Wilcox 1991; Stephany 1993; Wells 1985). Consequently, at an age at which children already use modal verbs frequently in their spontaneous speech, they still interpret *moeten* and *kunnen* non-adult-like.

A second result concerns the child's interpretation of the modal verb *moeten*. I compared correct meanings (i.e., requirement and obligation, 6 items) to incorrect ones (i.e., ability, volition, permission, opportunity, near future, and ongoing, 14 items). Figure 3 shows that children accepted the incorrect meanings more often than adults and the correct meanings equally often. The interaction effect turned out to be statistically significant: $F(1, 83) = 25.88, p < .001$. Consequently, the difference between correct and incorrect meanings explains differences in performance between groups, in the sense that children accepted not only the correct but also the incorrect meanings of *moeten*. In other words: *moeten* has both adult-like and non-adult-like interpretations for children.

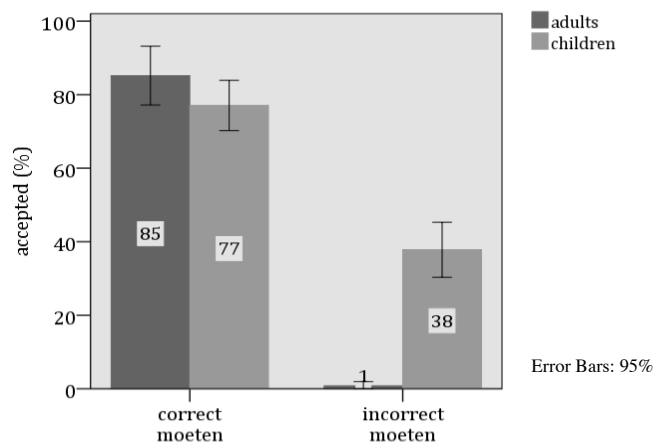


Figure 3: Correct and incorrect meanings of *moeten*, percentage of acceptance, differences between adults and children

For *kunnen*, I could not do a similar analysis, since the adults showed a lot of between-subject variation, thus making group comparison problematic. This

might be a consequence of the difficulty of constructing clear incorrect items for *kunnen* (due to the inevitability of the ability interpretation, see above).

Thirdly, I looked into the different modal sources: dynamic (i.e., ability and volition, 7 items), deontic (i.e., obligation and permission, 12 items), and situational modal source (i.e., requirement and opportunity, 9 items). As can be seen in Figure 4, children perform less target-like than the adults for all modal sources. Both groups performed better on the dynamic modality items than on the deontic and situational modality items. As both groups show the same response pattern, the interaction effect between modal source and group is not significant, $F(1.78, 145.63) = 0.5$, $p = .582$. So, although the items of dynamic modality in the truth-value-judgment-task were answered more adult-like than the items of deontic and situational modality, modal source could not explain the difference in performance between adults and children since both groups showed the same pattern. This is unexpected, as in the literature on the acquisition of modal verbs in child language, internal modal source (i.e., dynamic modality) has been reported to occur earlier than external modal source (i.e., deontic modality) (see, e.g., Adamzik 1985; Shatz & Wilcox 1991; Stephany 1986, 1993; Wells 1985).

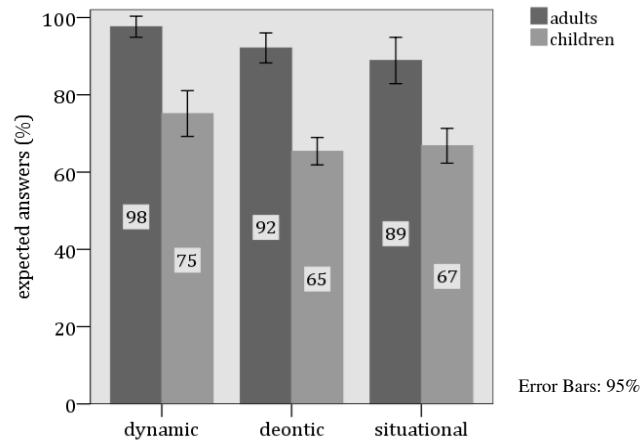


Figure 4: Percentage of expected answers on the modal source conditions, differences between adults and children

A last result is the role of modal force in the interpretation of modal meanings. I analyzed necessity (i.e., volition, obligation, and requirement, 11 items) versus possibility (i.e., ability, permission, and opportunity, 17 items). Children perform less target-like for both modal forces than the adults, see Figure 5. The difference

between adults and children in performance on the necessity items was smaller than on the possibility items, pointing towards an interaction between modal force and group. This interaction effect turned out to be statistically significant: $F(1, 83) = 18.27, p < .001$. So, it seems that modal force can explain differences in performance between groups, in the sense that children and adults perform more similarly on modal necessity than on modal possibility. This explanatory role of modal force is unexpected since it has – to my knowledge – not been reported in the literature on the acquisition of non-epistemic modality (see, e.g., Choi 2006; Shatz & Wilcox 1991; Stephany 1993).

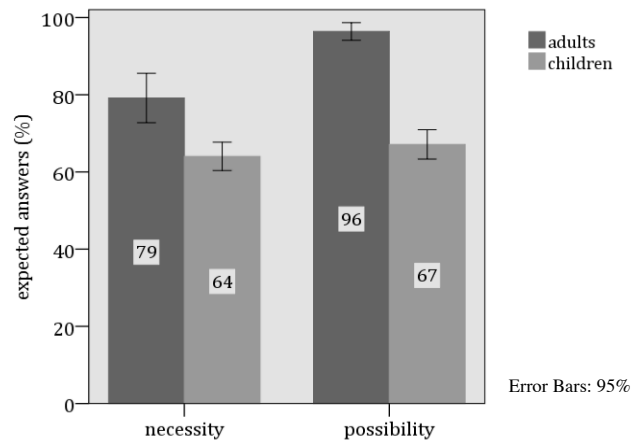


Figure 5: Percentage of expected answers on the modal force conditions, differences between adults and children

6. Discussion

A first conclusion of the truth-value-judgment-task is that children seem to have more interpretations for *moeten* than adults: not only the adult-like interpretations of *moeten* are accepted by the children, but also some non-adult-like interpretations are. Hence, children seem to be less restrictive in their interpretation of *moeten* than adults. This can be seen as an overgeneralization of the meanings of *moeten* in child language: children generalize the basic interpretation over more possible contexts than only the default and/or adult-like ones (suggested for the development of the lexicon by, e.g., Clark 1979; Fremgen & Fay 1989). This ‘too-general’ interpretation or ‘too broad’ meaning of *moeten* is possibly caused by its polysemy in adult language (see, e.g., Nuys

2006; Palmer 2001). Through the use of analogy-finding processes to deal with input variety (see, e.g., Goldberg 1995; Tomasello 2003), children construct a basic, general meaning that can account for all appearances of *moeten* in the input.

The question then is what exactly the (overgeneralized) meaning of modal verbs in child language is. It is possible that early modals are ‘semantically reduced’ (or even ‘empty’) (see, e.g., Adamzik 1985). I suggest that the general meanings of modal verbs possibly circle around their basic, default, semantic notions (see, e.g., Foolen & de Hoop 2009), without specific semantic, contextual, and pragmatic restrictions. For example, the modal verb *moeten* might be interpreted generally as ‘expressing necessity’, without differentiating between the different sources of necessity. In this way, all instances in which a necessity is implied can be expressed by *moeten*. Even in meanings of near future and ongoingness, a necessity might be implied, which explains why children accept these interpretations for *moeten*. However, children also accepted some possibility interpretations for *moeten*, which seems to argue against a general necessity interpretation, and might favor the idea that early *moeten* is semantically empty and hence can be used in a broad range of contexts. Based on this experiment, it is not possible to draw unambiguous conclusions about the interpretation of *kunnen*, but it deserves to be noted that this verb too is interpreted differently by children than by adults.

If modal verbs are overgeneralized over a broad range of contexts and interpreted by a general, basic, semantic notion, modal verbs can be seen as semantically underspecified (see, e.g., Clark 1979). Only some aspects are elaborated, but other aspects are not fully analyzed yet; or to use the terminology of Clark (1979): only a subset of semantic features is abstracted from the whole set of features that defines the meaning(s) of modal verbs. Later on, these semantically underspecified modal verbs in child language might receive more specificity in their meanings and come to exhibit adult-like aspects of modality, i.e., modal force and modal source (see, e.g., Choi 2006). Through increasing sensitivity to the semantic nuances of modal verbs in the input (see, e.g., Shatz & Wilcox 1991) and for the pragmatic conventions of modal verbs in caretaker-child interaction (see, e.g., Choi 2006), children come to understand the full polysemy of modal verbs.

A second conclusion of the truth-value-judgment-task is that children show a more adult-like understanding of necessity than of possibility. In order to explain this difference, I have to place this in the broader perspective of understanding both epistemic and non-epistemic modality. In the domain of epistemic modality, several cognitive explanations have been discussed: i.e., a developing ‘Theory of Mind’ (Papafragou 1998) and the interaction of different

cognitive constraints (Shatz & Wilcox 1990), which explain the later understanding of epistemic modality. In the non-epistemic domain, similar cognitive explanations have not been proposed explicitly. However, in order to account for the observed acquisitional difference between necessity and possibility in the truth-value-judgment task, I suggest that these cognitive abilities play a key role. This explanation relates to the accessibility of possible worlds which has been argued to be crucial to achieve correct modal interpretations (see, e.g., Kratzer 2012).

Understanding modality means understanding the difference between factual and – different kinds of – non-factual worlds (see, e.g., Choi 2006; Papafragou 1998; Shatz & Wilcox 1991). In order to understand necessity, children have to distinguish between the actual world on the one hand and a non-factual (needed, wanted or obliged) world on the other hand (see, e.g., Kratzer 2012). This necessary world is close to the present world, or at least directly related to it. In this respect, Papafragou (1998) puts forward an interesting idea to understand early uses of *must* (a necessity modal): at first, *must* is used as a pure “description of a normative regularity which holds in the actual, and not an ideal, world” (Papafragou 1998: 389). So, the necessary world falls together with the present world. Hence, necessity might be easily comprehensible for children, as it is directly connected to their own world. This argument of a more direct, and hence understandable, relation could account for the early appearance of volition (i.e., dynamic necessity). Although volition clearly implies the non-factuality of the situation, it is at first only connected to the child itself (in terms of egocentricity, see, e.g., Stephany 1993) and hence the wanted world is directly conceivable. In the case of an obligation (i.e., deontic necessity), the non-factual, obliged, world seems to be more ‘tangible’, as an obligation relates directly to a change in the actual world. So, the direct link to the actual world in case of necessity might make this notion easier to understand for children.

Conversely, for possibility, there seems to be a less direct connection to the actual world, which makes this notion more difficult. Understanding possibility means understanding the notion of ‘optionality’, i.e., the existence of more than one option (see, e.g., Kratzer 2012; Noveck, Ho & Sera 1996). In order to understand possibility, children have to distinguish between several worlds, which might be less conceivable. Moreover, a possibility does not necessarily imply a change in the actual world, and might be more ‘abstract’. Children have to be able to imagine other options that might be not directly related to the actual world (see, e.g., O’Neill & Atance 2000).

This acquisitional difference in modal force can be related to the acquisitional difference between certainty (related to necessity) and uncertainty (related to possibility), two central notions in the epistemic domain. Children are

said to understand and produce certainty before uncertainty (see, e.g., Bassano 1996; Hickmann & Bassano 2013; Moore, Pure & Furrow 1990; Noveck et al. 1996). The notion of uncertainty is said to be more difficult, as children have to “allow that assertions [can be left] open to question and consider non-actual references” (Bassano 1996: 104). Consequently, cognitive abilities not only account for the later acquisition of epistemic modality, but they also explain why necessity might be acquired earlier than possibility in the domain of non-epistemic modality.

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