

# Layers of Modality



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# Abstract

Much of the literature on modality focuses, at least implicitly, on the occurrence of single modal auxiliaries. However, cross-linguistically, modal auxiliaries can co-occur with one another, but under interesting restrictions. This thesis examines layered modal constructions and the semantic restrictions under which they combine. For instance, in languages such as Croatian, where double modal constructions are part of the standard, data shows that while some combinations are acceptable, others are not. Therefore, the aim of this thesis is to identify these semantic restrictions and to explain the rationale that motivates them.

To answer these questions, a systematic study of four possible combinations (epistemics embedding epistemics, epistemics embedding non-epistemics, non-epistemics embedding non-epistemics, and non-epistemics embedding epistemics) was carried out. The data shows that the first three groups are, in general, acceptable to native speakers, while the last one is not. Further to that, the data shows that within the non-epistemic + non-epistemic group there seem to be further restrictions. The result was a hierarchical analysis that is based on modal force and flavour. With respect to force, it is shown in Chapter 4 that necessity embeds possibility, crucially, only when two of the same flavour combine. In terms of flavour, the data shows that epistemics can embed non-epistemics, while in the non-epistemic group priority embeds the circumstantial group in which pure possibility embeds ability and disposition, respectively. This analysis carries some important implications for the traditional categorisation of modal flavours which is discussed in Chapter 4. Finally, in Chapter 5 I also discuss the possible rationale behind the hierarchy and the compositional nature of DMCs. It is concluded that the hierarchy should not be taken as a merely descriptive generalisation, but rather as an analysis that is predictable on the basis of the conceptual and logical reality of human language.

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# List of Abbreviations

$\forall$	. . . . .	universal quantifier/ necessity modal
$\exists$	. . . . .	existential quantifier/ possibility modal
<b>1</b>	. . . . .	1st person
<b>3</b>	. . . . .	3rd person
<b>ABIL</b>	. . . . .	ability flavour
<b>Adv</b>	. . . . .	adverbial/adverb
<b>AUX</b>	. . . . .	auxiliary
<b>B<sub>1</sub></b>	. . . . .	modal base of the first modal in a double modal construction
<b>B<sub>2</sub></b>	. . . . .	modal base of the second modal in a double modal construction
<b>BOUL</b>	. . . . .	bouletic flavour
<b>CIRCUM</b>	. . . . .	circumstantial flavour
<b>COND</b>	. . . . .	conditional
<b>CP</b>	. . . . .	complementizer phrase
<b>DBT</b>	. . . . .	deontic, bouletic, teleological
<b>DISPO</b>	. . . . .	disposition flavour
<b>DEONT</b>	. . . . .	deontic flavour
<b>DM</b>	. . . . .	double modal
<b>DMC</b>	. . . . .	double modal construction
<b>EPI</b>	. . . . .	epistemic flavour
<b>INF</b>	. . . . .	infinitive
<b>INFL</b>	. . . . .	inflection
<b>IP</b>	. . . . .	inflectional phrase
<b>LF</b>	. . . . .	logical form
<b>M<sub>1</sub></b>	. . . . .	first modal of a multiple modal construction
<b>M<sub>2</sub></b>	. . . . .	second modal of a multiple modal construction

<b>M<sub>3</sub></b>	. . . . .	third modal of a multiple modal construction
<b>MF1</b>	. . . . .	modal flavour
<b>MFr</b>	. . . . .	modal force
<b>MP</b>	. . . . .	modal phrase
<b>NON-EPI</b>	. . . . .	non-epistemic flavour
<b>NEG</b>	. . . . .	negation
<b>PL</b>	. . . . .	plural
<b>PolP</b>	. . . . .	polarity phrase
<b>PRES</b>	. . . . .	present tense
<b>PPOSS</b>	. . . . .	pure possibility flavour
<b>PRIOR</b>	. . . . .	priority flavour
<b>PTCP</b>	. . . . .	participle
<b>SMC</b>	. . . . .	single modal construction
<b>SG</b>	. . . . .	singular
<b>SpecIP</b>	. . . . .	the specifier position of the IP projection
<b>SpecVP</b>	. . . . .	the specifier position of the VP projection
<b>TELEO</b>	. . . . .	teleological flavour
<b>TMC</b>	. . . . .	triple modal construction
<b>T</b>	. . . . .	tense
<b>TP</b>	. . . . .	tense phrase
<b>VP</b>	. . . . .	verb phrase

# 1

## Introduction

### Contents

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<b>1.1</b>	<b>Layered modality . . . . .</b>	<b>1</b>
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### 1.1 Layered modality

The judgement that *John is studying* and *John might be studying* have different meanings is quite uncontroversial. Even to a naïve speaker, it is apparent that the former talks about a *real* event, something happening here and now (Hockett, 1960), while the latter speaks about the possibility of something happening, and is based on the knowledge or evidence we have.<sup>1</sup> The latter type of meaning can be conveyed by different modal expressions such as *must*, *should*, *may*, *could*, *can*, *ought to*, *have to*, *be able to*, *possibly*, *necessarily*. On a semantic level, modal

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<sup>1</sup>Note that when we talk about the real world (*John is studying*), our assumptions are still based on our knowledge or evidence; however, this evidence actually includes seeing John studying or knowing for a fact that John is studying (for instance, if you have spoken to John and he told you he is studying). The latter type of evidence/knowledge is not direct. It includes things like knowing that John studies everyday at 5pm and it is 5pm now, or knowing that John has an important exam tomorrow and therefore one can deduce he is studying.

elements can differ with respect to their modal force and their modal flavour. In other words, they can express either necessity or possibility, and a wide variety of flavours, such as epistemic (based on evidence), deontic (based on knowledge), circumstantial (based on circumstances).<sup>2</sup>

These expressions can be stacked on top of each other in sentences such as:

- (1) John **might possibly** be studying.
- (2) John **must necessarily** be studying.
- (3) John **might have to** be studying.
- (4) John **might be able to** be studying.

In examples (1) and (2) a modal auxiliary combines with a modal adverb, while in (3) and (4) a modal auxiliary is combined with a semi-modal verb.<sup>3</sup> These four examples show how different types of modality can combine. While examples (1) and (2) show how an adverbial modal can be combined with a verbal modal, examples (3) and (4) show how one type of verbal modality can embed another type of verbal modality. However, at least at first glance, the verbal-verbal combination seems to be possible only with a modal auxiliary embedding a semi-modal. If we were to replace the semi-modals *have to* and *be able to* with their modal auxiliary equivalents *must* and *can*, respectively, the structures no longer seem to be grammatical in standard English:

- (5) \*John **might must** be studying.
- (6) \*John **might can** be studying.

These two data points are certainly not new in the literature. While it is generally claimed that two modal auxiliaries cannot combine together in standard English and that a modal auxiliary can only embed a non-modal verb, it has been noted in the literature that double modal constructions (DMCs) are, in fact, possible

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<sup>2</sup>I will say more about these shortly.

<sup>3</sup>Terminology from von Stechow (2006).

in some non-standard dialects of Southern American English (Di Paolo, 1989; Battistella, 1995; Hasty, 2012a) as in (7):

- (7) I don't think I have any grants you **might could** apply for. (Di Paolo, 1989, p. 195)

They also appear in some non-standard Scottish English dialects (Bour, 2014, 2015) in the form of DMCs that are similar to the structure in (7), and even triple modal constructions (TMCs) as in (8):

- (8) One of our goals **might oughta should** be to encourage non-member involvement. (Bour, 2015, p. 60)

These structures are still highly stigmatised in English since they are considered to be a feature of certain non-standard dialects. For this reason, it is often hard to get grammaticality judgments on them from native speakers. Nevertheless, they have been a matter of interest for a wide variety of studies which have mainly studied this phenomenon from a sociolinguistic or syntactic perspective.

Cross-linguistically, however, English is an outlier, and yet the main body of research remains on DMCs and TMCs in English. Oddly, other languages seem to be fairly under-researched, even though DMCs are not rare, nor stigmatised, cross-linguistically, but rather quite standard, though some of the combinations available can be slightly pragmatically odd.

For instance, DMCs appear in Germanic languages such as Swedish, Icelandic, Danish, Dutch and German. Thráinsson & Vikner (1995) report the possibility of stacking modals in some Scandinavian languages, specifically Danish ((9)) and Icelandic ((10)):

- (9) Han **skal kune** svømme for at få jobbet.  
 he must can swim for to get job-the  
*He must be able to swim to get the job.* (Thráinsson & Vikner, 1995, p. 51)
- (10) Hann **kann að kunna** að synda.  
 he can to can to swim  
*He may know how to swim.* (Thráinsson & Vikner, 1995, p. 51)

Jędrzejowski & van de Vate (2013) present data from Dutch ((11)) and German ((12)):

- (11) Je **moet kunnen** luisteren.  
 you must can hear  
*One must be able to listen.*

(Wagenaar (2009, p. 126) in Jędrzejowski & van de Vate (2013))

- (12) Sie **müssen** skaten **können**.  
 they must skate can  
*They must be able to skate.* (Jędrzejowski & van de Vate, 2013, p. 4)

Apart from Germanic languages, they also appear in Romance languages such as Italian:

- (13) Con questo indizio, **dovresti poter** risolvere il  
 with this clue, should.∀DEONT can.∃CIRCUM solve the  
 problema.  
 problem  
*With this clue, you should be able to solve the problem.*<sup>4</sup>

- (14) **Potrei dover** lavorare anche sabato.  
 might.∃EPI must.∀DEONT work also Saturday  
*I may have to work on Saturday, too.*

Stacking of modals is also possible in some Slavic languages such as Bulgarian, Polish and Croatian. In Bulgarian we find DMCs such as in examples (15) and (16):

- (15) **Mozhe** da **moga** da go napravja.  
 may.∃EPI to can.∃CIRCUM to it do  
*I might be able to do it.*<sup>5</sup>

- (16) Az **trjabva** da **moga** da vdigam 10 kg.  
 I must.∀DEONT to can.∃CIRCUM to lift 10 kg  
*I must be able to lift 10 kg.*

The same modal combinations seem to be possible in Polish as well:

<sup>4</sup>Both Italian examples from Giulia Bovolenta, p.c.

<sup>5</sup>Both Bulgarian examples from Vesela Simeonova, p.c.

- (17) **Móglbys móc**                      coś                      zrobić.  
 might.∃EPI could.∃CIRCUM something do  
*You might be able to do something.*<sup>6</sup>
- (18) **Powinieneś móc**                      coś                      zrobić.  
 oughta.∀DEONT could.∃CIRCUM something do  
*You ought to be able to do something.*

Furthermore, it is not just Indo-European languages that use DMCs. Languages like Mandarin Chinese can also combine modal auxiliaries:

- (19) Yuehan **yinggai keyi**                      du  
 John    should.∀EPI can.∃CIRCUM read  
*John should be able to read.*<sup>7</sup>
- (20) Yuehan **bixu**                                      (yao) **hui**                      du  
 John    has to/must.∀DEONT need able.∃CIRCUM read  
*John should be able to read.*<sup>8</sup>

From just a very brief look at the phenomenon, one is able to see that modal auxiliaries in DMCs combine in different ways. For instance, in the example sets from (13) to (20), we can see that in some examples two non-epistemic auxiliaries combine, while in others an epistemic auxiliary embeds a non-epistemic auxiliary. In other words, it seems as if different types of modal auxiliaries can be combined to create different constructions. According to this data, one might predict that modal auxiliaries can combine with one another in an unrestricted way. In the following section, I show that this prediction, in fact, is not sustainable, and show why an alternative that predicts modal auxiliaries combine under certain restrictions is more appealing.

## 1.2 The double modal puzzle

Similarly to the data presented in the previous section, Croatian DMCs also occur often and without any dialectal markedness and in many different combinations.

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<sup>6</sup>Both Polish examples from Kinga Kozminska, p.c.

<sup>7</sup>Cong Zhang, p.c.

<sup>8</sup>Sherry Chen, p.c.



arises from this data is a global one — how do the two big groups of modals interact in DMCs and what are the restrictions on their combinations? This puzzle has been addressed in the literature with a prevailing view that non-epistemics cannot embed epistemics (Thráinsson & Vikner, 1995; Cormack & Smith, 2002; Butler, 2003; Nauze, 2008). Nevertheless, some questions still remain insufficiently explored, such as whether there are any ordering restrictions in combinations of non-epistemic modal auxiliaries and what the nature of these restrictions is.

In epistemic + non-epistemic combinations there are apparent structural reasons why this is the required ordering. On the other hand, while non-epistemic + non-epistemic combinations also have an ordering restriction, the structural differences between different flavours of non-epistemics are not as transparent. For example, the order in (23) is unacceptable but the opposite order is not, even though there are no apparent structural differences.

- (23) #Djeca **smiju** **morati** puno se igrati.  
 kids may.PRES.3PL.∃DEONT must.INF.∇DEONT a lot self play.INF  
*It is allowed for the kids to have to play a lot.*

Moreover, some circumstantial possibility modals are able to embed other circumstantial necessity modals, but not vice versa, such as in (24) and (25):

- (24) Context: A group is going bird watching. Their leader tells everyone not to make a sound when they get close to a bird. Someone says:

Alergičari **mogu** **trebati**  
 allergy-sufferers can.PRES.3PL.∃CIRCUM ought.INF.∇CIRCUM  
 kihnuti.  
 sneeze.INF  
*It is possible that the allergy sufferers will need to sneeze.*

- (25) #Alergičari **trebaju** **moći** kihnuti.  
 allergy-sufferers ought.PRES.3PL.∇CIRCUM can.INF.∃CIRCUM sneeze.INF  
*Allergy sufferers need to be able to sneeze.*

In the case of epistemic + non-epistemic combinations there are apparent structural restrictions that block the opposite order. However, in the case of non-epistemic +

non-epistemic combinations that type of restriction does not exist, and yet there still seems to be an ordering restriction. This raises an interesting question: why is word order important for what should be a simple conjunction semantics in DMCs?

We already know that modal auxiliaries can express either necessity or possibility, which is what the literature calls modal force, and can be based on evidence, rules, circumstances etc., which is what is usually called modal flavour. Based on these assumptions, some of the most important puzzles that arise here include questions such as whether the differences in modal force and flavour influence the acceptability of DMC orderings, is there a certain hierarchy according to which modal auxiliaries of certain flavour and force embed other modal auxiliaries of certain flavour and force, and finally, what are the relevant flavours and forces that influence these orderings?

Establishing what these restrictions are is necessary, but certainly not enough. Knowing what restrictions modal auxiliaries need to follow when combining does not tell us a great deal, at least from a compositional perspective, about how they actually combine. Additionally, knowing what the restrictions are tells us nothing about why these restrictions need to be as they are. In other words, once it is established what the restrictions are, it needs to be established what the compositional principles are that the modal auxiliaries follow when they combine. In addition to that, it is also necessary to explore possible conceptual and logical principles these restrictions are based on.

To summarise, the research questions I aim to answer in this thesis are:

- What are the compositional principles involved in layered modal constructions?
- What are the structural restrictions on combinations of modal auxiliaries?
- What is the semantic rationale behind these restrictions?

### **1.3 Contribution to the field**

The question of a possible modal hierarchy has been of interest to many linguists and numerous proposals have already been made in previous research. For example, Cinque (1999) suggests the following hierarchy of modal flavours:

- (26)  $\text{Mod}_{epistemic} > \text{Mod}_{necessity} > \text{Mod}_{possibility} > \text{Mod}_{volition} > \text{Mod}_{obligation} > \text{Mod}_{ability}$  (Cinque, 1999, p. 78)

while Nauze (2008) suggests that this is the right order:

- (27)  $\text{epistemic} > \text{participant-external} > \text{participant-internal}$  (Nauze, 2008, p. 20)

On the other hand, some other approaches talk about a force hierarchy, such as Cormack & Smith (2002) and Butler (2003), who suggest that necessity needs to scope over possibility:

- (28)  $\forall > \exists$

Nevertheless, while the modal hierarchy puzzle is certainly not a new one, there has not yet been an account that tries to provide answers based on combinations of modal auxiliaries. There have been several crucial missing pieces in the previous analyses. First of all, the majority of studies dealing with this puzzle have only looked at epistemic + non-epistemic combinations in English from a syntactic perspective (Battistella, 1995; Thráinsson & Vikner, 1995; Elsmann & Dubinsky, 2009; Hasty, 2012a), exploring just a very small part of this puzzle and not accounting for the wide variety of non-epistemic combinations that are available not only in different languages cross-linguistically, but in English as well. Second, since most of the previous accounts deal with English, most of them focus on combinations of modal auxiliaries and modal adverbs, instead of combinations of modal auxiliaries. This might be problematic due to other considerations that need to be taken into account, that is, that these are different modal elements and that they usually enter into a modal concord relationship, or more explicitly, that the modal concord relationship might be different from a modal combination relationship. Studies such as Nauze (2008), for instance, do not use English data but also do not focus on DMCs and rather on combinations of different modal elements. Third, since most of these accounts have dealt with English, there has never been a systematic data set that looked at different combinations of modal flavours, since this is certainly something that is difficult to elicit in a language whose standard variant does not allow DMCs.

Finally, none of these accounts attempt to say anything about how meanings of modal auxiliaries combine in DMCs.<sup>9</sup>

I plan to address several of these issues. First of all, I will look systematically at possible force and flavour combinations in non-epistemic DMCs and identify semantic restrictions not only in epistemic + non-epistemic combinations but also in non-epistemic + non-epistemic combinations. While this puzzle has previously been identified by Thráinsson & Vikner (1995), Nauze (2008) and Jędrzejowski & van de Vate (2013), there seems to be no proposal that answers it in full. Furthermore, my proposal is focused on combinations of fully-fledged modal auxiliaries.<sup>10</sup> These are advantageous for a couple of reasons. Since these belong to the same syntactosemantic class it is easier to do a systematic study of possible combinations. Due to their differences, in combinations of modal adverbs and modal auxiliaries there might be restrictions at play other than semantic ones. Moreover, adverbs are said to behave as modifiers, while auxiliaries add their own meaning in a more direct manner. This might be the reason why auxiliary + adverb combinations have a different relationship from auxiliary + auxiliary. Thus, using modal auxiliary combinations can help us make sure there is no interference from other restrictions that are difficult to control for.

Another advantage of looking at fully-fledged modal auxiliaries in languages where DMCs are standard constructions is that the process of getting acceptability judgements is a lot more clear-cut, since this is not something that is specific to a dialect and therefore there is less variation and prescriptive interference.

Looking at these structures systematically also allows us to explore the compositional nature of this phenomenon. In other words, one of the aims of this thesis is to pin down how exactly the compositional pieces of modality combine within DMCs, that is, how the modal force and flavour influence these combinations but also how they come together, creating a compositional meaning.

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<sup>9</sup>One modal concord study hints in a footnote that the manner in which they combine is cumulative (Geurts & Huitink, 2006), but the proposal does not go beyond this footnote.

<sup>10</sup>What it means to be a fully-fledged modal auxiliary will be discussed in Section 2.4.

And last but not least, through the study of DMCs, I also intend to look into the role modal force and flavour play in modal meaning. The question of a categorisation of modal flavours has been an important one in the literature, and there are many different proposals. Modal flavours tend to be identified in a more intuitive manner. However, it must be noted that what one intuitively understands about meanings might be different from what is actually grammatically encoded. Therefore, I will explore this puzzle by looking into the manner in which modal flavour affects combinations of modal auxiliaries. For instance, I will be concerned with whether some modal flavours play a more prominent grammatical role than others and how that is reflected in the grammatical restrictions these impose on DMCs. This will be discussed in terms of which modal flavours play a grammatical role and which do not. Further to this, DMCs will illuminate the relationship between forces too. The issues that I will address are: do modal force and flavour impose restrictions on DMCs independently and what kind of role does their relationship play in DMCs? These questions have not previously been addressed in full in the literature.

## 1.4 Methodological note

Due to the complexity of the data, I wish to make a methodological note before starting this thesis. Most of the data presented in this thesis comes from either Croatian or English, with some examples drawn from other languages. The Croatian data will in most cases be presented in the following form: context + Croatian sentence + glossed sentence + translation (Tonhauser & Matthewson, 2015).<sup>11</sup> Unacceptable items will be presented without contexts and often without translations, since they are semantically unavailable. Sometimes extra contextual information is added to the unacceptable sentence with an aim to help the reader to interpret the intended reading (for instance, *according to mother's wishes* for a bouletic reading). All the examples are glossed with their force and flavour. Since standard English does not have DMCs, there is a possibility that some of the translations might sound slightly unnatural. However, the glossed force and

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<sup>11</sup>When examples are repeated the context might be left out.

flavour in combination with the context should help in making the examples more transparent. Examples from other languages in the introductory chapter have been coded for flavour and force; however, there will be no contexts presented since they only serve to show the bigger picture. Examples from other papers are presented as they appear in the original work. If an example is from a corpus or an online source, this is noted in a footnote.

The Croatian examples were constructed according to possible combinations and for most of the examples their acceptability was judged based on my own native speaker judgements, while some of the more pragmatically odd ones were discussed with other native speakers as well. Some of the examples were constructed based on corpus examples and then simplified for the ease of presentation, while some were constructed by me, together with the contexts. This was done in this manner since this was the only way to target all possible combinations, which are identified in tables 3.2, 3.3, 3.4, 3.5 and 3.6, with appropriate contexts that are targeting specific propositions for different modal flavours and forces. For constructed examples this process included:

- Step 1: Identifying what the possible combinations are for any given two modal auxiliaries.
- Step 2: Identifying the appropriate context that targets the modal force and flavour that were determined in Step 1.
- Step 3: If it is impossible to determine the appropriate context for a certain combination so the structure is interpretable, then the example was judged unacceptable. If the example fits the context and is interpretable, the example was judged acceptable.
- Step 4: If the acceptability judgements were subtle, other native speakers ( $n < 5$ ) were asked to confirm the judgement.

It has to be noted that some of these structures seem to be more frequent and more natural, while some are less frequent mainly due to their pragmatic oddness. It

is necessary to emphasise that it is not my intention in this thesis to differentiate between examples that are semantically acceptable vs. pragmatically acceptable. For the purpose of this thesis, I will only be interested in examples that are semantically acceptable vs. unacceptable. This means that even though something might not appear in a corpus, that does not mean that it is not a grammatically acceptable and interpretable structure (as long there is a possible context in which it could be acceptable). Obviously, pragmatic considerations sometimes exclude these types of contexts, which is why I will not be concerned with the pragmatics of DMCs. In other words, this means that absence of an example in the corpus does not mean a great deal. It might be due to pragmatic interference, the grammar's inability to generate it or some other reason.

This takes us to the question of constructed examples and contexts. It might be claimed that, in order to provide a full analysis of DMCs, one needs to use corpora to see which combinations appear and which do not. This type of approach also reduces variation in acceptability judgements that native speakers might have and can be helpful in a more quantitative approach to the data. On the other hand, there are some serious issues with this approach. First of all, modal auxiliaries are not tagged with their flavours. If they were, this would predetermine what the relevant flavours are. This is problematic since it presupposes a correct proposal of modal flavours, and as we will see in the next chapter, there are many different theories of modal flavours. Second, looking for possible combinations in a corpus only gives us possible combinations of modal auxiliaries; however, this is not enough in the case of modal flavour combinations. For instance, in Croatian, the only difference in flavour one can get by simply using corpora tools is the difference between epistemic and non-epistemic flavour, since they are structurally different. Identifying differences within the non-epistemic group is a completely different task. One needs to first use the corpus tools to find the possible combinations, and then identify the possible flavours based on the context. This is a challenging task. First of all, modal flavours are very subtle and therefore might be difficult to identify from a natural context. This goes entirely against the goal of using corpora, since

it leaves a lot of room for errors and misinterpretations that can occur due to subtleness of a natural corpus. Some of these questions have been addressed in work done by Rubinstein et al. (2013) who note that annotating modal expressions is a demanding task for a number of reasons such as differences in prototypical exemplars of the class, modal ambiguity etc. In recent years studies attempting to tackle this issue have included De Haan (2011); Baker et al. (2012); Ruppenhofer & Rehbein (2012); Hacquard & Wellwood (2012).

One of the biggest issues that arises here, and the one that would be the most problematic if one intended to use this approach for DMCs, is how to determine modal flavours in a corpus. Rubinstein et al. (2012) show that it can be very difficult to get agreement between annotators on which flavour the modal auxiliary is expressing. For instance, in a paragraph such as this one:

- (29) Many workers have contracts that require them to work in a European Union state different from their country of origin. If they are unfairly dismissed or otherwise have action taken against them they need to know which country it is that they **can** pursue their claim in. The latest ruling from the European Court of Justice on the issue suggests that it should be the state in which the employee has worked the longest. (Rubinstein et al., 2012, p. 3)

Rubinstein et al. (2012) show that 2 out of 5 expert annotators judge *can* to be deontic, 2 out of 5 to be circumstantial, and 1 out of 5 to be dynamic. Rubinstein (2017) also notes that even when annotators are semantically trained graduate students, their judgements vary when identifying modal flavours in naturally occurring corpus examples. This shows that it is very difficult to resolve which flavour a modal auxiliary conveys. Nevertheless, Rubinstein et al. (2013) suggest a schema for annotations of modal items. This process included two native speaker annotators who were trained and then had the opportunity to discuss the problematic cases with each other but also with a group of experts. After the training phase the annotators began work on the corpus. The annotators used 5

different features, i.e. modality type (coarse), modality type (fine), environmental polarity, propositional arguments, and source.

However, it is clear that a project of this scale is beyond of the limits of this thesis. First of all, it requires multiple experts working on a corpus, and second, it is not clear whether this process would be as reliable for DMCs since there is some flavour interference. In other words, in DMCs it is more difficult to make distinctions between modal flavours and propositions from the modal bases that they rely on since there are two modal elements. Therefore, using constructed contexts and examples, at least at this stage of research, offers a better chance for a systematic look at the DM phenomenon, since using tools such as the ones Rubinstein et al. (2013) are using is quite unexplored and novel. This is due to the fact that in a controlled context one is able to control the conversational backgrounds for both modal auxiliaries and then provide judgements while making sure that the targeted modal flavours are being conveyed. Having consistent contexts and conversational backgrounds also helps with comparing examples to each other.

Obviously, this type of approach strongly depends on acceptability judgments from one or a few native speakers. As Sprouse & Diogo (2012) note, there has been some doubt about this approach in the literature since at least the sixties (Hill, 1961) which has continued in recent years in the work of Edelman & Christiansen (2003), Ferreira (2005), Wasow & Arnold (2005) and Gibson & Fedorenko (2010). Contrary to these proposals, Sprouse & Diogo (2012) show that the difference between traditional methods, that is, acceptability judgements, and formal experimental methods is only 2%. This suggest that native speaker judgements can be considered a reliable method of collecting data. Furthermore, acceptability judgements replicate at a better rate than experimental methods since they are inexpensive and not difficult to elicit, which means that researchers can promptly replicate and identify data reliably in a manner that is unavailable from more complex methods such as corpora.

To summarise, this type of approach was chosen for several reasons. First of all, for some pragmatically odd structures, corpus work cannot help very much.

The limits of a corpus approach lie in pragmatic interference that might appear in natural language data, but also in the fact that the corpus does not necessarily show what the grammar can produce. In other words, I am interested here in semantic competence, rather than what is necessarily being performed, since frequency and naturalness are often motivated by extra-grammatical issues. These issues can be minimised by focusing on what is grammatically possible as part of linguistic competence, rather than on performance issues.

Finally, due to the complexity of identifying modal flavours consistently in a corpus, constructed contexts are easier to control since they exhibit controlled conversational backgrounds with specifically targeted modal flavours and forces. Furthermore, tagging modal flavours in a corpus presupposes a correct theory of modal flavours. By challenging the accepted theories of modal flavours, I will be directly challenging the flavours that corpus tagging assumes. In other words, rather than tagging modals in accordance with accepted theories, I focus on flavours that have grammatical consequences, and then form the theory based on these.

## **1.5 Outline of the thesis**

Chapter 2 of this thesis is a brief overview of one of the most prominent frameworks used for analysing modality, which is the Kratzerian approach (Kratzer, 1981, 1991, 2012). I first give a brief overview of the main principles, terminology and notions of the framework. This is followed by a review of the most important accounts and puzzles in the literature that deal with modal flavour and modal force. With respect to the former, I focus on defining modal flavour and some of the issues surrounding terminology, which varies from author to author. With respect to the latter, I focus on defining modal force and its cross-linguistic differences. I explore both of these notions since these are the most important semantic pieces that make up modal meanings and will prove to be important in defining the manner in which DMCs combine. Apart from reviewing the semantic pieces that make up modal meanings, I also explore some of the existing syntactic approaches to modality, mainly focusing on differences between epistemic and non-epistemic modal auxiliaries. This literature

is reviewed due to the fact that some of these notions will be important in the later discussion on combinations of epistemic and non-epistemic modal auxiliaries. Finally, I examine the different structures that are able to express modality and define what type of structure is considered a DM structure in this thesis.

Chapter 3 focuses on establishing the current state of the literature that focuses on DMCs as well as on providing data that is the basis of the theoretical assumptions in Chapters 4 and 5. Chapter 3 begins with an overview of one of the most cited papers on American English DMCs, Di Paolo (1989), which provides a lexical analysis of DMCs. After that I focus on a number of syntactic accounts, including Battistella (1995), Thráinsson & Vikner (1995), Close (2004), Elsmann & Dubinsky (2009) and Hasty (2012a). I point out that most of these accounts focus only on combinations of epistemic and non-epistemic modal auxiliaries, while at the same time not providing an analysis for combinations of non-epistemic and non-epistemic modals which seem to operate under certain semantic restrictions. I also explore two descriptive studies, Bour (2015) and Jędrzejowski & van de Vate (2013), who present data from Scottish English, and Dutch and German, respectively. Furthermore, I review two typological studies, Cinque (1999) and Nauze (2008), who propose modal hierarchies based on data that does not include combinations of modal auxiliaries but rather different modal structures, such as modal adverb and modal auxiliary combinations. Finally, I explore the literature on modal concord, a phenomenon in which modal meanings of a modal adverb and modal auxiliary result in a concord reading. While the modal concord literature is not directly connected to the DMC phenomenon, I will show that it is, indeed, important when analysing semantic restrictions in DMCs. While some of the Croatian data is referenced in the first part of Chapter 3, in the second part of Chapter 3 I bring an overview of the DM data that will be used to discuss the DM phenomenon and semantic restrictions that occur within DMCs. I first focus on non-epistemics embedding non-epistemics, that is, the modal auxiliaries *morati* ‘must’, *trebati* ‘should, ought to’, *smjeti* ‘may’ and *moći* ‘may, can’. I show that while, in general, these structures are structurally acceptable (unlike non-epistemic + epistemic constructions), there

seem to be some additional restrictions that block certain combinations. Second, I focus on epistemics embedding non-epistemics. These do not seem to have any specific restrictions and are, in general, acceptable. Third, I focus on epistemics embedding epistemics. These result in acceptable structures but are pragmatically rather restricted due to the nature of double epistemic meanings. Finally, the fourth possibility concerns structures in which non-epistemics embed epistemics. I show that these structures are grammatically unacceptable across the board. In summary, Chapter 3 establishes the empirical reality that demands a theoretical explanation; for instance, why are there asymmetrical restrictions in DMCs and why are they these particular restrictions rather than others?

Chapter 4 identifies, discusses and analyses the semantic restrictions that arise from the data presented in Chapter 3. This chapter begins with a preliminary analysis that focuses on the big picture, that is, what the composition of epistemic and non-epistemic modal auxiliaries needs to be in order to correctly predict the acceptability of structures in which epistemics embed epistemics, epistemics embed non-epistemics and non-epistemics embed non-epistemics, as well as the unacceptability of structures in which non-epistemics embed epistemics. I propose two different compositional types for non-epistemics and epistemics, that is,  $\langle e, st \rangle$ ,  $\langle e, st \rangle \rangle$  and  $\langle st, st \rangle$ , respectively. After the preliminary analysis I focus on specific restrictions that occur in DMCs in which non-epistemics embed non-epistemics. I begin my analysis by identifying the generalisations and puzzles that arise from the Croatian data set. I first identify an anti-concord constraint that blocks all combinations in which modal force and flavour are the same. While establishing this constraint accounts for a substantial amount of the data, it still leaves some puzzles unanswered. To account for these data points I suggest that we need to view what is traditionally considered to be the circumstantial flavour as three separate grammatical flavours, while what are usually considered to be deontic, bouletic and teleological flavours ought to be considered one grammatical flavour, i.e. the priority flavour. To account for the acceptability and unacceptability of different data points, I propose that a final modal ordering is as follows:

(30) epistemic > priority > pure possibility > ability > disposition

Furthermore, I also propose that modal flavour is not the only modal piece that influences the ordering within DMCs. Based on the Croatian data, I propose that within the same flavour, the order of forces is necessity > possibility. Finally, I discuss the structure of the modal head and what might be implied by the fact that modal force and flavour play such an important role.

Chapter 5 explores the conceptual rationale behind the modal hierarchy proposed in Chapter 4 as well as the compositional nature of DMCs. The first part of the chapter digs deeper into the modal hierarchy by suggesting a possible rationale for the proposed ordering. Within this discussion I first propose a subset relationship for the ordering within the circumstantial group of modals that is based on propositions that are expected to be in the modal bases of these flavours. Second, I talk about the ordering restrictions between the priority flavour and the three circumstantial flavours, concluding that rules need to scope higher than circumstances based on the conceptual necessity that ordering sources need to scope over modal bases. I also talk about why epistemics scope over non-epistemics and why this must be based not only on structural assumptions but also on semantic considerations, such as the fact that one can only judge propositions, and not events/situations. Finally, I suggest that necessity needs to scope over possibility due to a logical problem, i.e. since a possibility modal in the initial position quantifies over only some of the possible worlds, this creates an issue for the second modal's universal quantification since it is given both the worlds for *p* and *not p*. For instance, in the case of *may must* where both of the modals are non-epistemic, the first modal *may* quantifies over only some of the possible worlds. This gives worlds in which both *may p* and *may not p* are true, which is problematic since there is an issue if *must*, an universal quantifier, quantifies over *may not p* instead of *may p*.

The second part of this chapter deals with compositional issues in combining modal auxiliaries in DMCs. I discuss two possibilities for DMCs: the subset hypothesis and the intersection hypothesis. I suggest that the principle according to which DMCs combine needs to be intersective since a subsective analysis would

suggest that all the same propositions that matter for the first modal need to matter for the second modal as well, which is a problem for DMCs since their meaning is not subsective, but rather cumulative. At the end of this section, I briefly go back to the internal structure of the modal head and discuss whether in DMCs of the same flavour there needs to be one or two modal bases. I conclude that based on the composition of DMCs, even when both modals are of the same flavour, there need to be two modal bases in the structure of the two modal heads.

# 2

## Modality: An Overview

### Contents

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### 2.1 Introduction

In this chapter I explore the theoretical framework I use throughout this thesis, which is the Kratzerian theory of modality (Kratzer, 1977, 1981, 1991, 2012). Starting with the central ideas behind Kratzer’s theory, I explore some of the main terminology and notions, such as modal quantification, modal base and ordering source, which are the main pieces that together form the modal meaning.

These issues are inseparably connected to modal force and flavour. In Sections 2.2.2 and 2.2.3 I say more about the state of the literature with respect to these two notions. Both modal force and flavour will remain important notions throughout

the thesis since I identify these modal pieces as having an important influence on semantic restrictions in DMCs. In Section 2.2.2 I especially focus on some of the likely candidates for modal flavours that are identified in the literature and explain the inconsistency in the modal flavour categorisations across the literature. In Section 2.2.3 I show that while there is no disagreement in the literature on identification and categorisations of modal forces, there are still some interesting puzzles and ideas concerning modal force. Even though there is much disagreement in the literature on different modal notions, there seems to be a consensus on the idea that modality includes both force and flavour. This idea comes from Kratzer's framework.

I also examine previous work on the syntax of modal constructions since the syntactic structure of modals also plays an important role in DMCs. For instance, one of the most important syntactic puzzles in the literature with respect to modal auxiliaries is certainly the syntactic difference between epistemic and non-epistemic modal auxiliaries. I discuss two opposing proposals. On one hand, some proposals argue for a unified account in which all modal auxiliaries are structurally the same. The best-known account advocating for such an analysis comes from Kratzer (1981, 1991, 2012), but there are other authors that suggest a similar approach (Bhatt, 1998; Wurmbrand, 1999; von Stechow & Heim, 2002). On the other hand, other accounts suggest that epistemics need to scope higher than non-epistemics and therefore have a different structure (Ross, 1969; Kiparsky, 1970; Perlmutter, 1970; Brennan, 1993; Thráinsson & Vikner, 1995; Butler, 2003). These issues will prove to be crucial when we discuss combinations of epistemic and non-epistemic modal auxiliaries in DMCs.

Finally, based on the syntax and semantics of modal auxiliaries, I explore the issue of what it means to be a DMC from both a syntactic and a semantic point of view. I will show that layered modality comes in different forms, for instance, in structures such as *might be able to*, but I will claim that these structures cannot be fruitful for exploring semantic restrictions in the same way as true DMCs (combinations of two auxiliaries) since their syntactic categories differ. I argue that it is most reasonable to use the so-called fully-fledged modal auxiliaries

when exploring restrictions on DMCs due to the fact that they make up an easily definable syntactic and semantic class of auxiliaries.

## 2.2 The standard theory of modality

### 2.2.1 Main assumptions

When talking about modality, one is practically obliged to start with what Portner (2009, p. 47) calls “the standard theory of modality”, which was developed by Kratzer over a series of papers (1977; 1981; 1991; 2012). Within the Kratzerian theory of modality, modal elements quantify either universally over all the possible worlds in which the relevant propositions are true, or existentially over a set of some possible worlds. For example, a modal auxiliary such as *must* quantifies over possible worlds universally, which makes it a necessity modal, while *may* quantifies over possible worlds existentially, which makes it a possibility modal. This difference in quantification is called *modal force*. For instance, these would be the lexical entries for *must* and *may* according to von Stechow & Heim (2002, p. 30):

$$(1) \quad [[\mathbf{must}]]^{w,g} = \lambda p_{s,t}. \forall w' : p(w')=1$$

$$(2) \quad [[\mathbf{may}]]^{w,g} = \lambda p_{s,t}. \exists w' : p(w')=1$$

The practical difference in force is best seen in examples such as these:

(3) \*You **must** do your homework and you **must** not do your homework.

(4) \*You **ought to** do your homework and you **ought not** to do your homework.

(5) You **may** do your homework and you **may** not do your homework.

In case of necessity modals *must* and *ought to* ((3) and (4)), the ‘*p* and *not p*’ construction is unacceptable due to the fact that both of these are universal quantifiers. In case of *may* ((5)), the example is acceptable due to the fact that *may* is an existential quantifier, and therefore it is possible for one to may do one’s homework and may not do one’s homework.

Also, it is often claimed that differences in degree of force exist between modal auxiliaries of the same force. For example, *must* is often said to be a strong necessity modal, while *ought* and *should* are called weak necessity modals. In other words, though the type of quantification is the same, a difference in the degree of force exists.<sup>1</sup> However, the meaning of a modal element is not based merely on the type of its quantification. The final set of possible worlds over which the modal element is quantifying is the result of an interaction between a *modal base*, which takes into account relevant circumstances, and an *ordering source*, which ranks the worlds the base picks out to get an ordered set of possible worlds (Kratzer, 1981, 1991, 2012).<sup>2</sup> Modal bases and ordering sources are conversational backgrounds which are equivalents to *accessibility relations* on possible worlds in modal logic (Kaufmann et al., 2006). More specifically, modal bases are functions from possible worlds to sets of propositions and they consider relevant circumstances that hold in the actual world (Kratzer, 2012). Ordering sources are similar — they also map possible worlds to sets of propositions and order the worlds from the modal base from best to worst. This gives a set of the most favoured worlds (Kratzer, 1981, 1991, 2012). Example (6) shows how an ordering source works:

- (6) For all worlds  $w$  and  $z \in W$ :  $w \leq_A z$  iff  $\{ p: p \in A \text{ and } z \in p \} \subseteq \{ p: p \in A \text{ and } w \in p \}$  (Kratzer, 2012, p. 39)<sup>3</sup>

As Rubinstein (2012, p. 192) puts it:

“If we take  $g(w)$  to represent some kind of ideal in a world of evaluation  $w$  (how politicians should behave, what we would like to do over the weekend, etc.), we say that one possible world comes at least as close to the ideal as another just in case the set of propositions in  $g(w)$  that are true in the first world is a superset of the set of propositions in  $g(w)$  that are true in the second. If the superset is a proper superset, we say

<sup>1</sup>Take a look at the examples traditionally used to show the modal strength difference: \**You must do that, in fact, you ought to vs. You ought to do it, in fact, you must.* (Rubinstein, 2012; von Stechow & Iatridou, 2008)

<sup>2</sup>For a practical application of this, see examples (7) to (11).

<sup>3</sup>According to Kratzer (2012, p. 39), one is to read this as: “a world  $w$  is at least as close to an ideal or norm determined by a set of propositions  $A$  as a world  $z$  iff all propositions of  $A$  that are true in  $z$  are true in  $w$  as well.”

that the first world is better than the second according to the ordering source.”

The modal base and the ordering source are related to the idea, widely accepted in the field, that modal elements receive different types of interpretations, sometimes called *modal flavours* (von Stechow & Heim, 2002), depending on the context. In some languages lexical items are ambiguous as to their modal flavour.<sup>4</sup> This means that one lexical item can have different interpretations, as shown in von Stechow (2006, p. 2):

- *epistemic* (given what is known): *This **has to** be your wife.* [given what I know about you]
- *deontic* (what is possible/necessary given a body of rules):  
*You **have to** eat everything that’s on your plate.* [hospital rules]
- *bouletic* (given person’s desires): *You **have to** go to bed at 10 pm.* [a stern father]
- *teleological* (given a particular goal): *To be the best, you **have to** train hard.*
- *circumstantial* (given a particular set of circumstances): *I **have to** sneeze.* [given the current state of one’s nose]

This type of theory is said to be unifying, meaning that the only difference between different modals is the contextual information they pick up on, with no structural differences between the modal auxiliaries.

Different modal meanings arise from the interaction of the modal base and the ordering source (Kratzer, 2012). The ordering sources differ with respect to different modal flavours; for example, while the modal base gives the set of all (or some of) the possible worlds in which all the relevant propositions are true, the ordering source is either empty or non-empty. An empty ordering source is a circumstantial ordering source, where the possible worlds from the modal base are not ordered in any way since only circumstances matter. A non-empty ordering

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<sup>4</sup>Languages appear to lexicalise either modal force (as in English or German) or modal flavour (as in St’át’imcets’).

source can be deontic, teleological, bouletic or epistemic. For example, a deontic ordering source contains rules/regulations according to which the possible worlds from the modal base are ordered (Kratzer, 2012).

Therefore, taking all of the above into account, the widely-accepted lexical entry for a necessity modal auxiliary based on Kratzer’s work looks like this:

$$(7) \quad \llbracket \mathbf{must} \rrbracket^{c,f,g} = \lambda p_{s,t}. \lambda w_s. \forall w' \in \max_{g(w)}(\cap f(w)): p(w')=1$$

Example (7) shows that there are a number of pieces that make up the modal meaning, which might sound confusing at first. Therefore, let us take a look at how the theory above would work in practice in an example such as *John must stop at a red light* (Werkmann, 2014).

Let us say that the modal base and ordering source consist of the following relevant propositions:

$$(8) \quad f(w_{@}) = \begin{aligned} f_1 &= \{w \in W \mid \text{John is driving his car in } w.\} \\ f_2 &= \{w \in W \mid \text{John is in control of his vehicle in } w.\} \\ f_3 &= \{w \in W \mid \text{John is approaching a traffic light in } w.\} \\ f_4 &= \{w \in W \mid \text{There are pedestrians crossing the street in } w.\} \end{aligned}$$

$$(9) \quad g(w_{@}) = \begin{aligned} q_1 &= \{w \in W \mid \text{Cars stop at a red light in } w.\} \\ q_2 &= \{w \in W \mid \text{Drivers are careful in } w.\} \\ q_3 &= \{w \in W \mid \text{Cars pass inspections in } w.\} \\ q_4 &= \{w \in W \mid \text{Drivers do not harm pedestrians in } w.\} \end{aligned}$$

The modal base  $f(w_{@})$  contains propositions that are true in the actual world ( $w_{@}$ ), as well as in an infinite number of possible worlds. It gives an intersection of worlds in which all the relevant propositions are true. The possible worlds which are in the intersection of the propositions in  $f(w_{@})$  are accessible from  $w_{@}$  “in the relevant way” (Rubinstein, 2012, p. 15). This is reflected in (7). The ordering source  $g(w_{@})$  gives the maximally good worlds, which is in accordance with the formalism in (6). In simpler terms, “John must stop at the red light iff it is true that in all of the most favoured worlds, John stops at the red light” (Werkmann, 2014, p. 29).

Nevertheless, these different layers of modal meaning, namely modal force and flavour, that make up the basis of this theory still raise many different unsolved

questions, mainly due to the complexity and subtlety of modal structures cross-linguistically. In what follows I explore issues in modal force and flavour, as well as some of the syntactic issues connected to the study of modality in this framework.

### 2.2.2 Modal flavour

As briefly mentioned in the previous section, modal auxiliaries in English, and in most Indo-European languages, are often capable of conveying many different meanings in just one lexical item. The semi-auxiliary *have to* is a great example of polysemy of meanings. Other fully-fledged modal auxiliaries exhibit the same properties, for instance, *must* can be epistemic, as well as deontic, bouletic and teleological. On the other hand *might* can only be epistemic.

The most prominent modal flavour distinction is the one between epistemic and non-epistemic modals.<sup>5</sup> For example, in an English sentence such as *John must be a good man*, there are two possible interpretations. The epistemic one is based on evidence that John is a good person, for instance if I saw John helping a homeless person. The non-epistemic interpretation is based on some sort of a priority, for instance, a goal. This would be in accordance with, for instance, a context in which John must be a good man if he wants Jane to fall in love with him.

Jackendoff (1972) assumed that these two interpretations actually differ structurally. The epistemic structure corresponds to

(10) [must [John be in his room] ],

while the non-epistemic structure corresponds to

(11) [John must [be in his room] ]

Furthermore, von Stechow & Iatridou (2009, p. 6) also note that non-epistemic modal auxiliaries, such as deontics, actually “assert that the subject had a certain property, [...] the property of having a particular obligation”. On the other hand, epistemics function as propositional predicates, and “say nothing about the subject

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<sup>5</sup>Due to inconsistency in terminology for the root group of modals, I will refer to it as the non-epistemic group of modals throughout this thesis.

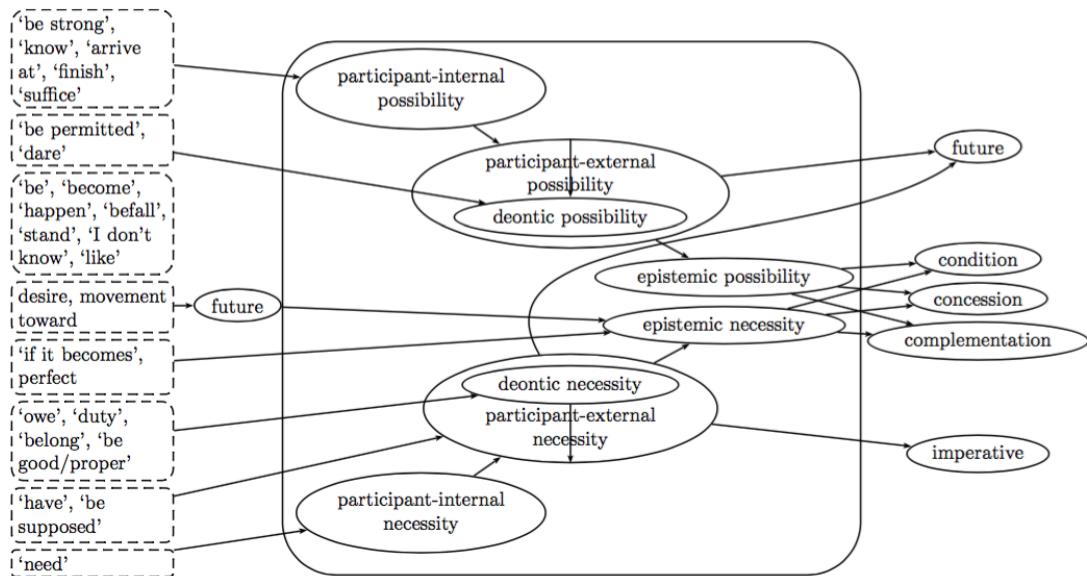
of any particular argument inside the clause”. This suggests that an epistemic modal scopes over a proposition, i.e. *John be in his room*, while a non-epistemic modal scopes over the verb phrase, i.e. *be in his room*. This idea is different from Kratzer’s unifying modal account and has been pursued further by many academics as discussed in Section 2.3.

While the distinction between these two groups seems to be a given, without any significant disagreement within the existing literature,<sup>6</sup> the distinctions among the flavours of the non-epistemic group of modals are messier across the literature. While most recent accounts make the distinction between at least three different groups of modals, some of the early work in semantics only focuses on epistemics and deontics (Lyons, 1977), which are also categories that the logic literature focuses on, as representatives of epistemic and non-epistemic modals. For Lyons (1977), these are two kinds of necessities conveyed in two different interpretations of *Alfred must be unmarried*. The epistemic paraphrase of this sentence is *I (confidently) infer that Alfred is unmarried*, and the deontic is *Alfred is obliged to be unmarried*.

While the earliest work offers a rather simplistic view of modal flavours, some of the later typological studies offer a slightly different picture. Van der Auwera & Plungian (1998) suggest that there are four basic domains of modality that involve either possibility or necessity within participant-internal, participant-external, deontic and epistemic modality, and map out possible interpretations of modals in a complex diagram (van der Auwera & Plungian, 1998, p. 98):

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<sup>6</sup>Note that while there is no disagreement on the fact that these are two separate groups of modals, there is disagreement on how their structure should be syntactically and semantically represented.



**Figure 2.1:** Van der Auwera and Plungian's semantic map of modality

To motivate the four proposed types of modality they use these examples (van der Auwera & Plungian, 1998, p. 80–81):

- (12) a. **Participant-internal:** Boris *can* get by with sleeping five hours a night.  
 b. **Participant-external:** To get to the station, you *can* take bus 66.  
 c. **Deontic:** John *may* leave now.  
 d. **Epistemic:** John *may* have arrived.

In exploring the subtypes of these four basic types of modality van der Auwera & Plungian (1998) use a variety of languages, such as Czech, Serbian/Croatian, Russian, Dutch, Spanish, Hungarian, Tinrin, German, Latin, Basque, Swedish.

The diagram in 2.1 shows that van der Auwera & Plungian (1998) make a distinction between participant-external and participant-internal possibility and necessity. Within these there are categories of deontic possibility and necessity as well as epistemic possibility and necessity. Participant-external necessity can be used to express imperative meanings, while both participant-external possibility and necessity can be used to express future meanings. Epistemic meanings are used

to express condition, concession and complementation, with epistemic necessity being conveyed in notions and words such as *desire*, *movement toward*, *if it becomes*, *perfect*. Participant-internal possibility is conveyed in words like *be strong*, *know*, *arrive at*, *finish*, *suffice*.<sup>7</sup> Deontic possibility is related to constructions such as *be permitted* and *dare*, while deontic necessity has to do with *owe*, *duty*, *belong*, *be good*, *have*, *be supposed*. Finally, participant-internal necessity has to do with verbs like *need*. It is important to note that most of the recent work on modal flavour does not seem to focus on the distinction between external and internal modality (von Prince et al., 2017).

Van der Auwera and Plungian’s work goes along similar lines to Bybee et al. (1994) who propose there are four types of modality: agent-oriented, speaker-oriented, epistemic and subordinating. For Bybee et al. (1994) agent-oriented modality includes notions such as obligation, necessity, ability, desire, intention, willingness. Speaker-oriented modality has to do with directives, that is, imperative, prohibitive, optative, hortative, admonitive and permissive constructions. The definition of epistemic modality is a traditional one — it “applies to assertions and indicates the extent to which speaker is committed to the truth of the proposition” (Bybee et al., 1994, p. 179). The final type is subordinating modality, which includes the same forms as speaker-oriented and epistemic modality, but in subordinate clauses, for instance:

(13) I suggested that he **should** call you immediately. (Bybee et al., 1994, p. 180)

(14) Although he **may** be a wise man, he has made some mistakes in the past. (Bybee et al., 1994, p. 180)

On the other hand, Portner (2009) proposes three modal flavours: epistemic, priority and dynamic. Within the priority group, Portner places deontic, bouletic and teleological flavours. The dynamic group of modals, on the other hand, is

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<sup>7</sup>Note here that most of these meanings can also somehow be related to English *can*.

divided into two groups, first, the volitional flavours, i.e. ability, opportunity and dispositional, and second, the quantificational group, i.e. existential and universal.<sup>8</sup>

Palmer (2001) follows along similar lines, proposing a difference between propositional and event modality. Palmer's event modality corresponds to what has traditionally been known as root or non-epistemic. Within the event modality group, Palmer places deontics, which depend on permission, orders, authority etc., and dynamic modals, which include willingness and ability modals.

Similar categorisations can be found even outside the generative framework. Nuyts (2005) opts for dynamic/deontic/epistemic categorisation, mentioning the other proposals within the functional grammar literature such as facultative modality (Goossens, 1985) and inherent modality (Hengeveld, 1988) instead of the term dynamic modality.

Authors such as von Stechow & Gillies (2007) and Kratzer (2012) dub the dynamic flavour the circumstantial flavour. In their work circumstantial flavour unites different notions of modality. For instance:

- (15) I **have to** sneeze. (von Stechow & Gillies, 2007, p. 34)
- (16) It **can** grow very tall. (von Stechow & Heim, 2002, p. 34)
- (17) Hydrangeas **can** grow here. (Kratzer, 1981, 1991)
- (18) Cathy **can** make a pound of cheese out of this can of milk. (von Stechow & Heim, 2002, p. 37)

It is important to note that most of the work following the Kratzerian theory, for instance, Bhatt (1999), von Stechow & Heim (2002), von Stechow (2006), Hacquard (2006), von Stechow & Gillies (2007), von Stechow & Iatridou (2008), von Stechow & Gillies (2011), Rubinstein (2012), Rubinstein (2013) adopt this categorisation.<sup>9</sup>

I have shown in this section that there is little agreement on what are the likely candidates for modal flavours. As we have already seen in the methodological

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<sup>8</sup>Since Portner's work is very influential in the current theories of modality, I will revisit his proposal in Chapter 4 where I will be talking about priority and circumstantial modals.

<sup>9</sup>I will say more about different modal meanings in these examples in Chapter 4.

discussion in the introductory chapter, modal flavours are very subtle and quite difficult to identify and define. Therefore, it should not come as a surprise that the literature on this issue is full of conflicting accounts. This is due to the fact that it is possible to approach modal flavour on different levels of super- and subordination. In other words, while some authors identify more general levels of modal flavours, some are concerned with very specific notions. In my work I aim to focus on the grammatical role different flavours play, which will be crucial in determining the relevant modal flavour categories.

### 2.2.3 Modal force

When compared with the modal flavour literature, modal force seems to be a rather simple notion. The literature agrees that “necessity and possibility are the central notions of modal logic” (Lyons, 1977, p. 787). These notions of modal logic then extend to the linguistic notion of modal elements. Therefore, there are two modal operator types, necessity modals, such as *must* and *should*, and possibility modals, such as *may* and *can*, as already noted in Section 2.2.1.

As English and German were for a long time the central interest of the study of modality, it was often claimed that modal force is something that is lexicalized in a modal element, and therefore, comes as a set category, while the modal flavour is something that is filled in by contextual factors (Kratzer, 2012). For example, a modal such as *must* can be both epistemic and deontic, but cannot express possibility.

On the other hand, in languages such as St’át’imcets (Rullmann et al., 2008) and Nez Perce (Deal, 2011) the well-known notion of modal force being lexicalized does not seem to be valid. As shown by Rullmann et al. (2008), St’át’imcets’ modals are restricted in terms of the modal flavour they can convey, i.e. in terms of the conversational background they allow, rather than the quantificational force. For example, the epistemic *k’a* can only be used in epistemic contexts, but varies in quantificational force. Example (19) is an example of the epistemic *k’a* conveying necessity, while it conveys possibility in (20).

- (19) Context: Speaker is telling about when she was a child and she used to play in the evenings with her friends.

na s-pála7-s-a, wá7-lhkalh k'a wenácwts-am'.  
 DET NOM-one-3POSS-DET IMPF-1PL.SUBJ INFER loud-MID  
*One time, we must have been loud.* (Matthewson, 2005, p. 410)

- (20) cq7aoz kw-en-wá stexw lexláx-s lh-as wa7  
 NEG DET-1SG.POSS-IMPF very remember-CAUS COMP-3CONJ IMPF  
 k'a qelh-n-ás nilh kw s-ts'áqw-an'-em  
 INFER put.away-DIR-3ERG FOC DET NOM-eat-DIR-1PL.ERG  
 lh-kalál-as  
 COMP-soon-3CONJ  
*I don't really remember what we did with the leftover fish. Maybe she put it away and we ate it later.* (Matthewson, 2005, p. 58)

A similar phenomenon is found with other modals in St'át'imcets, that is, the future *kelh* and deontic/irrealis *ka*.

Deal (2011) explores a similar modal system in which modals seem to be mainly existential. For instance, the Nez Perce possibility modal *o'qa* does not contrast with a modal of necessity. Deal (2011) also suggests that there are languages, such as English, which seem to have modals with scales (e.g. *must* vs. *may*), as well as languages in which modals are not positioned on a scale. There are two types of non-scalar languages with respect to modality. First, languages such as St'át'imcets in which modals are flexible in downward-entailing contexts, and second, systems such as Nez Perce, in which modals are flexible in upward-entailing contexts.<sup>10</sup>

Finally, even though the state of the literature seems to be much more consistent with respect to modal force when compared to modal flavour, there are some interesting puzzles that have been previously explored. For example, while modal auxiliaries such as *should* and *ought* are generally thought of as necessity modals, it seems that native speakers have the intuition that these are somehow weaker than *must*. This issue was explored by von Stechow & Iatridou (2008), who suggest an analysis that employs a secondary ordering source. On the other hand, Rubinsteyn

<sup>10</sup>While the scalar issue is interesting and important, it is important to note that it is not a central issue for this thesis and therefore will not be further explored.

(2012) suggests that differences between strong and weak necessity modals actually come from differences in commitment and priorities.

To conclude, in languages such as English, which lexicalise modal force, the literature seems to be quite consistent. Nevertheless, as shown above, this does not mean there are no open questions concerning modal force. In the chapters to follow I will show that both modal force and modal flavour play a prominent and complex role in DMCs.

## 2.3 Syntax of modal auxiliaries

While there are many different topics and puzzles in the area of syntax of modal auxiliaries, such as the interaction of modals and tense (Condoravdi, 2001; Stowell, 2004), aspect (Arregui, 2005; Hacquard, 2006), negation (Cormack & Smith, 2002) etc., one of the most interesting and most explored areas is certainly the syntactic position and argument structure of epistemic vs. non-epistemic modal auxiliaries.

As has already been mentioned, ever since Jackendoff (1971, 1972), this has been one of the most important issues in the syntactic representation of modal auxiliaries. On one hand, there are authors suggesting that epistemics must be syntactically higher (Ross, 1969; Kiparsky, 1970; Perlmutter, 1970; Brennan, 1993; Thráinsson & Vikner, 1995; Butler, 2003), while on the other hand, there are unifying accounts that do not suggest any syntactic differences between the two big groups of modals (Kratzer, 1981, 1991, 2012; Bhatt, 1998; Wurmbrand, 1999; von Stechow & Heim, 2002).

Among the former group of accounts, some authors (such as Brennan (1993)) suggest that there is a difference between *ought to do* and *ought to be* deontic modality. *Ought to do* describes what the world ought to be like based on someone's law/desires/goals, while *ought to be* expresses what the world should be like based on someone's law/desires/goals and who should be in charge of getting the world into this state (Bhatt, 1998).

- (21) a) There **must** be regular elections in a democratic country. (*ought to be*)  
 b) John **must** finish his assignments on time. (*ought to do*)  
 (Bhatt, 1998, p. 5)

Most accounts which propose the *ought to do/ought to be* difference, suggest that while epistemics are always raising predicates, non-epistemics can be either control or raising.

For instance, Brennan (1993) suggests that deontic modals can be both control and raising predicates, while epistemics are always raising. Support for this claim comes from, among other evidence, expletives and idioms. While epistemic modals easily take expletive subjects, these constructions, when combined with deontic and circumstantial modals, can sometimes be unavailable.

- (22) It **can** be hard for Joan to climb that tree. (#It has the ability for Joan to climb that tree) (Brennan, 1993, p. 118)
- (23) There **will** be three students answering the phones. (#There is willing/ is disposed to be three students answering the phones.) (Brennan, 1993, p. 118)
- (24) Unfair advantage **may** have been taken. (Brennan, 1993, p. 116)

Example (24) is said to take a single argument, that is, a proposition, and would lose its idiomatic meaning in a control structure:

- (25) #Unfair advantage **can** be taken.

Along similar lines, Thráinsson & Vikner (1995) suggest that non-epistemic modals in Icelandic behave like control verbs, assigning a theta-role, while epistemics are raising verbs. On the other hand, in Danish, epistemics are raising verbs, but non-epistemics fall somewhere in between these two categorisations.<sup>11</sup>

Recent accounts that suggest otherwise mostly claim that all modal auxiliaries are raising predicates. Wurmbrand (1999) states that there are several properties

<sup>11</sup>Thráinsson & Vikner's analysis and data will be discussed in more detail in Chapter 3.

of modal structures that suggest that all modals are raising predicates, rather than control structures — these properties being thematic and case properties in Icelandic, height of interpretation of the subject and assignment of the theta-role. To exemplify one of these properties that motivate Wurmbrand’s raising analysis of modals, let us take a look at an example from Icelandic. According to Wurmbrand (1999), in Icelandic, subjects can be non-nominative, that is, quirky case marked. Data shows that “if quirky case is retained, the construction involves raising, if the subject shows the case that the higher verb assigns, the construction involves control” (Wurmbrand, 1999, p. 602). Example (26) shows that modal constructions, in fact, retain quirky case and therefore need to be considered raising structures.

- (26) Haraldi / \*Haraldur **verður** að líka hamborgarar  
 Harold-DAT / \*Harold-NOM must to like hamburgers  
*Harold must like hamburgers* (in order to be accepted by his new American  
 in-laws) (Wurmbrand, 1999, p. 602)

Similarly, Bhatt (1998) claims that there is a difference between *ought to be* and *ought to do*, but not a syntactic one. Bhatt (1998) claims that based on cases such as (27), a control analysis is unavailable since it is meant to represent a bearer of an obligation as a controller. However, the bearer is identified from context by inference which makes it unnecessary to posit a control analysis to identify the bearer.<sup>12</sup>

- (27) John **has to** eat an apple a day. (as said as an instruction to John’s  
 caretaker at the day-care) (Bhatt, 1998, p. 7)

These discussions show that there are opposing views on the argument structure of non-epistemic and epistemic modals. In this brief overview it was demonstrated that while there is evidence supporting both sides of the discussion, a consensus is yet to be reached. This discussion will prove to be important in the study of DMCs because structures in which epistemics embed non-epistemics are quite prominent and important in the study of DMCs. Further to that, epistemics embedding epistemics and non-epistemics embedding epistemics also need to be

<sup>12</sup>Other evidence to support Bhatt’s claim comes from Hindi obligational constructions.

explored. Moving forward in this thesis we will see that this will be an especially interesting issue in Croatian examples which seem to support the former hypothesis, that is, that epistemics and non-epistemics differ syntactically.

## 2.4 What counts as a double modal?

Modality comes in many different forms. For example, modal meanings in English can be conveyed by modal auxiliaries (*may, might, must*), semi-modal verbs (*has to, ought to, need*), adverbs (*perhaps*), nouns (*possibility, necessity*), adjectives (*necessary*), and conditionals (von Stechow, 2006). In addition to this, cross-linguistically, modality is often expressed by clitics (Rullmann et al., 2008; Deal, 2011), or different lexical constructions that are combinations of, for instance, nouns and verbs (Nauze, 2008) or suffixes (Nauze, 2008).

Nevertheless, these categories are not the only way to express modal meanings. For instance, Bhatt (1999) suggests that modal meanings can be expressed even without a particular modal element:

(28) Tim knows [how to solve the problem]. ( $\approx$  Tim knows how one/he could/should solve the problem) (Bhatt, 1999, p. 1)

(29) Will is to leave tomorrow. ( $\approx$  Will is scheduled/supposed to leave tomorrow) (Bhatt, 1999, p. 2)

These are some of the ways in which English expresses single modality. However, as already mentioned, double modality can be expressed in English as well, even though it is often claimed that it cannot.

English is often said to not have DM structures as part of the standard dialect. However, there are structures that suggest otherwise. For example, while structures containing two modal auxiliaries, such as (30), are not possible in standard English, (31) is.

(30) \*You **must can** do that.

(31) You **have to be able to** do that.

Example (30) shows how an English modal auxiliary is not able to embed another modal auxiliary. On the other hand, the semi-modal expressions, such as *be able to* and *have to* seem to have that ability. This means that, in a way, standard English does have layered modality, at least from a semantic perspective.

Nevertheless, when we talk about fully-fledged modals, we tend to talk about modal auxiliaries — such as *must*, *can*, *might*. Von Stechow (2006, p. 1) states: “It is traditional to use English modal auxiliaries or semi-modal verbs as the primary source of illustrative examples. This is in spite of the fact that these elements have a rather curious set of grammatical properties.” On the other hand, for Bhatt (1999), even a sentence such as (32) in which a semi-modal is used is an example of covert modality.

(32) Bill **has to** reach Philadelphia before noon. (Bhatt, 1999, p. 2)

Bhatt (1999) says that while the interpretation of (32) includes modality, there is no lexical item which the modal sense comes from. He claims that while there is a variety of expressions that include infinitival constructions and covert modality, the modality does not come directly from the semantics of the infinitival, but rather from a covert modal in the *have to* construction (Bhatt, 1998).

Following the same tradition, most double modal studies, such as Elsmann & Dubinsky (2009) and Hasty (2012a,b), when talking about DMCs, use examples that combine modal auxiliaries such as *might could*, *might can*, *must can*, *may should* etc. Nevertheless, some authors, such as Di Paolo (1989) include constructions such as *might supposed to* and *better can*.

In this thesis I will take the strictest form of the above approach, along the lines of Bhatt (1999), Elsmann & Dubinsky (2009) and Hasty (2012a,b), for the following reasons. Modal auxiliaries form a uniform syntactic and semantic class of auxiliaries. This makes them more consistent as an object of study, in opposition to studying how different modal elements combine. Furthermore, such restricted focus will assist in exposing constraints on modal layers that would otherwise be obscured if elements from different syntactic classes were explored. For instance, many studies deal with

the relationship between modal auxiliaries and modal adverbs. However, this might yield different results, since these can have many different semantic effects such as modal concord (Geurts & Huitink, 2006; Zeijlstra, 2007; Anand & Brasoveanu, 2010; Huitink, 2012), which then interfere with exploring semantic restrictions for possible combinations within DMCs. Since the focus of this study is the Croatian modal system, I will focus on four Croatian modal auxiliaries (and their combinations) that share the same syntactic properties (verb-noun agreement, tense properties).

Finally, it is important to note that even though I will be using *pure* DMCs, consisting of two modal auxiliaries, a good theory should imply that the findings on modal combinations should extend to these modal auxiliary + semi-modal and semi-modal + semi-modal constructions too. This is due to the fact that these, even though they belong to different syntactic classes, still share the same semantics of modality, including the modal force and flavour.

## 2.5 Conclusion

In this chapter I have introduced the basic terminology that will be used throughout the thesis, such as modal force and flavour, universal and existential modal quantification, modal base and ordering source. Furthermore, this section has focused on the basic principles of the theoretical framework that has its roots in Kratzer's work (1981; 1991; 2012). We have also seen how the framework works on the sentence *John must stop at the red light*.

I have also explored different views on modal flavour categories in the literature, showing that the literature does not always agree on what some of the possible candidates for modal flavours are. This will be crucial in the later stages of this thesis since I will show that modal flavours play a very important role in semantic restrictions on DMCs, while, at the same time, DMCs can help categorise modal flavours.

The section that followed showed that, while the notion of modal force seems to be more straightforward than that of flavour, modal force also raises interesting issues. It was noted that even though the notion of modal force does not seem

complex in English and similar languages, it will be shown later in the thesis that it also plays an important and intricate role in DMCs and their semantic restrictions.

I have also explored some of the basic questions in the syntactic modality literature, such as differences between epistemic and non-epistemic modal auxiliaries, showing how some proposals claim that these need to be syntactically different groups, while some claim they do not. In later chapters I will make the claim that these do indeed need to be structurally different in order to be able to explain how Croatian modal auxiliaries behave in single modal constructions (SMCs) and DMCs.

Finally, I have also discussed what it means syntactically and semantically to be a modal auxiliary, and more importantly, a true DMC. This discussion is important due to the fact that while many claim that standard English does not have verbal layered modality, there are structures that prove otherwise. In this section I explain why I will take only modal auxiliary combinations to be true DMCs and only use them to explore semantic restrictions in DMCs.

While I have now laid the basic groundwork for exploring DMCs, in what follows I focus on the existing literature on DMCs and DMC data from Croatian. In doing this, notions of modal force and flavour will play an especially important role in the exploration of non-epistemic combinations, while some of the syntactic issues discussed for modal auxiliaries will be relevant for epistemic + non-epistemic combinations.

# 3

## Layered Modality

### Contents

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### 3.1 Introduction

The early approaches in the generative literature, such as Chomsky (1957) and Akmajian et al. (1979), assumed that stacking of modal auxiliaries is not possible — it was assumed that there could be only one modal auxiliary per clause. This view was refuted by the early descriptive/lexical work of Di Paolo (1989), who

presented a large amount of Southern American English data demonstrating that modal auxiliaries can be stacked, such as Di Paolo's example in (1):

- (1) We **might can** go up there next Saturday.

Nevertheless, Di Paolo's paper, while very valuable due to the large amount of novel and interesting data it provided, offered a rather limited view on double modal auxiliaries by suggesting that these combine randomly on the basis of stipulation, rather than predictable rules. The work that followed (Battistella, 1995; Elsmann & Dubinsky, 2009; Hasty, 2012a) focused on similar data (examples in (2)).

- (2) a. I **might could** go to the store.  
b. You **might should** eat before you go.  
c. You **might oughta** get your coat.  
d. Those ducks **must not can** feel cold.  
e. I **might should oughta** take these out of the oven.

(Hasty, 2012b, p. 1717)

They also used negation, questions, and stranded quantifiers to show that there are important syntactic restrictions connected to this type of DMCs.

These papers mainly focused on combinations of epistemic and non-epistemic modal auxiliaries and aimed to show that these restrictions are predictable and cannot be a matter of stipulation. Other studies, such as Cinque (1999) and Nauze (2008), focused on hierarchies among modal flavours, without using modal auxiliary data, but rather data that mixed different types of modal elements. Another prominent topic has been modal concord (Geurts & Huitink, 2006; Zeijlstra, 2007; Anand & Brasoveanu, 2010; Huitink, 2012). This literature focuses on the syntactic and semantic analysis of combinations of modal adverbs and auxiliaries.

There are several missing pieces in these analyses. Most of these analyses focus only on syntactic facts while disregarding the semantics of DMCs. In addition, these studies explore a certain type of data (epistemic + non-epistemic), while leaving aside non-epistemic + non-epistemic combinations. In other words, they do

not offer evidence that can provide a deeper insight into possible non-epistemic + non-epistemic restrictions. Another issue is that the data used in these studies often comes from Southern American English, where getting grammaticality judgements might be difficult due to the sociolinguistic status of non-epistemic combinations.

Therefore, the aim of this chapter is, first of all, to explore previous analyses with special emphasis on their ability to account for the Croatian data and the questions they leave open, that is, to identify some of the unanswered questions in the previous literature on layered modal structures, and second, to give a systematic overview of Croatian DMCs and draw some initial conclusions and generalisations.

In the first part of this chapter, I present the previous analyses from the literature. I cover several approaches, starting with one of the earliest analyses, that is, the lexical approach of Di Paolo (1989). With respect to this proposal, I will lay special emphasis on the fact that grammatical restrictions cannot be pure stipulations. I also explore a number of syntactic-semantic analyses (Battistella, 1995; Thráinsson & Vikner, 1995; Close, 2004; Elsmann & Dubinsky, 2009; Hasty, 2012a) which mostly deal with combinations in which epistemics embed non-epistemics. I will show that data exists which is not covered by any of these analyses.

Furthermore, I will also discuss some of the descriptive work, such as Jędrzejowski & van de Vate (2013) and Bour (2014), as well as Cinque's (1999) and Nauze's (2008) typological analyses. Finally, I also examine the literature that deals with the phenomenon of modal concord (Geurts & Huitink, 2006; Zeijlstra, 2007; Anand & Brasoveanu, 2010; Huitink, 2012).

Throughout this chapter, I put special focus on the ability of existing analyses to deal with the Croatian data, especially the non-epistemic + non-epistemic cases that are unaccounted for. Note that I will use some Croatian examples here to identify issues with the previous analyses, but the complete overview of the Croatian data follows after the discussion of the analysis, where I identify other puzzling generalisations of the data and future research questions that may or may not have already been explored in the previous literature. It also must be noted that the

majority of the analyses I explore here are entirely syntactic accounts that do not develop a semantic analysis, which is a gap that this thesis will try to address.

The studies I focus on were chosen according to their relevance to the questions I am trying to answer and their recency, especially focusing on the semantic nature of DMs. Therefore, I am forced to leave out a number of studies that deal with Southern American English constructions, such as Butters (1973), Coleman (1975), Pampell (1975), Boertien (1986), Brown (1991), Montgomery & Nagle (1993), Nagle (1994) and De La Cruz (1995) since these are mainly sociolinguistic, dialectal, and diachronic studies.

The second part of this chapter is a systematic overview of the Croatian modal system, which will be used to explore the phenomenon of layered modality. I focus on four types of DMCs, that is, non-epistemics embedding non-epistemics, epistemics embedding non-epistemics, epistemics embedding epistemics, and finally, non-epistemics embedding epistemics. I will show, among other things, that the first three groups result in grammatically acceptable combinations, while the fourth one is unacceptable. Additionally, the first group stands as the most interesting group of data. To my knowledge, this is the first systematic database of DM structures in which modal auxiliaries are glossed for their force and flavour.<sup>1</sup> Finally, the data and its description are followed by some initial generalisations.

## 3.2 Double modality in previous work

### 3.2.1 Lexical analysis

Di Paolo (1989) presents one of the first and most widely cited overviews of DMCs in the Southern dialects of American English. Her lexical analysis of DMCs in English is based on the claim that they are, in fact, multi-word lexical items, as they exhibit some of the features other multi-word expressions do, such as both unit-like and non-unit-like behaviour, non-productivity, and syntactic and semantic irregularities.

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<sup>1</sup>Note that there exists an American English database of multiple modals (Reed & Montgomery, 2012). However, it is not annotated with force and flavour, but rather focused on sociolinguistic/pragmatic factors.

Firstly, Di Paolo (1989) claims that DMCs show features of unit and non-unit-like behaviour. This means that syntactic and semantic rules sometimes interact with DMCs as if they are one word and sometimes as if they consist of more words. One of the main objections to her analysis in the literature (Elsman & Dubinsky, 2009; Hasty, 2012b) is the fact that DMCs should resist separation if they are single lexical items. However, this is well attested both in English, such as in (3)), and Croatian, such as in (4):

(3) I've seen ones that **might** possibly **could** be flowers... (Di Paolo, 1989, p. 205)

(4) Context: Ivan sings the main part in a musical and today he cannot hit the high note in the final song:

To je nešto što Ivan **mora** uvijek  
 that is something that Ivan must.PRES.3SG.∇DEONT always  
**moći** otpjevati.  
 can.INF.∃CIRCUM sing  
*That is something that Ivan must always be able to sing.*

In example (3), the DMC *might could* is separated by *possibly*, while in (4), DMC *morati moći* 'must can' is separated by *uvijek* 'always'.<sup>2</sup> Elsman & Dubinsky (2009) note that it is possible to separate DMCs by either pronouns, negations or adverbs. The same is completely natural in Croatian as well. However, this argument may not be the most convincing one against Di Paolo's analysis. Di Paolo does not claim that they are not inseparable, she merely claims that they sometimes exhibit separability and sometimes inseparability, which are features of other English idiomatic expressions as well, and thus, she claims this speaks in favour of her proposal. In other words, saying that DMCs are, in fact, separable is not a strong argument against the *single lexical item* account, since some other English idioms, which are often considered to be multi-word lexical items, are also separable.

<sup>2</sup>Interestingly, native speakers of Croatian claim that DMCs, while sometimes a little odd, become more natural when separated by different words.

However, the core theoretical argument for a single lexical item account of DMs hinges on non-productivity. Di Paolo argues that DMCs exhibit non-productivity and that if they were productive, all modal auxiliaries should be able to combine in all possible ways. Additionally, another argument that speaks in favour of non-productivity is the fact that not all speakers recognise all different DMCs as acceptable. I claim that these restrictions are wrongly interpreted here. According to Di Paolo, the restrictions on the productivity of possible DMC combinations are, in fact, a matter of stipulation, not derivable and predictable. Firstly, it seems that there is a clear syntactic reason why epistemics come first in English dialects since it is well known that they are often considered to be raising predicates in the existing modality literature. Also, the initial position of epistemics in DMCs seems to be a universal rule in languages that license DMCs.<sup>3</sup> These issues are discussed in the majority of the DM literature that followed Di Paolo (1989), such as Thráinsson & Vikner (1995), Elsmann & Dubinsky (2009) and Hasty (2012a,b) etc.

Second, as for the non-epistemic modals, especially in Croatian, their behaviour also does not seem to be arbitrary. This will become clearer in the second part of this chapter — it seems that the possible combinations in which DMCs can occur in Croatian are highly dependent on their modal flavour and force.

Finally, the cross-linguistic picture sheds a different light on the argument that DMCs are not acceptable for all speakers of Southern non-standard dialects of American English. In other languages, where DMCs are completely standard and acceptable to all speakers, we find that there is no variability in speaker judgements about DMCs, akin to the variability that is found in Southern American English. Taken together, the cross-linguistic picture undermines Di Paolo's claims for non-productivity of DMCs.

The non-compositional view also goes against the *modal concord* approach seen in works by Geurts & Huitink (2006), Zeijlstra (2007), Anand & Brasoveanu (2010), Huitink (2012) and Grosz (2010), since they widely claim that while modal concord is attested in modal adverb + modal auxiliary combinations, modal auxiliary +

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<sup>3</sup>Most of the literature agrees on this, apart from some isolated cases such as Kratzer (1976), but this will be discussed further in Section 4.5.

modal auxiliary combinations do not exhibit modal concord and instead seem to be compositional in nature. I will say more about modal concord in Section 3.2.4.

### 3.2.2 Syntactic analyses

As already mentioned, the majority of analyses dealing with DMCs have focused on structures from Southern American English in which an epistemic modal auxiliary such as *might* embeds a non-epistemic modal auxiliary such as *can* or *must*.<sup>4</sup> In what follows my aim is to show why such approaches might be incomplete and to identify questions that need to be answered in addition to the syntactic issues covered in these analyses.

Battistella (1995) claims that DMCs can best be analysed as non-core adverbial constructions. This analysis is based on one of the first ever analyses of DMCs, by Labov in 1972, who claimed that in DMCs such as *might could*, *might* is categorially an adverb and is parallel to *possibly could* or *maybe could*. Battistella adopts this view because of the conceptual advantage it has. This kind of view allows us to claim that the first modal (or at least one of the modal auxiliaries) is not a true modal. Therefore, Battistella proposes to treat *might* “as a defective modal form which modifies the head modal *could*” which makes it “an adverbial rather than an adverb” (Battistella, 1995, p. 27). In Battistella’s view, in a construction such as *might could*, *could* licenses *might*.

While this might fit the English data, it becomes problematic when it comes to Croatian data. According to Battistella (1995), the second modal is the true modal which functions as the head and licences the first modal, based on the evidence that in English the second modal is the one that sometimes exhibits tense features. However, this is not true for Croatian, where the first modal is marked for tense, person and number, while the second modal and the main verb that follow are always in the infinitive.<sup>5</sup> Here I repeat the example from above in which *mora* is in present tense, 3rd person singular, and *moći* and *otpjevati* are in the infinitive form.

<sup>4</sup>Note that *can* and *must* do not have to be non-epistemic, while *might* is always epistemic.

<sup>5</sup>This morphosyntactic pattern is consistent in non-epistemic + non-epistemic DMCs. Epistemics, however, demonstrate a distinct pattern, which I will discuss in Section 3.4.2.

- (5) To je nešto što Ivan **mora** uvijek  
 that is something that Ivan must.PRES.3SG.∇DEONT always  
**moći** otpjevati.  
 can.INF.∃CIRCUM sing  
*That is something that Ivan must always be able to sing.*

Thus, in Croatian the first modal actually exhibits the morphosyntactic features all modals exhibit when in SMCs. This is not in accordance with the claim that the first modal is not a real modal. It also goes against the claim that the second modal is the head in this construction. It must be noted that some other languages, such as Dutch, also exhibit this morphosyntactic pattern (Jędrzejowski & van de Vate, 2013).

On the other hand, even in Croatian there are cases in which the first modal looks like it is not marked for tense. As we can see in Croatian epistemic SMCs, the epistemic modal is always in present tense third person singular, which is the Croatian impersonal form, no matter which tense the main verb takes and when the event took place. Nonetheless, due to the data in (5), the claim that the first modal is not a true modal cannot be accepted just on the basis of (6) to (8). In other words, even though the data from (6) to (8) might speak in favour of the claim that the first modal behaves in a particular way (does not exhibit tense features), there needs to be an explanation why it does not behave like that in (5).

- (6) **Mora** biti da Ivan pleše.  
 must.PRES.3SG.∇EPI be.INF that Ivan dance.PRES.3SG  
*It must be that Ivan is dancing.*
- (7) **Mora** biti da je Ivan dobio peticu.  
 must.PRES.3SG.∇EPI be.INF that be.PRES.3SG Ivan get.PTCP five  
*It must be that Ivan got an A.*
- (8) **Mora** biti da će Ivan doći kasnije.  
 must.PRES.3SG.∇EPI be.INF that will Ivan come.INF later  
*It must be that Ivan will come later.*

Second, according to the adverbial analysis we should be able to replace any of the modals in the initial position with the closest modal adverb and still get the same meaning. However, it is not clear which adverb could replace the circumstantial

existential in (9), since modal adverbs tend to be either epistemic or deontic. In other words, if we replace *moći* ‘can’ with the Croatian translational equivalent of *probably* (in (10)), which is *možda*, we do not get the same meaning as in (9).

(9) Alergičari            **mogu**                            **morati**                            kihnuti.  
 allergy-sufferers can.PRES.3PL.∃CIRCUM must.INF.∀CIRCUM sneeze.INF  
*It is possible that the allergy sufferers will have to sneeze.*<sup>6</sup>

(10) Alergičari            **možda moraju**                            kihnuti.  
 allergy-sufferers probably must.PRES.3PL.∀CIRCUM sneeze.INF  
*Allergy sufferers probably have to sneeze.*

In (9) the meaning of the sentence is something similar to *The circumstances are such that allergy sufferers have to sneeze*, which is not captured in (10) where the meaning of the first circumstantial modal in (9) changes to an epistemic meaning since this is the meaning that *probably* takes. This speaks against the argument that the first modal is adverbial in nature.

Third, it is not clear what this analysis would mean for triple modal constructions. It seems to imply that the third modal would license the first two modals, but it is not clear how this would account for cases such as *might could oughta*. The questions that arise here are whether the right-most modal becomes the head of the DMC or *could* remains the head, and if the right-most modal becomes the head, what changes in the syntactic nature of *could* in comparison to the *might could* from Battistella’s initial analysis?

Similarly to Battistella (1995), Close (2004) claims that in Arkansas English, DMs are not actually stacked modal auxiliaries, but rather a combination of a modal adverb and a modal auxiliary. It is argued that DMs are a result of a lexical choice since the speakers of this dialect seem to have an adverbial *might* as part of their lexicon which is used to modify modal adverbs. These claims are supported by the fact that *normal* modal adverbs such as *perhaps* and *maybe* come in initial sentence position in interrogatives:

<sup>6</sup>Note that the circumstantial *morati* is almost interchangeable with the circumstantial *trebati*. The difference is similar to saying *I have to sneeze* vs. *I need to sneeze*.

- (11) a. **Maybe** we **could** come?  
 b. **Perhaps** I **should** go?  
 c. **Might** we **could** come? (from ‘We might could come’)  
 (Close, 2004, p. 167)

In addition to question data, Close (2004) also claims that the fact that negation comes on the second modal, such as in (12), suggests that the second modal instead of the first modal functions as a *proper* modal, while the first modal resembles a modal adverb:

- (12) He **might couldn’t** come. (Close, 2004, p. 168)

Close (2004) also argues that in Tennessee English there is no adverbial *might* but that there is a non-finite modal *might* and, in Scottish dialects, DM structures are argued not to be adverb + auxiliary structures but rather instances of stacked modal auxiliaries. Therefore, Close (2004) suggests that DM dialects exhibit a two-way distinction. First, they can differ with respect to having different types of *might* — either an adverbial *might* or a non-finite modal *might*. Second, DM dialects are different from non-DM dialects by having either one of the two types of *might* in the first distinction. On the other hand, non-DM dialects have finite modals.

One of the limitations of Close’s analysis is the fact that it only focuses on a very limited number of modal auxiliaries, that is, on *might could*, *might should* and *might would*. This is problematic since it does not include any of the non-epistemic + non-epistemic combinations which can be found in non-standard dialects of English but also in many other languages as well. Furthermore, it might be problematic to propose that one modal auxiliary behaves in three different ways within one flavour. It is difficult to pin down what the conceptual rationale would be behind saying that a modal auxiliary (within the same flavour) can have three different structural behaviours, i.e. adverb, non-finite modal and a finite modal. First of all, a desirable theory for a modal auxiliary is certainly a unifying one<sup>7</sup> — it is

<sup>7</sup>Recall, that in the literature, theories that assume the same argument structure for all modal auxiliaries are usually called unifying, e.g. Kratzer’s theory.

rather problematic if we cannot offer any explanation as to why these different meanings and different syntactic behaviours would all be lexicalized in this one lexical item. While a unifying theory is indeed something we need to aim for, it is not always possible. Most of the authors who propose non-unifying theories suggest that there are differences between epistemics vs. non-epistemics. However, Close's analysis is going even further by saying there need to be inherent differences within a flavour. Second, it raises questions about the compositional nature of *might* since this type of analysis implies there needs to be at least three possible lexical entries for *might* varying across dialects.

Third, there are the same concerns as there were for Battistella's adverbial analysis. These include issues such as, first, the fact that in other languages the first modal is often the tensed modal, second, the fact that (9) and (10) cannot mean the same thing, and third, the capacity of the adverbial analysis to deal with triple modals.

One of the more recent analyses comes from Hasty (2012a,b) who presents a syntax-based analysis that argues for a structure in which the first modal is placed in an MP (Modal Phrase) merged above a TP, while the second modal occurs in T. The analysis is based on the notion that the first modal of a DM pair is immune to sequence of tense effects, which for Hasty (2012a,b), serves as evidence that the first modal lacks syntactic tense. Hasty (2012a,b) claims that the novelty of his analysis is the fact that it accounts for the observed data regarding negation, questions and stranded quantifiers. He also extends his account to triple modal constructions, and considers *ought* in constructions such as *might should oughta* as "a VP with *to* heading a nonfinite clausal complement" (Hasty, 2012b, p. 1733).

First, it is important to note that Hasty's analysis is based only on DMCs in which epistemic modals embed non-epistemic modals. Hasty presents two arguments that speak strongly in favour of his analysis. The first one is the sequence of tense effect. In sentences with tense-mixed modals, there is a distinction between the first modal and the second modal.

- (13) a. John said it **may could** snow. (ambiguous)  
 b. John said it **may could** snow, and it did.  
 c. John said it **may could** snow, but it hasn't yet. (Hasty, 2012b, p. 1726)
- (14) John said it **may can** snow. (not ambiguous) (Hasty, 2012b, p. 1726)

The fact that *may could* in (13) has an ambiguous reading,<sup>8</sup> and (14) does not, serves as evidence that only the second modal plays a role in sequence of tense effects. Thus Hasty (2012a,b) claims that this supports the idea that only the second modal bears syntactic tense.

Second, Hasty (2012b) presents cross-linguistic data from Korean, Turkish and Una that supports his argument. The Croatian data also speaks in his favour, at least in the case of the epistemic + non-epistemic structures which is what we have already seen above in (5) through (10). However, as I will show in Section 3.4.1, it does not support his claim in the case of non-epistemic + non-epistemic combinations, which is the same issue as previously discussed for Battistella's (1995) proposal. In other words, while it seems correct for Croatian epistemics to say that they lack syntactic tense, this does not seem correct for combinations of non-epistemic modals since the first modal is clearly the inflected one, and the second modal is in the infinitive form, as was shown in example (5).

Also, it is not clear why Hasty disregards occurrences of non-epistemic modals in DMCs of Southern American English. While he uses Di Paolo's epistemic + non-epistemic modal data, where the first modal is almost always *may*, *might* or *must*, and claims that the first position is always "confined" (Hasty, 2012b, p. 1718) to these appearing there, it is not clear why combinations such as *oughta could* or *should oughta* were ignored, where the first modal is a non-epistemic modal instead of an epistemic one. Though Hasty (2012b) briefly discusses the fact that the cases with *might* occurring as the first modal in DMCs are the most frequent ones, this

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<sup>8</sup>The ambiguity is between a shifted reading and a simultaneous reading. The former case refers to a case in which the evaluation time for the embedded clause is shifted to a time before the evaluation time of the matrix clause, while the latter case refers to a reading in which both of the clauses have the same evaluation time (Hasty, 2012b).

should not be a reason for us to disregard the non-epistemic + non-epistemic cases, even if they are judged as unacceptable by some speakers.

Another syntactic analysis comes from Elsman & Dubinsky (2009) who claim that epistemic modals which embed non-epistemic modals are basically sentential polarity operators that “head a POLP, must raise at LF and take scope over the proposition and may also bear tense” (Elsman & Dubinsky, 2009, p. 74), while all other modals “head VP and behave as AUX verbs, moving to T overtly when they bear Tense”. According to them, the key to the correct analysis of DMCs lies in the fact that epistemic *must*, *may* and *might* exhibit exceptional behaviour<sup>9</sup> in SMCs as well as in DMCs.

On this basis, they work under the assumption that the first modal in a DMC always has to be a P-modal, *must*, *may* and *might*, while the second modal is always a V-modal, *can*, *could*, *would*, *should*, *will*. Once things are set up like that, the first modal, a P-modal, raises to take scope over a proposition, while the second modal, the V-modal, heads a VP and behaves as an AUX verb. Thus both modals in the DMC are true modals, behaving in the same way as in SMCs. This addresses the issue we had with Battistella’s analysis, which assumed that only one of the modals in a DMC is a true modal.

While Elsman and Dubinsky offer an interesting syntactic analysis, they only account for cases such as *might could* where the first modal is epistemic (similar to Battistella (1995), Close (2004) and Hasty (2012a)). In Croatian this is surface obvious because epistemics embed clauses overtly, unlike in English. However, the analysis does not explain how the “exceptional behaviour” (Elsman & Dubinsky, 2009, p. 76) of epistemic *must*, *may* and *might* could account for the analysis of DMCs in which non-epistemic modals embed non-epistemic modals. In other words, they say that in order for their analysis to work the first modal in a DMC always has to be a P-modal (*must*, *may* or *might*), while the second modal is always a V-modal, i.e. *can*, *could*, *would*, *should*, *will*.

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<sup>9</sup>For instance, they do not assign theta roles and do not undergo subject-auxiliary inversion (Elsman & Dubinsky, 2009).

Since their account does not address non-epistemic + non-epistemic combinations, it is not clear how this data accounts for DMCs such as *oughta could* or *should oughta* in which the first modal is not *may, might, must* (V+V, instead of P+V). Their account might be extended to say that non-epistemic modals can also occur in P-heads, but that is problematic if we do not change the basic characteristics of a P-modal, that is, that it does not assign a theta role and that it does not undergo subject-auxiliary inversion. Apart from the English examples, this is also problematic for Croatian data and other languages across the board,<sup>10</sup> in which we find many non-epistemic + non-epistemic combinations. Additionally, it also does not support data drawn from other Germanic languages, such as Icelandic and Danish, which are the focus of Thráinsson & Vikner (1995).

Thráinsson & Vikner (1995) deal with Danish and Icelandic DMC data, focusing both on non-epistemic + non-epistemic combinations, such as in example (15), and epistemic + non-epistemic, such as in example (16).

- (15) Han **skal kune** svømme for at få jobbet. (Da)  
 he must can swim for to get job-the  
*He must be able to swim to get the job.* (Thráinsson & Vikner, 1995, p. 51)

- (16) Hann **kann að kunna** að synda. (Ice)  
 he can to can to swim  
*He may know how to swim.* (Thráinsson & Vikner, 1995, p. 51)

According to Thráinsson & Vikner (1995), possible combinations include epistemics over non-epistemics, epistemics over epistemics, and non-epistemics over non-epistemics, while epistemics cannot be embedded under non-epistemics. To my knowledge, Thráinsson & Vikner (1995) are the first to observe this asymmetry, which will remain an important generalisation in the literature and one I will be building on.

Thráinsson & Vikner (1995) suggest different analyses for Danish and Icelandic. First, they suggest that Danish epistemic and non-epistemic modals are to be treated as raising modals. This is not in accordance with, some might say, the traditional

<sup>10</sup>This was shown to be true of at least Polish, Bulgarian, Italian and Mandarin Chinese in the introductory chapter.

view on epistemic and non-epistemic modals in which epistemics are considered to be raising predicates and non-epistemic modals to be control predicates.<sup>11</sup> In other words, epistemics are said not to assign a thematic role to the subject, while the opposite is true for non-epistemic modals. According to Thráinsson & Vikner's analysis, epistemic modal auxiliaries in Danish do not assign a thematic role, but neither do non-epistemic modals, at least not a regular one. In sentences such as (17), the subject ends up with one thematic role that is assigned by the embedded verb *enjoy*, which is raised to the subject position of the epistemic modal auxiliary.

- (17) Han **skal** more sig.  
 he shall enjoy self  
*He is said to enjoy himself.* (Thráinsson & Vikner, 1995, p. 63)

This type of analysis predicts that different types of subjects, such as non-argument subjects and weather-*det*, should be licensed in epistemic structures, but not in non-epistemic contexts, as in the following examples:

- (18) Skörin **kann** að færast upp í bekkin. (Ice)  
 step-the can to move up in bench-the  
*This may go too far. (\*this knows to/is able to...)*  
 (Thráinsson & Vikner, 1995, p. 59)

- (19) Det **kan** regne i morgen. (Da)  
*It may rain tomorrow (\*knows/is able to rain...)*  
 (Thráinsson & Vikner, 1995, p. 59)

As for the non-epistemic modal auxiliaries, Thráinsson & Vikner suggest treating them as raising predicates with an additional adjustment: non-epistemic modals do not just assign a thematic role to the subject, but they also assign an *additional* thematic role. For (20) that means that the subject ends up with one regular thematic role, assigned by *enjoy* to its subject which is raised, and an additional role assigned by the non-epistemic modal *shall* itself to the subject position.

<sup>11</sup>This dates back to Ross (1969), Kiparsky (1970), and Perlmutter (1970), who claimed that epistemic modals (like raising verbs) do not assign a thematic role to their subject whereas non-epistemic modals (like control verbs) do.

- (20) Han **skal** more sig.  
 he shall enjoy self  
*He must enjoy himself.* (Thráinsson & Vikner, 1995, p. 64)

The key advantage of this analysis is that it accounts for the fact that epistemics license non-argument subjects, and non-epistemic modals do not. In other words, if the verb under a non-epistemic modal has a non-argument subject, it cannot raise to receive the additional thematic role, while this is possible for epistemics. As for the DMCs in Danish, in (21), the subject of the DMC is first assigned a thematic role by the non-modal main verb *build*, is then raised and acquires an additional thematic role from the non-epistemic modal *want*, and is finally raised again to the SpecVP of the epistemic modal, which does not assign a thematic role. Finally, it is moved to the SpecIP position.

- (21) De **skal ville** bygge et hus.  
 they shall want build a house  
*They are said to want to build a house.*  
 (Thráinsson & Vikner, 1995, p. 73–74)

However, there seems to be some incompatibility between their data and the analysis. While in the beginning of their paper Thráinsson & Vikner present data from Danish where non-epistemic modals are embedded under non-epistemic modals (22), in one of the final sections they claim that their analysis correctly predicts that those constructions should not be possible in Danish. According to their analysis, only one *additional* thematic role can be assigned. However, if there are two non-epistemic modals, this should result in unacceptable constructions. This is not in accordance with the data in (22). Thráinsson & Vikner acknowledge this, and claim that this is an exception to the rule, and that *can* is not a regular modal. For this reason, they propose that *can* is either to be treated as an epistemic verb that does not assign a theta role, or as a control verb (similar to Icelandic non-epistemic modals). They show preference for the latter proposal.

- (22) Han **skal kune** svøme for at få jobbet  
 he must can swim for to get job-the  
*He must be able to swim to get the job.* (Thráinsson & Vikner, 1995, p. 51)

For Icelandic modals, they offer a slightly more traditional analysis. For epistemic modals, the same analysis applies as for Danish. However, the Icelandic data does not motivate an analysis in which non-epistemic modal auxiliaries should be treated as raising predicates. The main piece of evidence for this is that non-epistemic modals in Icelandic seem to have no problem embedding event expressions. Thus Thráinsson & Vikner assume the traditional control predicate analysis for non-epistemic modals, as it seems that none of the arguments for introducing such an analysis in Danish are relevant for Icelandic data. In other words, Icelandic non-epistemic modals, as opposed to these found in Danish, assign a regular thematic role to their subject.

Thráinsson & Vikner also note that while Icelandic seems to license many more non-epistemic + non-epistemic combinations, their analysis does not explain why some of these are not licensed. For example, while (23) and (24) are allowed, (25) and (26) are not.

- (23) Hann **á** að **kunna** að synda.  
 he ought to can to swim  
*He ought to be able to swim.* (Thráinsson & Vikner, 1995, p. 51)
- (24) Hann **verður** að **eiga** að gera eitthvað.  
 he must to ought to do something  
*He must have to do something.* (Thráinsson & Vikner, 1995, p. 51)
- (25) #Hann **kann** að **eiga** að synda.  
 he can to ought to swim  
 (Intended meaning: *He is able to ought to...*)  
 (Thráinsson & Vikner, 1995, p. 75)
- (26) #Hun **á** að **hljóta** að fara.  
 she ought to must to go  
 (Thráinsson & Vikner, 1995, p. 76)

The above data draws our attention to what seems to be the biggest issue for this analysis and its ability to cope not only with Croatian data, but also with data

from Icelandic and Danish (something Thráinsson & Vikner (1995) acknowledge), and other languages. While the Icelandic analysis might account for the syntax of Croatian DMCs as presented thus far, it does not offer a solution to why some non-epistemic modals can combine while others cannot, and why there sometimes appears to be an ordering restriction that may be based on elements of modality.

As we can see in examples (23) to (26), the restrictions that apply here seem to be slightly different from those relevant to Croatian. In (23) a deontic necessity modal embeds a circumstantial possibility modal, while in (24) a deontic necessity modal embeds another deontic necessity modal. The latter pattern does not seem to be possible in Croatian but there might be something in the translation/glosses that fails to capture an interpretation of weak vs. strong necessity. A context is needed to see whether this is actually a case where two modals of the same force and flavour are combined. Also, while (26) is not allowed in Croatian, (25) is possible if the modal is interpreted as circumstantial, but is not if it is deontic. These are impossible to judge without the appropriate contexts. It may be that apart from modal combinatorics, language-specific lexical restrictions are also important when considering the analysis of a single language. This links back to Section 1.4, where I discussed why it is important to present examples in context and what some of the possible interpretation issues might be. Finally, it is important to note here that while lexical gaps are possible, my aim is to propose a theory that is able to capture constraints cross-linguistically.

### **3.2.3 Descriptive and typological proposals**

#### **3.2.3.1 Descriptive work**

Some interesting work comes from Jędrzejowski & van de Vate (2013), who do not offer a final analysis, but do make observations on restrictions in DMC combinations. They bring a brief overview of the German and Dutch modal systems, where we find examples such as these:

- (27) Je **moet** **kunnen** luisteren  
 you must.2SG can.INF hear.INF  
*One must be able to listen to.*  
 (Wagenaar (2009, p. 126) in Jędrzejowski & van de Vate (2013))
- (28) Man muss doch wissen, wann man **müssen darf**.  
 one must.3SG MP know.INF when one must.INF may.3SG  
*One has to know when he is allowed to have (to do something).*  
 (IDS, St. Galler Tagblatt, 03/09/2009 in Jędrzejowski & van de Vate (2013))

One of their more interesting predictions is that if a single modal verb can have different interpretations, such as *können*, and DMCs are possible to construct in the language in question, such as in German, then it should be possible to embed one modal auxiliary under another using just one modal item. This prediction seems to hold in both German (as shown in (29)) and Dutch.

- (29) Ich weiss zwar, dass er das, was er behauptet, nicht kann ja  
 I know in.fact that he that what he claims NEG can.3SG MP  
 gar nicht **können kann**, er wäre denn noch grosser als der  
 NEG can.INF can.3SG he were.3SG MP still greater than the  
 grösse Frangipani.  
 great Frangipani  
*I know for a fact that he can't do what he claims he can, can't possibly do it. Why, that would make him greater than the great Frangipani.* (Süskind (1986, p. 78) in Jędrzejowski & van de Vate (2013))

This prediction is correct for Croatian as well, in the case of modal auxiliary *moći*:

- (30) Context: The online student system is set up in such a way that the student is the only one who is able to see their grades. It says on the university website:
- Samo student **može** **moći** vidjeti  
 only student may.PRES.3SG.∃DEONT can.INF.∃CIRCUM see.INF  
 svoje ocjene.  
 their grades  
*It is permitted only for the student to be able to see their grades.*



restrictions to other Germanic languages. This might be due to the following piece of data and its interpretation. Jędrzejowski & van de Vate (2013) claim that data from Norwegian shows that epistemic verbs can be embedded under non-epistemics. However, the constructions they refer to do not contain two modal auxiliaries, which might be problematic:

- (32) Jon **antas** å **måtte** være ungar.  
 Jon is.said to must.INF be.INF bachelor  
*Jon is supposed to have to be a bachelor.* (Eide, 2003, p. 123)

The modal construction in (32) consists of one non-modal verb (*antas*) with what seems to be epistemic meaning and an epistemic modal (*måtte*). Note that Jędrzejowski & van de Vate (2013) do not say anything about the meaning of the first verb; they simply point out that epistemic modals can be embedded too. However, this may not tell us much if we do not know whether the first modal is non-epistemic or epistemic.

Based on this example, Jędrzejowski & van de Vate (2013) claim that there are no restrictions on modal combinations in Norwegian, but they seem to put aside the fact that data containing non-epistemic + epistemic modal auxiliary combinations has still not been attested, which would speak against the claim that anything is possible in DMCs in Norwegian. As noted previously, the fact that such combinations cannot be constructed in some Scandinavian languages has been mentioned by Thráinsson & Vikner (1995) with respect to Icelandic and Danish. Further to these epistemic + non-epistemic combinations, there are also some open questions for the non-epistemic + non-epistemic data. Other languages seem to show that there are restrictions within these combinations — does Norwegian show the same tendencies?

Another descriptive study comes from Bour (2014) who presents an overview of Scottish double and triple modals. However, no analysis is presented since this work is more focused on native speaker judgements and description of DMCs and TMCs. Some of the more frequent DMCs that appear in Scottish border dialects include constructions such as *will can*, *should can*, *would could* and *must could*. As for TMCs, they do appear, but they seem to be very rare, except for

*will should can*, which seems to be widely accepted. Among other examples of TMCs are structures such as (33).

(33) He'll **might can** come the morn. (Bour, 2015)

Though (Bour, 2014, 2015) offers no analysis, thinking of (33) as a TMC might be an interesting idea. However, note that some scholars claim that *will/would* ought to be considered full necessity modal verbs (Steedman, 2000; Condoravdi, 2003; Stowell, 2004), while other scholars claim that *will/would* ought to be considered as ambiguous between modal and future meanings (Comrie, 1985; von Stechow, 1995). If we follow Bour and the former group of authors and assume that *will* is, in fact, a modal auxiliary, then this might be relevant for future work. For instance, there are other languages in which different structures might be thought of as modal. For example, in Croatian, use of the conditional mood (*bi*) could be considered as adding an additional modal layer to non-modal and modal structures, and thus creating a triple modal structure in example (34).

(34) Context: Ivan has been taking cooking classes for years and still does not know how to cook pasta. All other students in his cooking class are already very proficient in pasta preparation. His teacher says:

To je nešto što **bi morao moći** skuhati.  
 that is something that be.COND.2SG must.PTCP can.INF cook.INF  
*That is something that you must be able to cook.*

Another interesting point from Bour (2014, 2015) is his suggestion that non-epistemic modals should be able to scope over epistemic modal auxiliaries.

(35) Yes, we **ought to might** go now. (Coleman, 1975, p. 96)

(36) Oh well, if you're planning a trip we **should might better** go ahead have a look. How's Wednesday for you? (Mishoe & Montgomery, 1994, p. 16)

Bour interprets *ought to* and *might* in (35) as non-epistemic and epistemic modals, respectively, and *should* and *might* in (36) as non-epistemic and epistemic, respec-

tively. However, I suggest that it is very difficult to interpret these and to pin down the flavours of these modal elements without context. Without context we cannot be convinced that these are not examples of epistemic + epistemic combinations. In addition, even though most of the literature claims that *might* is always epistemic, these seem to be cases where it is very difficult to determine whether we are actually dealing with epistemic possibility or with some sort of circumstantial possibility. It would not be surprising if it is indeed circumstantial possibility, since this is something that frequently occurs across the board cross-linguistically.

### 3.2.3.2 Typological and cartographic work

In his seminal work from 1999, Cinque devotes a section to hierarchies among multiple modal constructions. First of all, Cinque points out that modal elements can in general be divided into two groups, epistemic and non-epistemic.<sup>12</sup> Secondly, he notices that it seems that the non-epistemic group of modals is not uniform since there are modal elements within this group that can assume different interpretations, that is, volition, obligation, permission, or ability. For Cinque, the crucial issue is whether all these different classes of non-epistemic modals “occupy the same position in the functional portion of the clause” (Cinque, 1999, p. 78).

Based mainly on Italian adverb data, Cinque (1999) suggests the following strict hierarchical ordering for modal elements:

- (37)  $\text{Mod}_{epistemic} > \text{Mod}_{necessity} > \text{Mod}_{possibility} > \text{Mod}_{volition} > \text{Mod}_{obligation} > \text{Mod}_{ability}$  (Cinque, 1999, p. 78)

The Croatian modal auxiliary data seems a little more complex than this. If we try to extend this hierarchy to modal elements other than modal adverbs, we obtain different results. For instance, it seems that there are cases in Croatian where possibility can embed necessity, which is not in accordance with Cinque’s proposed hierarchy for modal adverbs:

<sup>12</sup>Cinque uses the term *root* for *non-epistemic*.

- (38) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam. Among others, he says:

**Smijete**                      **trebati**                      piškiti.  
 may.PRES.2PL.∃DEONT ought.INF.∀CIRCUM pee.INF  
*You are allowed to need to pee.*

Example (38) speaks against the necessity > possibility order, at least in the form in which this restriction is set up in Cinque's work. This order is attested in Croatian since both possibility modals, *smjeti* and *moći*, can embed the universal modals *trebati* and *morati* in their circumstantial meaning. However, though the idea of a modal hierarchy is appealing and interesting, one should be very careful when defining the relationship the modal force and flavour have in this hierarchy. For instance, Cinque takes them as equal elements of the hierarchy that are positioned on a scale together. The issue of modal force ordering will be addressed in the next chapter, where I will claim that while there is a way to position them on a scale together, they have a different relationship with the modal flavour, that is, they do not behave as equal elements of the hierarchy.<sup>13</sup>

Another extensive study of different modal systems comes from Nauze (2008), who focuses on a cross-linguistic typological reality of modality and deals with modal elements from 6 different languages: Dutch, a cluster of Fon dialects, Korean, Lillooet, Turkish and Tuvaluan. Nauze (2008) aims to present some of the different ways in which languages express modality, focusing on both SMCs and DMCs, but mainly focusing on combinations of modal adjectives/adverbs and modal auxiliaries, which I do not take to be DMCs in this thesis.

Based on these six languages Nauze suggests that there are semantic ordering restrictions if two modal elements are combined, that is:

- (39) epistemic > participant-external > participant-internal (Nauze, 2008, p. 20)

<sup>13</sup>At least not in the way Cinque suggests.

Participant-internal modality is connected to the ability/capacity flavour of modality, in other words, “the internal needs of the agent” (van der Auwera & Plungian, 1998, p. 80). Nauze (2008) further splits this category into physical ability, learned ability and circumstantial ability, but does not make further claims on whether these categories influence the DM ordering. Participant-external modality has to do with deontic modality and everything that does not fall under the umbrella of epistemicity, ability and capacity. This category is mainly based on deontic and goal-based modality (often dubbed teleological elsewhere in the literature).

First, in Dutch Nauze mainly focuses on combinations of modal auxiliaries with modal adjectives and adverbs, concluding that epistemic modality scopes over participant-external modality due to the fact that epistemics express the “speaker’s judgement” (Nauze, 2008, p. 33) about the participant-external item. For instance, the order in which a participant-external modal embeds an epistemic modal is not acceptable, as in (40).

- (40) #Het **moet** **waarschijnlijk** zijn dat je naar die veradering  
 3N must.SG probable COP that 2SG PREP DEM meeting  
 gaat.  
 go.3SG  
*It must be probable that you are going to this meeting.*

(Nuyts (2004, p. 50) in Nauze (2008))

He draws similar conclusions about epistemics scoping over participant-internal modality in Dutch. As for the participant-external/participant-internal relationship in Dutch, Nauze claims that the hierarchy he proposes (see above in (39)) is confirmed by Dutch modal combinations.<sup>14</sup> Second, in the Fon cluster (a group of dialects spoken in Benin), Nauze discusses combinations of modal auxiliaries and modal markers and adverbs, concluding that his assumptions from (39) hold there as well. Third, in Korean, Nauze focuses on combinations of modal markers with noun-verb constructions that carry a modal flavour. This data further confirms Nauze’s hierarchy, but note that, interestingly, Nauze also states that these distinctions in Korean do not come from syntactic restrictions, but rather from semantic ones.

<sup>14</sup>Note that for the latter two groups Nauze only shows acceptable examples.

He bases this on the fact that one of his informants first judged deontic over epistemic as grammatical, but then changed her mind since she could not interpret its meaning. This is because these examples are syntactically well-formed and implies that restrictions come from the semantics of modals rather than being “hard-wired in the syntax” (Nauze, 2008, p. 71). Fourth, Nauze analyses Lillooet evidential and modal enclitics, concluding that their combinations are quite rare and some are even unattested, but that they still support his hypothesis. Fifth, Nauze uses Turkish evidential and modal markers/suffixes to analyse modal combinations. While evidential + epistemic combinations are unattested, in non-evidential modal cases Nauze finds that Turkish modal suffixes can attach to the same stem, and more importantly their scope supports his hypothesis. Finally, in Tuvaluan, Nauze looked at combinations of modal adverbs with modal auxiliaries, concluding that they also follow the proposed hierarchy.

While Nauze’s analysis and data present very valuable cross-linguistic evidence, I believe that one of the most important points Nauze makes in his conclusions is the fact that these restrictions do not only come from syntactic considerations, but also from modal flavours, or as Nauze calls them, interpretations. This is something that has previously been noted by Thráinsson & Vikner (1995) and Jędrzejowski & van de Vate (2013), but not in other syntactic DMC studies.

However, one of the crucial parts of a modal interpretation is modal force, and as the Croatian data will show, there can be no successful DM hierarchy without taking into account both modal force and flavour as important pieces of modal meaning. In addition, it must be emphasised that Nauze does not base his analysis on combinations of modal auxiliaries, which might be the reason why his analysis may yield different results from what we would expect from a DMC data set.

Furthermore, while Nauze’s analysis suggests that the participant-internal group needs to be taken as one modal flavour, Nauze does not say anything about the possibility of these circumstantial flavours influencing the grammaticality of different combinations within the DMCs. This will be further discussed in Chapter 4.

### 3.2.4 Modal concord

The current research on combined modal expressions also focuses on *modal concord* or *modal matching* (Geurts & Huitink, 2006; Zeijlstra, 2007; Anand & Brasoveanu, 2010; Grosz, 2010; Huitink, 2012),<sup>15</sup> which is distinct from DMCs, since combinations of modal auxiliaries and modal adverbs seem to be interpreted as one, which is not possible for DMCs. The effect of modal concord is quite similar to that created by negative concord. For example, in the sentence *We don't need no education* only one negative operator is interpreted. Similarly, in modal concord cases only one modal operator is interpreted. Modal concord is exemplified in (41):

- (41) a. You **may possibly** have read my little monograph upon the subject.  
 b. Power carts **must mandatorily** be used on cart paths where provided.  
 (Geurts & Huitink, 2006, p. 15)

The two modal operators in (41)a. are a modal auxiliary *may* and a modal adverb *possibly*, both of them in their epistemic flavour and expressing possibility. In (41)b., both modal operators, *must* and *mandatorily*, occur in their deontic flavour, and both of them express necessity. Geurts & Huitink (2006) suggest that in sentences such as these, where two modal operators are extremely similar in flavour and force, only one of them is interpreted. In other words, since their flavours and forces are the same, interpreting both of the modal meanings would be in a way superfluous, therefore only one gets interpreted.

Alternatively, if they are not of the same force and flavour, their interpretation has to be cumulative/compositional, as in (42), where *maybe* is a possibility epistemic modal adverb and *to have to* is a deontic necessity modal auxiliary:

- (42) **Maybe** Mary **has to** leave. (Zeijlstra, 2007, p. 317)

Interpreting only one modal element in (42) would yield incorrect results since flavours and forces are different and therefore the concord effect cannot appear.

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<sup>15</sup>I will adopt the term *modal concord* throughout this thesis.

It is also noted by Geurts & Huitink (2006) that when two modal auxiliaries occur together, the modal concord reading does not seem possible. The only reading available for constructions such as *might could* is *it is possible that one is in a position to do that*. The first modal occurs in its epistemic meaning, while the second modal conveys circumstantial meaning. Therefore, in order to allow a modal concord reading, the two co-occurring modal operators must be a modal auxiliary and another modal element such as a modal adverb, and they have to be of the same or similar flavour and force (Zeijlstra, 2007).<sup>16</sup>

This poses an interesting question for the DM data. While the modal concord literature briefly suggests that DMCs should have cumulative, rather than concord readings, it is necessary to explore this further. In other words, one of the questions I aim to answer in the chapters to come is how important the notion of modal concord for DMCs is and whether it is possible at all for DMCs to allow a concord reading. The modal concord issue will be discussed in detail in Chapter 4.

### 3.2.5 Summary of proposals and unanswered puzzles

In Section 3.2 we have seen that studies dealing with the layered modality phenomenon cover a wide variety of topics and DM characteristics. There is a lexical analysis, Di Paolo (1989), syntactic analyses such as Battistella (1995), Thráinsson & Vikner (1995), Close (2004), Elsmann & Dubinsky (2009), and Hasty (2012a,b), typological studies such as Cinque (1999) and Nauze (2008), and descriptive studies such as Jędrzejowski & van de Vate (2013) and Bour (2014, 2015). There are also a substantial number of sociolinguistic dialectal and diachronic studies such as Butters (1973), Coleman (1975), Pampell (1975), Boertien (1986), Brown (1991), Montgomery & Nagle (1993), Nagle (1994) and De La Cruz (1995).

Di Paolo's 1989 paper stands as an important early paper due to the large amount of novel data it employs from Southern non-standard dialects of American English. The analysis treats DMs as multi-word lexical items, claiming that they are not productive and are based on stipulations rather than predictable syntactic

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<sup>16</sup>Note that it is not completely clear what the notion *similar* means here. Perhaps this notion is targeting cases where the force is necessity but differs in whether it is weak or strong.

and/or semantic rules. I have shown that, first, the non-productivity argument cannot hold since there are some well-known assumptions in the literature that show the opposite (for instance, epistemic > non-epistemic order) as well as examples of non-epistemic combinations from many different languages. Second, the argument that not all combinations are acceptable for all speakers cannot hold in languages where DMs are part of the standard dialect.

The biggest issue with the existing syntactic studies is that most of them only deal with combinations of epistemic + non-epistemic DMs while leaving the non-epistemic + non-epistemic combinations aside. Battistella's analysis (1995), which focuses on epistemic + non-epistemic combinations, suggests that the first modal needs to be treated as a non-true modal resembling an adverb. I show that this view cannot capture a characteristic that is very well-attested cross-linguistically, that is, the first modal being the element that bears tense. In addition, I show that replacing a modal auxiliary with an adverb does not yield the same meaning, which is something we would expect if this proposal held.

Close's analysis (2004) goes along the same lines. Close suggests that the first modal can behave as an adverb, as a non-finite modal or as a finite modal, depending on the dialect. This is problematic since it does not assume a unifying account for all occurrences of the same modal auxiliary even when it expresses the same modal flavour. Further to that, Close only deals with a very limited number of examples, which again only tells us something about syntactic restrictions on the epistemic + non-epistemic group, without considering non-epistemic combinations.

Similarly to Battistella (1995) and Close (2004), Hasty (2012a,b) also focuses only on DMCs in which epistemics embed non-epistemics, without saying anything about non-epistemic combinations. Hasty (2012a,b) proposes a structure in which the first modal is placed in an MP merged above a TP, while the second modal occurs in T. Second, the assumption that the first modal lacks tense seems to be very English-specific and cannot be applied cross-linguistically.

Finally, the last syntactic study dealing with English that was discussed, which also only deals with epistemic + non-epistemic combinations, was Elsmann &

Dubinsky (2009), who propose that the first modal, a P-modal, raises to take scope over a proposition, while the second modal, the V-modal, heads a VP and behaves as an AUX verb. This is problematic since it is not able to account for cross-linguistic data where the first and the second modal often behave structurally alike.

Thráinsson & Vikner (1995) propose two slightly different analyses for Danish and Icelandic. While Danish epistemic and non-epistemic modals are treated as raising predicates, Icelandic non-epistemics are treated as control predicates. One of the most important ideas coming from their work is that they identify the issue with non-epistemics, that is, that there is something about certain non-epistemic combinations that makes them unacceptable, and it is not their syntax. This question is one of the central questions of this thesis.

The descriptive studies that were discussed such as Jędrzejowski & van de Vate (2013) and Bour (2014, 2015) stand as an important source of data while also posing some interesting questions. For instance, Bour (2014, 2015) suggests that non-epistemics can, in fact, scope over epistemics. I have shown in Section 3.2.3.1 that these claims are difficult to confirm without a proper context since examples without contexts are difficult to verify in terms of modal flavour. Jędrzejowski & van de Vate (2013) also note, similarly to Thráinsson & Vikner (1995), that there are certainly some semantic restrictions that block certain combinations of DMCs.

Moreover, interesting suggestions come from cross-linguistic typological approaches in Cinque (1999) and Nauze (2008). Even though neither of them works on modal auxiliary DMCs, they suggest a hierarchy of modal flavours. Also, while Nauze's hierarchy does not include modal force, Cinque includes necessity and possibility as elements of the hierarchy together with the rest of the modal flavours, thus mixing these two modal categories together. Cross-linguistic data shows that modal force plays a crucial role in establishing semantic restrictions within DMC combinations. I will suggest that while modal force and flavour certainly interact in DMC restrictions, their relationship differs from the one suggested in Cinque's analysis.

Finally, I have also explored the manner in which previous research dealt with combinations of modal adverbs and modal auxiliaries. Most of the work reviewed suggests that these modal combinations result in a modal concord meaning, whereas combinations of modal auxiliaries seem to have a compositional/cumulative reading (Geurts & Huitink, 2006; Zeijlstra, 2007; Anand & Brasoveanu, 2010; Grosz, 2010; Huitink, 2012).

To summarise, while the studies discussed above cover a wide variety of topics, there are certainly some unanswered questions that can be identified which are crucial for our understanding of the phenomenon of layered modality:

- Syntactic issues:
  - How do non-epistemic + non-epistemic combinations behave syntactically?
  - Is it their syntax that blocks some possible combinations, or rather something else?
- Semantic issues:
  - With respect to the question raised by Thráinsson & Vikner (1995), Nauze (2008) and Jędrzejowski & van de Vate (2013), if it is not the syntax that blocks some non-epistemic + non-epistemic combinations, what are the semantic restrictions that block them?
  - Since both Cinque (1999) and Nauze (2008) suggest that there is a hierarchy of modal flavours, is modal flavour what influences these restrictions in DMCs, and is modal force important too?

### **3.3 Overview of the Croatian modal system**

In what follows I briefly introduce the basic characteristic of the Croatian modal system to establish some initial assumptions that will be important in exploring the DM data set. After that, I turn to DM data and some initial generalisations.

The focus of the data set to follow is on four Croatian modals, that is, *morati*, *trebati*, *smjeti* and *moći*. According to Knežević & Brdar (2011), the modals in Table 3.1 are Croatian *fully-fledged* modals. Knežević & Brdar’s corpus study included *valjati* as well, but it is excluded from this paper due to its rarity in a modal meaning in everyday speech and contemporary grammar books, and its semantic similarity to the weak necessity modal *trebati* (Werkmann, 2014). Instead, I focus on *smjeti*, for which Knežević & Brdar (2011) claim that it only occurs in its deontic flavour and thus cannot be considered a *fully-fledged* modal. In fact, *smjeti* can occur in other modal meanings such as bouletic and teleological, though it cannot take epistemic and circumstantial meanings. However, it is not clear why this should make it less of a fully-fledged modal since it is known that some modal auxiliaries such as *to have to* (occurs in all modal flavours) are able to have a wide variety of modal flavours, while others are limited to only one flavour, such as *might* (occurs only in epistemic flavour) (von Stechow, 2006).

**Table 3.1:** Overview of Croatian fully-fledged modal auxiliaries

Modal auxiliary	English translation	Modal force	Possible readings
MORATI	must, have to	necessity	epistemic, deontic, bouletic, teleological, circumstantial
TREBATI	ought to, should	necessity	deontic, bouletic, teleological, circumstantial
SMJETI	be allowed to, may	possibility	deontic, bouletic, teleological
MOĆI	may, can	possibility	epistemic, deontic, bouletic, teleological, circumstantial

Table 3.1 shows the distribution of modal forces and flavours in Croatian.<sup>17,18</sup>

<sup>17</sup>Note that *trebati* can have epistemic meaning but only in combination with the conditional mood. For instance, in a sentence such as this one:

- (i) Ovo bi trebala biti ta kuća.  
 this be.COND should.PTCP be.INF that house  
*This should be that house.*

the epistemic reading is not accessible without the conditional morphology.

<sup>18</sup>Modals *trebati* and *smjeti* can have non-modal meanings as well. These are not to be confused with their modal flavours. The non-modal meaning of *trebati* is something similar to the English

It also goes to show that the Croatian modal system is actually quite similar to the English modal system with respect to the manner in which modal auxiliaries lexicalise modal flavours and forces. In other words, Croatian modal auxiliaries are able to express a wide range of modal flavours. However, they are only able to express one modal force each. This means that if a modal auxiliary is a possibility modal auxiliary, its force will express possibility, and crucially never necessity, in any given context.<sup>19</sup>

One of the most important and interesting facts about the Croatian modal system is that non-epistemic and epistemic modals occupy different syntactic positions and scope higher than subjects, and this is reflected in the linear order.<sup>20</sup> The structures in (43) and (44) carry different meanings, deontic and epistemic, correspondingly:

(43) Ljudi **moraju** voljeti predsjednika.  
 people must.PRES.3PL.∇DEONT love.INF president  
*People must love the president.* [according to the laws of the country]

(44) **Mora** biti da ljudi vole predsjednika.  
 must.PRES.3SG.∇EPIST be.INF that people love.PRES.3PL president  
*It must be that people love the president.* [according to what I know]

In (43) the modal auxiliary is inflected for person, tense and number and takes an infinitive complement. This can be seen on *moraju* which is in the third person plural of the present tense. Non-epistemic modals behave like ordinary verbs and can thus be used in the present, the past, and the future tense, with the same morphosyntactic markers.<sup>21</sup>

When conveying epistemic flavour, the modal auxiliary cannot take an infinitive complement but takes instead a *da*-clause complement (Grivičić, 2004; Todorović,

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*to need, to require.* When expressing this meaning, the verb becomes transitive, and does not embed another verb. As for *smjeti*, some speakers use it to express something similar to English *to dare*, as was pointed out to me by Boban Arsenijević. However, this meaning is inaccessible to many young adults, therefore it seems that it is quite archaic, even though it is listed as a possible interpretation in modern-day dictionaries.

<sup>19</sup>Unlike some other languages analysed in Rullmann et al. (2008) and Deal (2011), St'át'imcets and Nez Perce.

<sup>20</sup>As was pointed out to me by Anne Mucha, this phenomenon is present in other non-Indo-European languages, such as Medumba. For more on Medumba, see Mucha (2015).

<sup>21</sup>Modals in many languages display these properties, including those in Romance, Slavic, and some Germanic languages, while English modals are unusual from this perspective.

2012) with a verb inflected for the present tense. In (44) the modal is inflected for mood and tense but it is always third person singular (*mora* in (44)) which indicates that this construction is impersonal. It combines with an entire CP, while the main verb in the CP is marked for tense, number and person.

### 3.4 Overview of Croatian DMCs

Since Croatian is one of the languages where DMCs are standardly used structures, the range of possible constructions is quite wide.<sup>22</sup> Within this section I focus on different types of DMCs: i) non-epistemic modal auxiliaries embedding non-epistemics, ii) epistemic modal auxiliaries embedding non-epistemics, iii) epistemic modal auxiliaries embedding epistemics, and finally, the combination that does not seem to be possible in Croatian, iv) non-epistemic modal auxiliaries embedding epistemics. In the first section, which deals with non-epistemic + non-epistemic data, I will base the possible combinations on modal flavours that are usually used in literature that follows the Kratzerian way of thinking about modals (Kratzer, 1981, 1991, 2012; Hacquard, 2006; von Stechow, 2006; Rubinstein, 2012); that is, I will analyse the acceptability of combinations of deontic, bouletic, teleological, circumstantial and epistemic flavours. The focus of this section is on the substantial amount of data that is in most cases presented together with contexts and always marked for modal flavour and force. The remaining part of this data set can be found in Appendix 1. This data set forms the basis of the analysis that follows in Chapter 4.

#### 3.4.1 Non-epistemic modals over non-epistemic modals

##### 3.4.1.1 Modals under *morati*

*Morati* ‘must, have to’ can embed both possibility modals and the other necessity modal, *trebati* ‘ought to, should’.

For instance, (45)a. and b. are examples of a bouletic *morati* embedding *morati* and *trebati* in their circumstantial meanings. The examples, though slightly pragmatically questionable, are not semantically unacceptable, since it is possible

<sup>22</sup>What is taken as “possible” was discussed in Section 1.4.



- (46) #Prema majčinim željama on **mora**  
 according to mother's wishes he must.PRES.3SG.∇BOUL  
**trebati** pospremiti sobu da bi dobio čokoladu.  
 ought.INF.∇TELEO clean.INF room to be.COND get chocolate  
*According to his mother's wishes, he must need to clean the room to get a  
 chocolate.*
- (47) #Prema majčinim željama on **mora**  
 according to mother's wishes he must.PRES.3SG.∇BOUL  
**trebati** pospremiti sobu jer je takav  
 ought.INF.∇DEONT clean.INF room because be.PRES.3SG that-kind  
 zakon.  
 law  
*According to his mother's wishes, he must need to clean the room because  
 the law says so.*
- (48) #Da bi dobio čokoladu, on **mora**  
 to be.COND get chocolate he must.PRES.3SG.∇TELEO  
**trebati** pospremiti sobu jer je takav  
 ought.INF.∇DEONT clean.INF room because be.PRES.3SG that-kind  
 zakon.  
 law  
*To get a chocolate, he must need to clean the room because the law says so.*

The intuition here is that the unacceptability of these structures results from the fact that the propositions these modals rely on are too similar and therefore it is quite confusing to determine which modal relies on what. For instance, in (46) it is confusing whether it is the emperor's wishes or the goal of getting the chocolate that is the relevant priority for both modals. When interpreting these one receives the initial impression that they might be acceptable, but when one tries to compose the meaning, it becomes clear that they are semantically uninterpretable. This is due to the fact that one can interpret these if both parts of contexts (e.g. *according to the emperor's wishes* and *to get a chocolate* in (46)) are attributed to a single modal auxiliary. However, this is not the intended interpretation. The intended interpretation attributes the former to *morati*, and the latter to *trebati*, which then causes a clash of priorities these rely on.



- (50) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that based on the rules of the society, it has to be allowed by the wishes of your voters for you to say this:

To **moraš** **smjeti** reći bez obzira na  
 it must.PRES.2SG.∇DEONT may.INF.∃BOUL say.INF no matter on  
 masovni pritisak.  
 mass pressure  
*You must be allowed to say that in spite of public pressure.*

- (51) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that based on the rules of the society, it has to be allowed for him to say this so he can focus on his work:

To **moraš** **smjeti** reći bez obzira na  
 it must.PRES.2SG.∇DEONT may.INF.∃TELEO say.INF no matter on  
 masovni pritisak.  
 mass pressure  
*You must be allowed to say that in spite of public pressure.*

Importantly, a circumstantial *morati* cannot embed *smjeti* and *moći*. It will be shown in Sections 3.4.1.3 and 3.4.1.4 that the opposite order is possible. Note that with a circumstantial interpretation of *moći* this also results in an unacceptable structure. This will be further discussed in Section 3.4.1.4.

- (52) #Alergičari **moraju** **smjeti/moći**  
 allergy-sufferers must.PRES.3PL.∃CIRCUM may/can.INF.∇DEONT  
 kihnuti.  
 sneeze.INF  
*Allergy sufferers have to be allowed to sneeze.*<sup>23</sup>

Note that it is very important to interpret the first modal here as a circumstantial, rather than a deontic, bouletic or teleological modal, in which case this would be an

<sup>23</sup>Note that the first modal needs to be interpreted as circumstantial, rather than deontic.

acceptable construction. It is rather difficult to interpret it here as a circumstantial since this meaning is conceptually very difficult to access. However, if one does interpret *morati* here as relying on internal circumstances as in case of *I need to sneeze*, it is clear that this combination is unacceptable.

*Moći* is a highly versatile modal in Croatian. It occurs in all non-epistemic modal flavours and the epistemic flavour. It is possible to embed it under deontic *morati* as a deontic modal in (53) and as a circumstantial modal in (54).

- (53) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says:

To je nešto što uvijek **moraš**  
 that is something that always must.PRES.2SG.∀DEONT  
**moći** napraviti.  
 may.INF.∃DEONT do.INF  
*That's something you must always be allowed to do.*

Similarly to the cases above, where *morati* embeds *smjeti*, combinations of bouletic and teleological *morati* and *moći* are also possible. In (54) *moći* ‘may, can’ is embedded under *morati*.<sup>24</sup> Finally, this ordering is not acceptable in the case of circumstantial *morati*.

- (54) Context: Ivan is a soldier. He is asked to do 100 push-ups but he fails. His sergeant says:

To je nešto što uvijek **moraš**  
 that is something that always must.PRES.2SG.∀DEONT  
**moći** napraviti.  
 can.INF.∃CIRCUM do.INF  
*That's something you must always be able to do.*

To summarise, it seems that the Croatian strong necessity modal *morati* is capable of embedding the weak necessity modal *trebati* and *morati* in constructions which are admittedly rather pragmatically odd, but still semantically available. It is

<sup>24</sup>Note that *moći* is glossed differently in (53) and (54) to demonstrate the difference in meanings more clearly in English.

capable of embedding both possibility modals in all their available meanings. Also, when *morati* is embedding another modal auxiliary, it tends to be in the deontic, bouletic or teleological flavour, rather than its circumstantial meaning (which it can convey in SMCs). The summary of restrictions based on examples from (45) to (54) can be seen in Table 3.2.

**Table 3.2:** Summary of restrictions for DMCs where *morati* is in the initial position

M2	M1			
	<i>morati<sub>deont</sub></i>	<i>morati<sub>boul</sub></i>	<i>morati<sub>teleo</sub></i>	<i>morati<sub>circum</sub></i>
<i>morati<sub>deont</sub></i>	-	-	-	-
<i>morati<sub>boul</sub></i>	-	-	-	-
<i>morati<sub>teleo</sub></i>	-	-	-	-
<i>morati<sub>circum</sub></i>	+	+	+	-
<i>trebati<sub>deont</sub></i>	-	-	-	-
<i>trebati<sub>boul</sub></i>	-	-	-	-
<i>trebati<sub>teleo</sub></i>	-	-	-	-
<i>trebati<sub>circum</sub></i>	+	+	+	-
<i>smjeti<sub>deont</sub></i>	+	+	+	-
<i>smjeti<sub>boul</sub></i>	+	+	+	-
<i>smjeti<sub>teleo</sub></i>	+	+	+	-
<i>moći<sub>deont</sub></i>	+	+	+	-
<i>moći<sub>boul</sub></i>	+	+	+	-
<i>moći<sub>teleo</sub></i>	+	+	+	-
<i>moći<sub>circum</sub></i>	+	+	+	-

### 3.4.1.2 Modals under *trebati*

*Trebati* is a weak necessity modal. This means that in terms of force it is the same as *morati* but there is a difference in terms of modal strength. According to the following data, it seems that *trebati* behaves similarly to *morati*.

First, it behaves similarly to *morati* with respect to whether it can embed itself or *morati*. Note, however, that these combinations seem pragmatically quite odd, as was the case for combinations where the first modal is *morati*, as discussed in the previous section. It seems to only be able to embed itself if the flavour is substantially different, that is, if the first modal is deontic, teleological or bouletic and the second modal is circumstantial. The opposite ordering, in which the circumstantial modal is in the initial position, is not acceptable.

(55) Context: Ivan is an actor. The director needs him to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.

a. On **treba** **morati** kihnuti u tom  
 he ought.PRES.3SG.∇BOUL must.INF.∇CIRCUM sneeze.INF in that  
 trenutku.  
 moment

*He ought to have to sneeze at that moment.*

b. On **treba** **trebati** kihnuti u tom  
 he ought.PRES.3SG.∇BOUL ought.INF.∇CIRCUM sneeze.INF in that  
 trenutku.  
 moment

*He ought to need to sneeze at that moment.*

Note that the above example is very similar to what was seen above for *morati* (in example (45)). This is due to the fact that the two verbs are very similar in meaning, but differ in modal strength, so the *morati* cases would concern situations in which it is absolutely necessary for the actor to do something, while (55) would concern situations where it is recommended.

Furthermore, note here that the same restrictions apply in the case of a deontic and teleological *trebati*. Also similarly to *morati*, examples like *treba trebati* and *treba morati* where the modal auxiliaries are combinations of deontic, bouletic and teleological flavours seem to be unacceptable. In other words, the following 9 combinations for both *treba trebati* and *treba morati* are not semantically acceptable: deontic + deontic, deontic + bouletic, bouletic + teleological, bouletic + deontic, bouletic + bouletic, bouletic + teleological, teleological + deontic, teleological + bouletic and teleological + teleological. This goes along the same lines as the examples with *morati* (examples (46) to (48)) from the previous section.

Example (56) shows that *trebati* can embed the possibility modal *smjeti*, in which case both are either deontic, bouletic or teleological.

- (56) Context: Ivan is the son of a very wealthy man who donates a lot of money to the police force. He broke the law but was let go early due to his father's influence. One of the more outspoken police officers says:

Ivan **treba** **smjeti** biti zadržan u  
 Ivan ought.PRES.3SG.∇DEONT may.INF.∃DEONT be.INF kept in  
 zatvoru.  
 prison  
*It ought to be allowed that Ivan is kept in prison.*

Again, these examples are similar to examples (50) and (51) from the previous section in which the first modal is *morati*.

As with *morati*, the ordering in which a circumstantial *trebati* embeds *smjeti* or *moći* (either deontic or circumstantial) is not acceptable.<sup>25</sup>

- (57) #Alergičari **trebaju** **smjeti/moći**  
 allergy-sufferers ought.PRES.3PL.∃CIRCUM may/can.INF.∇DEONT  
 kihnuti.  
 sneeze.INF  
*Allergy sufferers need to be allowed to sneeze.*

Finally, *trebati* can embed both deontic/bouletic/teleological and circumstantial *moći* ((58) and (59), respectively), but only when it is not circumstantial. In (58), a bouletic *trebati* embeds a deontic *moći*. Note that with a slight manipulation of the contexts, that is, the propositions that the modals pick up on, both of these could also be any combination of deontic/teleological modal auxiliaries, and the result would also be grammatical.

- (58) Context: Ivan is the CEO of the company and he is late for a meeting. The person he is supposed to meet complains. Ivan's assistant says:

On **treba** **moći** doći kad on  
 he ought.PRES.3SG.∇DEONT may.INF.∃BOUL come.INF when he  
 želi.  
 wish.PRES.3SG  
*He ought to be allowed to come when he wishes.*

<sup>25</sup> For an explanation on why this needs to be interpreted as a circumstantial modal refer to page 78, example (87).

In example (59), a deontic *trebati* embeds a circumstantial *moći*:

- (59) Context: Ivan is training to be a firefighter. They are learning about how to emotionally deal with difficult situations. The lecturer says:

To je užas koji **trebaš** **moći**  
 that is horror which ought.PRES.2SG.∀DEONT can.INF.∃CIRCUM  
 preživjeti.  
 survive.INF  
*That is a horror that you ought to be able to survive.*

Note that in (58) and (59) there is an issue with first place modals possibly being interpreted as circumstantial. Recall example (52) on page 78. It was claimed that it is crucial to interpret the first modal here as a circumstantial, rather than a deontic, bouletic or teleological modal. When one tries to take into account propositions that would make this a circumstantial modal, it becomes impossible to think of any, since this meaning is conceptually very difficult to access. However, similarly to the case in (52), if one does interpret *morati* here as relying on internal circumstances, this combination is unacceptable.

To sum up, the Croatian weak necessity modal *trebati* can embed itself and the other necessity modal *morati*, albeit in combinations that are slightly pragmatically odd. Also, it cannot come in the initial position if it is in its circumstantial meaning. It can embed both possibility modals *smjeti* and *moći* in all their available modal flavours. The summary of restrictions based on examples (55) to (59) can be seen in Table 3.3.





circumstantial meaning. The summary of restrictions based on examples (60) to (64) can be seen in Table 3.4.

**Table 3.4:** Summary of restrictions for DMCs where *smjeti* is in the initial position

M2	M1		
	smjeti <sub>deont</sub>	smjeti <sub>boul</sub>	smjeti <sub>teleo</sub>
morati <sub>deont</sub>	-	-	-
morati <sub>boul</sub>	-	-	-
morati <sub>teleo</sub>	-	-	-
morati <sub>circum</sub>	+	+	+
trebati <sub>deont</sub>	-	-	-
trebati <sub>boul</sub>	-	-	-
trebati <sub>teleo</sub>	-	-	-
trebati <sub>circum</sub>	+	+	+
smjeti <sub>deont</sub>	-	-	-
smjeti <sub>boul</sub>	-	-	-
smjeti <sub>teleo</sub>	-	-	-
moći <sub>deont</sub>	-	-	-
moći <sub>boul</sub>	-	-	-
moći <sub>teleo</sub>	-	-	-
moći <sub>circum</sub>	+	+	+

#### 3.4.1.4 Modals under *moći*

The possibility modal *moći* seems to be the most interesting modal of the four. Thanks to the wide variety of interpretations it can convey, *moći* is one of the most frequent modals in Croatian. It is used especially prominently in its circumstantial ability meaning, where it conveys a meaning similar to English *to be able to*.

The modal auxiliary *moći* in its deontic, bouletic and teleological meanings does not seem to be able to embed deontic, bouletic and teleological *morati* and *trebati*.

- (65) #Djeca **mogu** **morati/trebati** pospremiti  
 children may.PRES.3PL.∃DEONT must/ought.INF.∀DEONT clean.INF  
 sobu.  
 room  
*The children are allowed to have to/ought to clean the room.*

When the first modal *moći* is in its circumstantial meaning, a deontic/bouletic/teleological meaning seems to be blocked.

- (66) #Ivan **može** **morati/trebati** pospremiti sobu.  
 Ivan can.PRES.3SG.∃CIRCUM must/ought.INF.∀DEONT clean.INF room  
*It is possible for Ivan to have to clean the room/ Ivan is able to have to clean the room.*

The *it is possible* interpretation here might be available for some speakers. However, I claim that this is due to the fact that in that case it is actually interpreted as an epistemic-like expression where it is actually scoping over the entire proposition and the use is based on some sort of evidence/assumptions. Therefore, in the purely circumstantial interpretation it does not seem to be available in this order. Again, to make sure that it is actually interpreted as a circumstantial modal one needs to rely on correct propositions, i.e. circumstances, which is sometimes difficult since they are conceptually unavailable. This is similar to the case of circumstantial necessity modals in first place positions.

However, it seems that it is possible to have a circumstantial *moći* and a circumstantial necessity modal together, such as in examples (67) and (68). Example (67) is a circumstantial *moći* embedding a circumstantial *morati*, while in example (68) a circumstantial *moći* embeds a circumstantial *trebati*. Note that here second place modals need to be interpreted as circumstantial due to the context which makes deontic/bouletic/teleological flavours unavailable since it is based on internal circumstances.

- (67) Context: At the beginning of a long bus trip, the driver warns the passengers that the toilet is out of order. Someone says:

Djeca **mogu** **morati** piškiti.  
 children can.PRES.3SG.∃CIRCUM must.INF.∀CIRCUM pee.INF  
*It is possible for the kids to have to pee.*

- (68) Context: A group is going bird watching. Their leader tells everyone not to make a sound when they get close to a bird. Someone says:

Alergičari            **moğu**                            **trebati**  
 allergy-sufferers can.PRES.3PL.∃CIRCUM ought.INF.∇CIRCUM  
 kihnuti.  
 sneeze.INF  
*It is possible that the allergy sufferers will need to sneeze.*

When combined with the other possibility modal *smjeti*, it seems that *moći* cannot embed it, such as in (69) and (70). For (70), there might be the same issue as above with the *it is possible* interpretation. Nevertheless, I argue that where speakers do find these cases acceptable, they are actually interpreting *moći* as some sort of epistemic *moći*.

- (69) #Ivan **može**                            **smjeti**                            otvoriti vrata.  
 Ivan may.PRES.3SG.∃DEONT may.INF.∃DEONT open.INF door  
*Ivan may be allowed to open the door.*<sup>26</sup>

- (70) #Ivan **može**                            **smjeti**                            otvoriti vrata.  
 Ivan can.PRES.3SG.∃CIRCUM may.INF.∃DEONT open.INF door  
*Ivan is able to be allowed to open the door.*

And finally, similarly to other modal auxiliaries such as *morati* and *trebati* which can convey a variety of modal meanings, *moći* can embed *moći* both in examples where the first modal is deontic and the second modal is circumstantial, and where both modals are circumstantial:

- (71) Context: The online student system is set up in such a way that the student is the only one who is able to see their grades. It says on the university website:

Samo student **može**                            **moći**                            vidjeti  
 only student may.PRES.3SG.∃DEONT can.INF.∃CIRCUM see.INF  
 svoje ocjene.  
 their grades  
*It is permitted only for the student to be able to see their grades.*

<sup>26</sup>Note that this English translation is easily confused with the epistemic *may*. Here the deontic flavour is intended.

- (72) Context: There is a hole in the wall. Ana says no human can pass through it because it is too small, and Ivan replies:

Djeca **mogu** **moći** proći  
 children can.PRES.3PL.∃CIRCUM can.INF.∃CIRCUM pass.INF  
 kroz tu rupu.  
 through that hole  
*It is possible for children to be able to pass through that hole.*

To summarise, a deontic/bouletic/teleological *moći* only seems to be able to embed circumstantial flavours of other modal auxiliaries, that is, *morati* and *trebati*, as well as itself. On the other hand, it does not seem to be able to embed *smjeti* since *smjeti* does not appear in circumstantial meanings. Interestingly, as seen in (71) and (72), a circumstantial *moći* can embed another circumstantial *moći*.

**Table 3.5:** Summary of restrictions for DMCs where *moći* is in the initial position

M2	M1			
	<i>moći<sub>deont</sub></i>	<i>moći<sub>boul</sub></i>	<i>moći<sub>teleo</sub></i>	<i>moći<sub>circum</sub></i>
<i>morati<sub>deont</sub></i>	-	-	-	-
<i>morati<sub>boul</sub></i>	-	-	-	-
<i>morati<sub>teleo</sub></i>	-	-	-	-
<i>morati<sub>circum</sub></i>	+	+	+	+
<i>trebati<sub>deont</sub></i>	-	-	-	-
<i>trebati<sub>boul</sub></i>	-	-	-	-
<i>trebati<sub>teleo</sub></i>	-	-	-	-
<i>trebati<sub>circum</sub></i>	+	+	+	+
<i>smjeti<sub>deont</sub></i>	-	-	-	-
<i>smjeti<sub>boul</sub></i>	-	-	-	-
<i>smjeti<sub>teleo</sub></i>	-	-	-	-
<i>moći<sub>deont</sub></i>	-	-	-	-
<i>moći<sub>boul</sub></i>	-	-	-	-
<i>moći<sub>teleo</sub></i>	-	-	-	-
<i>moći<sub>circum</sub></i>	+	+	+	+

### 3.4.1.5 Summary of restrictions in non-epistemic + non-epistemic combinations

Following this data, these seem to be the provisional rules for DMCs when both of the modals express non-epistemic modality.<sup>27</sup> Some of the provisional rules with

<sup>27</sup>It is important to note that this overview has only covered bare modals without the additional conditional mood. The reason one needs to mention the conditional mood is that it is another

initial questions coming out of the generalisations are listed below:

- Necessity modal auxiliaries can be stacked on top of each other if their flavours are different

**Question:** Is there an ordering restriction on flavours if they are both necessity modals?

**Answer:** It seems that there is — deontic/bouletic/teleological modals scope over circumstantials.

- Necessity modal auxiliaries can be stacked on possibility modal auxiliaries.

**Question:** In which flavours are these stacked in this way?

**Answer:** It seems that necessity scopes over possibility in the case where the modal auxiliaries have the same flavour. Within the same flavour, the order possibility > necessity is impossible.

- Possibility modal auxiliaries can be stacked on necessity modal auxiliaries.

**Question:** In which flavours are these stacked this way?

**Answer:** It seems that possibility scopes over necessity only when a necessity modal auxiliary conveys a circumstantial flavour.

- Possibility modals can be stacked on possibility modals.

**Question:** For which flavours is this available?

**Answer:** It seems to be available for deontic/bouletic/teleological *smjeti* and *moći* when they embed a circumstantial *moći*, and for the circumstantial *moći* when it embeds a slightly different interpretation of the circumstantial *moći*.

- Deontic, bouletic and teleological modal auxiliaries seem to behave alike in DMCs and do not cause different restrictions.

**Question:** How is this reflected in the existing modal flavour categorisations? What does this say about the syntactic and semantic status of these flavours?

**Answer:** This might imply that these flavours have a slightly different status from other flavours that cause semantic restrictions.

---

way in which epistemic meaning can be expressed with *trebati*, which is not included above. This might result in additional possibilities for stacking modals.

The conclusions drawn from the previous sections are summarised in Table 3.6. For the sake of concision, I am here using the abbreviation DBT for the deontic, bouletic and teleological modal auxiliaries since the data shows they behave alike in DMCs.

**Table 3.6:** Summary of restrictions

	DBT + circ	DBT + DBT	circ + circ	circ + DBT
mora trebati	+	-	-	-
mora smjeti	-	+	-	-
mora moći	+	+	-	-
treba morati	+	-	-	-
treba moći	+	+	-	-
treba smjeti	-	+	-	-
smije morati	+	-	-	-
smije moći	+	-	-	-
smije trebati	+	-	-	-
može morati	+	-	+	-
može trebati	+	-	+	-
može smjeti	-	-	-	-
mora morati	+	-	-	-
treba trebati	+	-	-	-
smije smjeti	-	-	-	-
može moći	+	-	+	-

### 3.4.2 Epistemic modals over non-epistemic modals

From just a single glance at the data, it seems that the epistemic *morati* has no problems embedding other modal auxiliaries since the epistemic *morati* always embeds another verb, whether this is a non-modal verb or a modal auxiliary. For instance, in examples from (73) to (75) we can see how an epistemic *morati* embeds non-epistemic *morati*, *trebati*, *smjeti* and *moći*.









a matter of stipulation and suggested that they are in fact predictable, which is something that has been confirmed by the majority of subsequent work.

Secondly, I discussed some of the syntactic studies that mainly deal with epistemic + non-epistemic combinations and build their proposals largely on syntactic restrictions on these combinations (Battistella, 1995; Close, 2004; Elsmann & Dubinsky, 2009; Hasty, 2012a,b). I have argued here that the missing piece in most of these analyses is the fact that they do not seem to be able to account for restrictions in non-epistemic + non-epistemic data that do appear in non-standard Southern dialects of American English, but in many other languages as well. However, one study, Thráinsson & Vikner (1995), raises the issue of non-epistemic combinations as being relevant here but does not attempt to solve the semantic puzzle behind it.

After the syntactic studies, I explored some of the descriptive studies that present interesting data from English, Dutch and German, and raise some important questions on the combinatorics of DMCs (Jędrzejowski & van de Vate, 2013; Bour, 2014). I have also discussed some of the typological work coming from Cinque (1999) and Nauze (2008), who propose a hierarchical approach based on combinations of modal structures — the crucial pieces of data for these two accounts are combinations of modal auxiliaries and modal adverbs. However, I have noted that both of these do not seem to account for differences in modal force that are crucial for combinations of modal auxiliaries. Nevertheless, Cinque acknowledges a modal force ordering but places it on the same hierarchy with modal flavour, where they are considered to be elements of the same status.

Finally, I briefly reviewed the literature on modal concord and work by authors such as Geurts & Huitink (2006), Zeijlstra (2007), Anand & Brasoveanu (2010), Grosz (2010) and Huitink (2012). The literature on modal concord shows how combinations of modal auxiliaries and modal adverbs tend to cause a concord effect, while it has been pointed out that the same effect does not occur in combinations of modal auxiliaries.

Based on the previous literature I have identified some of the most relevant puzzles that still remain unsolved, such as how non-epistemic + non-epistemic

combinations behave syntactically and whether it is their syntax that blocks some of the possible combinations. On the other hand, if it is not syntax that blocks some non-epistemic + non-epistemic combinations, what are the semantic restrictions that block them, and finally, do both modal force and flavour play a role in these semantic restrictions?

As already mentioned, the answers to these questions lie in DM data. Therefore, in the second part of this chapter I have presented Croatian DM data in four main groups, i.e. non-epistemics embedding non-epistemics, epistemics embedding epistemics, epistemics embedding non-epistemics, and non-epistemics embedding epistemics. Within the section dealing with non-epistemic + non-epistemic data, I have identified possible combinations with respect to different flavours and different modal auxiliaries in both modal positions.

Throughout this chapter, I have drawn some initial conclusions. It has been shown that while some constructions are available when an appropriate context is found, others are completely semantically unavailable, either due to the fact that they have the same force and flavour or for some other reasons that will be explored in the chapters to come. A summary of these restrictions is shown in Table 3.7.

**Table 3.7:** Summary of restrictions with reasons for unacceptability

	DBT + circ	DBT + DBT	circ + circ	circ + DBT
mora trebati	pragmatically odd	same MFl & Fr	same MFl & Fr	semantically bad
mora smjeti	flavour not accessible	+	semantically bad	semantically bad
mora moći	+	+	semantically bad	semantically bad
treba morati	pragmatically odd	same MFl & Fr	same MFl & Fr	semantically bad
treba moći	+	+	semantically bad	semantically bad
treba smjeti	flavour not accessible	+	semantically bad	semantically bad
smije morati	pragmatically odd	semantically bad	flavour not accessible	flavour not accessible
smije moći	+	same MFl & Fr	flavour not accessible	flavour not accessible
smije trebati	+	semantically bad	flavour not accessible	flavour not accessible
može morati	pragmatically odd	semantically bad	+	semantically bad
može trebati	pragmatically odd	semantically bad	+	semantically bad
može smjeti	flavour not accessible	same MFl & Fr	flavour not accessible	semantically bad
mora morati	pragmatically odd	same MFl & Fr	same MFl & Fr	semantically bad
treba trebati	pragmatically odd	same MFl & Fr	same MFl & Fr	semantically bad
smije smjeti	flavour not accessible	same MFl & Fr	same MFl & Fr	flavour not accessible
može moći	+	same MFl & Fr	+	semantically bad

In Table 3.7 I identified five possible acceptability outcomes for non-epistemic combinations. First, the combinations may simply be acceptable. These constructions are generally judged to be acceptable across the board and should not show much variation across judgements from different speakers. Second, DMCs may be acceptable, but slightly pragmatically odd. These are constructions that are semantically available, but only acceptable in very specific contexts due to their

oddness. In DMCs the pragmatic oddness often comes from the fact that modal auxiliaries can be ambiguous and therefore DMCs can consist of two lexical items that are the same but convey different modal flavours. These two possibilities are marked in green and will both be considered acceptable structures in the the analysis to come.

The remaining three combinations refer to DMCs that are unacceptable. These are marked in orange in the table. First, the combination might be missing from the set of possible combinations due to the unavailability of a particular modal flavour. Recall that not all modal auxiliaries express all modal flavours, for instance, *smjeti* cannot be epistemic. Second, the unacceptability can come from the fact that two modals are of the same or similar<sup>28</sup> force and flavour. Third, the combinations can be semantically bad. This refers to combinations that are not grammatical, that is, there is no available semantic interpretation. The difference between these and the pragmatically odd cases is that for the latter there is a possible context in which they are grammatical, while for the semantically bad examples there is no such context.

As can be seen in Tables 3.6 and 3.7, some of the initial restrictions I have identified include: necessity and possibility modal auxiliaries can be stacked on top of each other; necessity modal auxiliaries can be stacked on possibility modal auxiliaries; possibility modal auxiliaries can be stacked on necessity modal auxiliaries; possibility modals can be stacked on possibility modals;<sup>29</sup> and finally, deontic, bouletic and teleological modal auxiliaries seem to behave the same in DMCs and do not cause different restrictions. I have also discussed why these restrictions might be interesting and what some possible causes underlying them might be, or alternatively, what needs to be done to answer the questions they raise. The other three groups were much less complex. Within the epistemic + non-epistemic combinations I showed why these are acceptable and how these combine. Furthermore, I have shown that combinations in which epistemics embed epistemics are acceptable, though slightly

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<sup>28</sup>As in the case of deontic, bouletic and teleological modals. This will be discussed in more depth in Chapter 4.

<sup>29</sup>Note that based on the assumptions and data we have seen so far I cannot draw any definite conclusions yet on whether the flavour needs to be different. This is a topic that will be discussed in Chapter 4.

pragmatically odd. Finally, I have concluded the chapter with combinations that do not seem to be acceptable, i.e. non-epistemics embedding epistemics.

To summarise, the aim of this chapter was to set up the context and the data for the main puzzle of this thesis: What are the semantic restrictions for combining modal auxiliaries into DMCs, and why? What are the compositional pieces that influence these restrictions and how do they come together in any DMC? These are the principal questions I aim to answer in Chapters 4 and 5.

# 4

## Force and Flavour as Semantic Restrictors in DMCs

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### 4.1 Introduction

The main puzzle that emerges from the DM data in Croatian shows that modal auxiliaries combine on the basis of certain semantic restrictions, thus creating multiple layers of modality. For example, epistemic modals can embed non-epistemic modals but not vice versa, as in (1):



these restrictions, being the most important compositional pieces in creating modal meanings even in SMCs. This results in a hierarchical analysis of the Croatian DM data which takes into account both modal flavour and modal force as crucial pieces of modal meaning. I also discuss the possible implications of DM data on the way we traditionally define modal flavours within the non-epistemic group and suggest some alterations to the existing categorisation. I will propose that DM data suggests that while some flavours are grammatically prominent and cause different restrictions, others do not, and therefore need to have a different status.

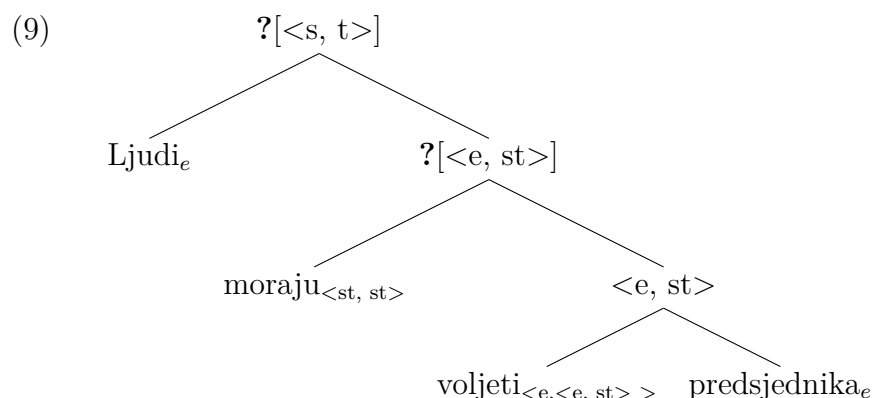
This chapter starts with a preliminary analysis in which I explore a possible type-based proposal to account for some of the initial conclusions on the relationship between the two big groups of modal auxiliaries. I will suggest that epistemics and non-epistemics need to be identified as structurally distinct in order to be able to account for the differences in behaviour between these two groups. While some of these syntactic differences are visible even in SMCs, I will here use DMCs to strengthen my claim that they need to be of different types. The account I propose will go along similar lines to some previous accounts that suggest non-epistemics behave as control structures (Chierchia, 1984), while epistemics behave like raising verbs.

In Section 4.3 I start with some basic assumptions that need to be addressed in the analysis, including an anti-concord constraint that is crucial for understanding the semantic restrictions on DMCs. Second, based on the data, I challenge some of the traditional assumptions on modal flavours in Section 4.4. In this section I propose a distinction between grammatical and non-grammatical modal flavours. I will also give a short overview of the previous account and the possible modal flavours they propose, using these to pin down what the grammatical flavours are that influence restrictions in DMCs. Based on the previous accounts and Croatian DMC data, I suggest a categorisation of flavours that is crucial for a full analysis of DMCs.

Finally, in Section 4.5 I propose the final analysis for the semantic restrictions on non-epistemic DMCs, focusing on restrictions within different groups of non-epistemic modals, their relationship with epistemics, as well as what this means



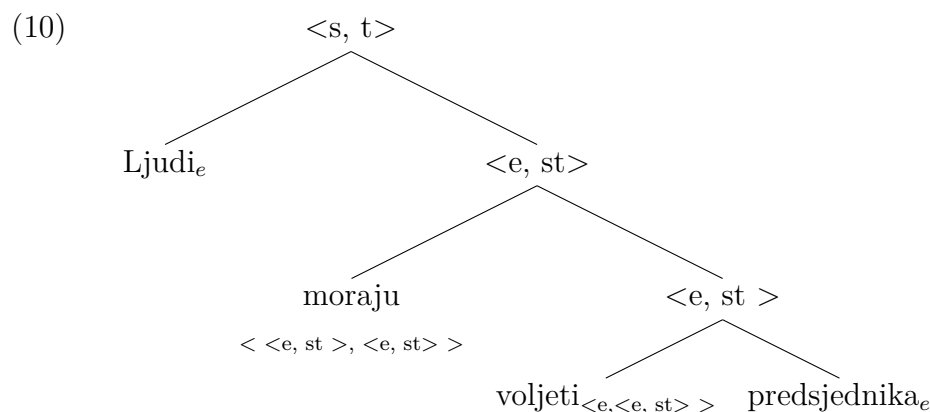




Due to the differences in syntactic structure between (7) and (9), the same compositional type does not fit both epistemic and non-epistemic structures. Since *morati* in (8) does not take the proposition as its argument it cannot be of type  $\langle st, st \rangle$ .<sup>2</sup> There are two separate views on the compositional puzzle of modal structures in the literature. The more traditional view (Jackendoff, 1971) is that non-epistemic modals are control predicates and epistemic modals are raising predicates. If we assume this type of analysis, it is not possible to assume a lexical entry that would be the same for both types of modals and differ only in the type of modal base. The other, more recent view is that all modal verbs are raising predicates (Bhatt, 1998; Wurmbrand, 1999; von Stechow & Heim, 2002). Kratzer's lexical entry assumes just that. However, Kratzer's analysis fits languages in which both epistemic and non-epistemic constructions exhibit the same syntactic characteristics. When comparing (7) and (9) we can see that this is not the case in Croatian.

Therefore, I propose to treat non-epistemics and epistemics in Croatian as structures of different compositional types and to change the lexical entry for *morati* to (11):

<sup>2</sup>This is assuming that there is no movement of the modal above the subject at LF. The analysis that does not assume movement has been chosen for reasons of surface transparency.



(11)  $[[\mathbf{morati}]]^{c,f,g} = \lambda P_{e,st}. \lambda x_e. \lambda w_s. \forall w' \in \max_{g(w)}(\cap f(w)): P(x)(w')=1.$

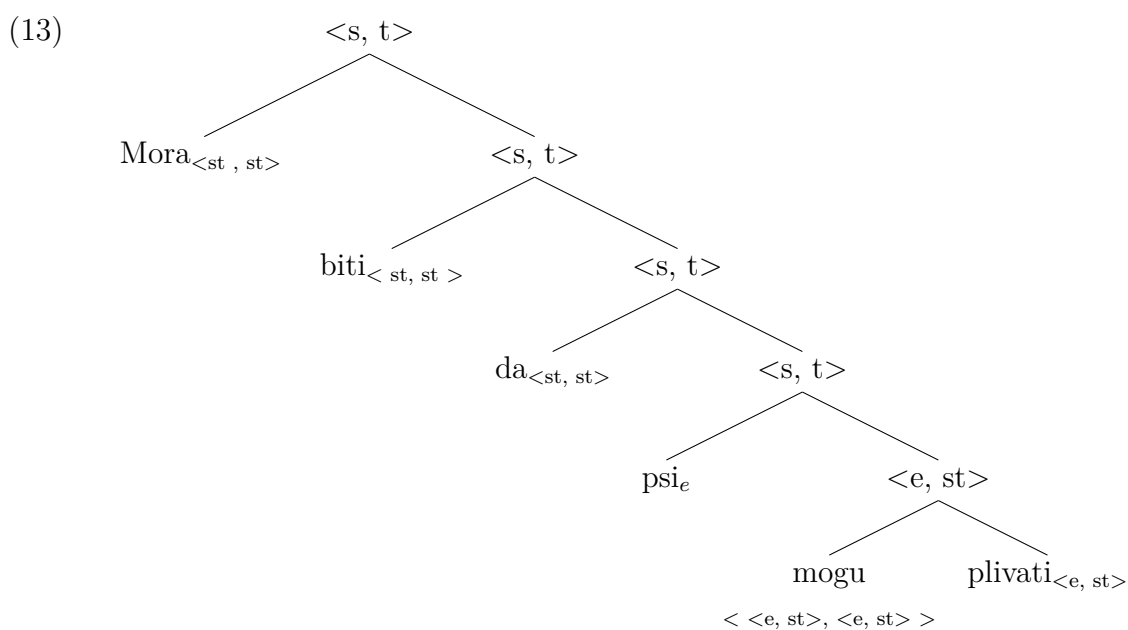
Within this proposal, non-epistemic modals like *morati* in (8) are treated as type  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$  (which under some analyses is considered to be a control structure (Chierchia, 1984)).<sup>3</sup> Otherwise, the lexical entries in (5) and (11) both follow Kratzer's framework and are quite similar. The modal quantifies universally over the set of all the possible worlds from the modal base, which is an intersection of the worlds in which all propositions in question are true ( $\cap f(w)$ ). These worlds are then ordered according to the propositions from the ordering source to give us maximally good worlds ( $\max_{g(w)}$ ). The main difference between (5) and (11) is that in (5) the modal takes a type  $\langle s, t \rangle$  for an argument, while the non-epistemic modal of type  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$  in (11) takes type  $\langle e, st \rangle$ . This addresses and fixes the issue arising from (9).

Though example (10) shows how this analysis fits SMCs, it is yet to be seen how it would account syntactically for DMCs. Firstly, the simplest DMC syntactically is the combination in which an epistemic modal embeds a non-epistemic modal:

<sup>3</sup>Note, however, that if Kratzer's 1996 proposal to sever the external argument is adopted, then epistemic and non-epistemic types can be unified. Since the differences between the epistemics and non-epistemics are not the central issue of this thesis, this will have to remain an open question for future scholarship.

- (12) Context: Marija is not sure whether dogs can swim. She leaves her dog on one side of the river, leaves, and when she comes back she sees her dog all wet on the other side of the river. She says:

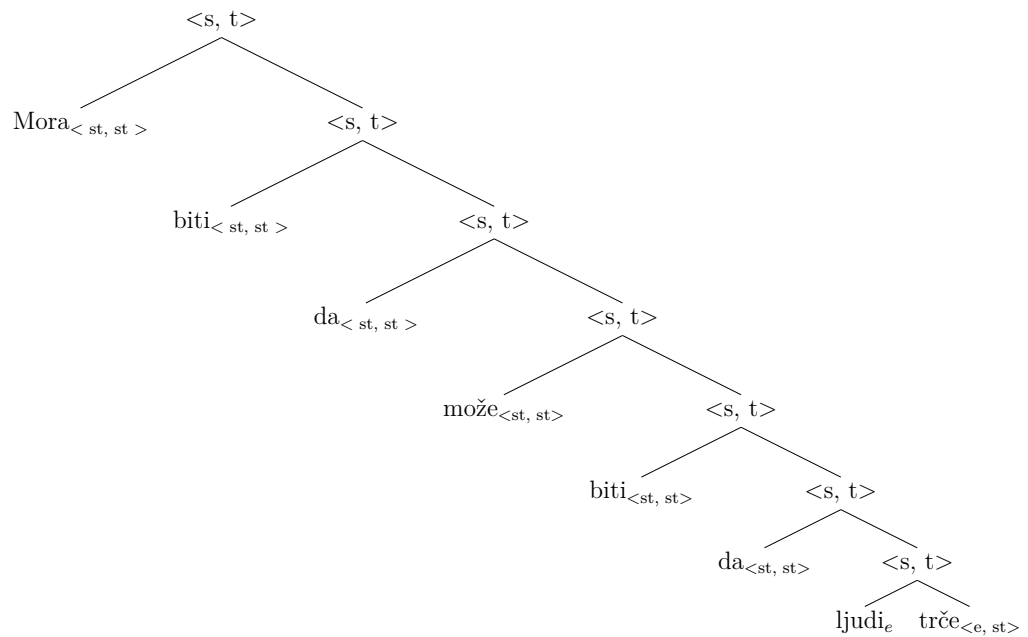
**Mora**                                  biti    da    psi    **mogu**  
 must.PRES.3SG.∀EPIST be.INF that dogs can.PRES.3PL.∃CIRCUM  
 plivati.  
 swim.INF  
*It must be that dogs are able to swim.*



Secondly, recall the combinations in which epistemics embed epistemics, which are somewhat hard to construe but, in general, acceptable. This account is able to account for them as well, since the type  $\langle st, st \rangle$  can be iterated indefinitely above the subject position.

- (14) **Mora**                                  biti    da    **može**                                  biti    da  
 must.PRES.3SG.∀EPIST be.INF that may.PRES.3SG.∃EPIST be.INF that  
 ljudi    trče.  
 people run.PRES.3PL  
*It must be that it may be that people run.*

(15)

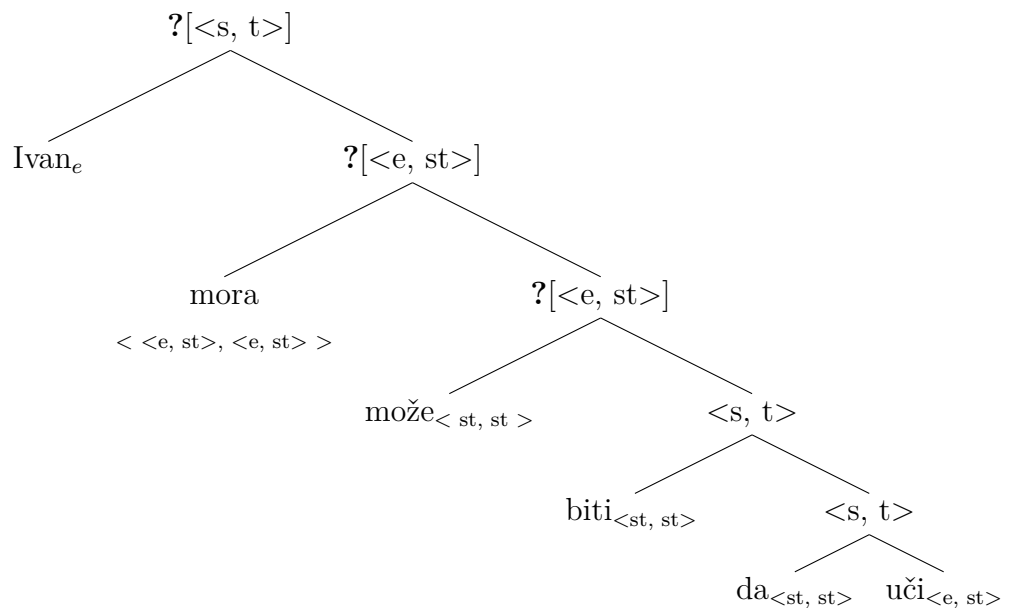


### 4.2.2 Non-epistemic over epistemic modals

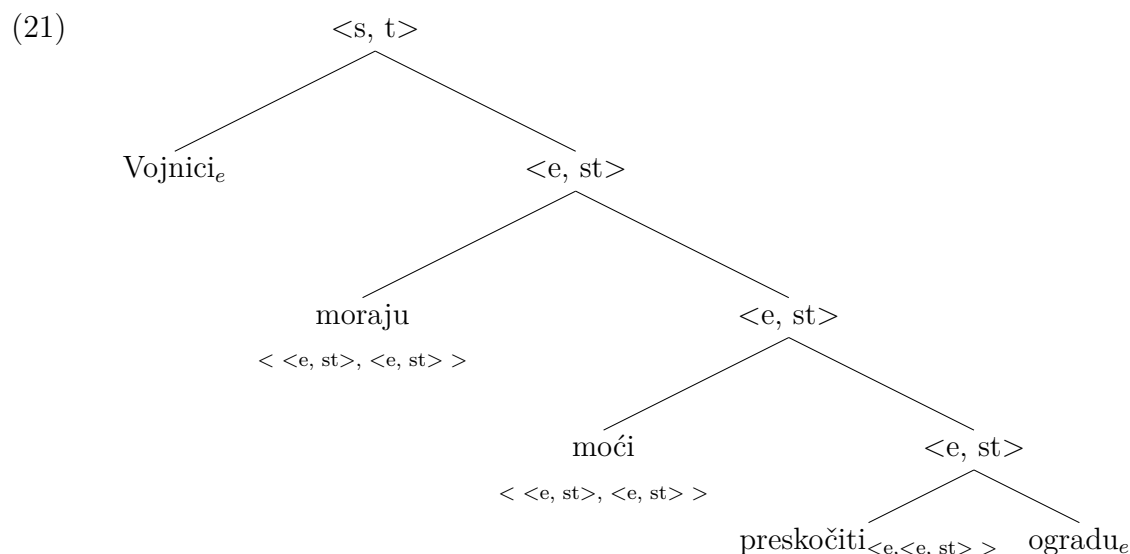
The data also shows that non-epistemic + epistemic combinations are not possible. Example (17) illustrates the clash of compositional types found in sentences where a non-epistemic modal embeds an epistemic modal:

- (16) #Ivan **mora** **može** biti da  
 Ivan must.PRES.3SG.  $\forall$ DEONT may.PRES.3SG.  $\exists$ EPIST be.INF that  
 uči.  
 study.PRES.3SG

(17)







Though these distinctions in syntactic and semantic representation might account for how these verbs behave in SMCs and DMCs, they do not explain why some non-epistemic modals combine to give acceptable structures while others do not. Since all non-epistemic modals appear to behave the same syntactically, we ought to look for differences in their behaviour in their semantics. This seems to be the biggest problem with the previous analyses as well: the only accounts that mention the issue are Thráinsson & Vikner (1995), Nauze (2008) and Jędrzejowski & van de Vate (2013).

Recall some of the restrictions we detected in Table 3.6. For example, necessity modals cannot be stacked on necessity modals, but they can be stacked on possibility modals. These initial generalisations could imply various things. For instance, it might be that the restrictions are dependent on the modal force and that the flavours do not matter, or vice versa, that the flavours matter but the forces do not. Or alternatively, both of these modal pieces matter, which is probably the most plausible proposal based on what we have seen in Chapter 3.

### 4.3 The anti-concord constraint

The question of a possible modal hierarchy in layered modal structures has previously been addressed in the literature (Cinque, 1999; Nauze, 2008). For instance, as introduced in Section 3.2.3.2, Cinque (1999) explores a possible hierarchy of modal

heads using modal adverbs to show restrictions on where different modal heads can appear in syntax. One of the important questions to emerge from Cinque's hierarchy concerns modal force. Cinque makes no differentiation between what seem to be two different sets of hierarchical relationships, that is, modal force and modal flavour, and unites both of these modal characteristics in a single hierarchy as elements of the same status. On the other hand, in my analysis I will be explicit about treating modal force and flavour as two separate parts of modal meaning and not conflating them as the previous literature may seem to do.

As previously discussed in Section 3.2.3.2, another more recent account comes from Nauze (2008), who argues on the basis of data from 6 different languages that epistemics scope the highest, with deontics and ability modals below them, in that order. Recall that in addition to this ordering, Nauze argues that deontics cannot be stacked, which is something I will be arguing against based on Croatian data. My argument is also in line with von Stechow & Iatridou (2009). Furthermore, Nauze makes no assumptions concerning quantificational force, completely excluding it from his hierarchy, perhaps also due to the use of adverbial constructions instead of DMCs. Nevertheless, when the possible orderings of multiple modal constructions are determined, both flavour and force have to be taken into account, especially when two modals of the same flavour combine.

By this point we have seen strong evidence that there exist certain semantic restrictions on combining non-epistemic modals in Croatian.<sup>4</sup> Based on the data, it was proposed in the previous chapter that these restrictions are based on the relationship between modal force, modal base and ordering source, that is, they are based on modal force (necessity/possibility) and flavour (e.g. deontic, circumstantial etc.).<sup>5</sup>

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<sup>4</sup>It seems that certain semantic restrictions apply to similar structures in other languages as well, but this chapter focuses on Croatian data only.

<sup>5</sup>Recall that the former distinction is parallel to the distinction between universal and existential quantifiers over possible worlds, following Kratzerian modal semantics (1981; 1991; 2012). The latter is related to the interpretation the modal verb assumes in a certain context. The manner in which a modal acquires that meaning depends on its modal base and ordering source. For example, a deontic modal has a circumstantial modal base and a non-empty deontic ordering source, while a circumstantial modal has a circumstantial modal base and an empty circumstantial ordering source.



However, two modals with the same force are not acceptable if their flavour is also the same. This can be seen in the following example, where two modals of the same force and flavour combine, i.e. there are two different deontic necessity modals in both modal positions (*morati* and *trebati*).

- (24) #Ona **mora** **trebati** pospremiti sobu.  
 she must.PRES.3SG.∀DEONT ought.INF.∀DEONT clean.INF room  
*She has to need to clean the room.*

Similarly, (25) shows how a DMC in which there are two different deontic possibility modals in both modal positions (*smjeti* and *moći*) is also unacceptable due to the fact that both force and flavour are same.

- (25) #Moj stariji brat **smije** **moći** otvoriti  
 my older brother may.PRES.3SG.∃DEONT may.INF.∃DEONT open.INF  
 vrata.  
 door  
*My older brother may be allowed to open the door.*

Since the traditional approaches to modality rely heavily on modal logic, when trying to solve the above puzzle, the first step needs to be concerned with whether axioms of modal logic can account for some of these restrictions. I take the axioms from the weak system K (Garson, 2014) as the basis for the principles according to which DMs combine and show that while they are able to capture some characteristics of natural language, natural language seems to be a little more complex; that is, the traditional semantics of modal verbs relies not only on quantification over possible worlds, but also on modal flavours. Modal logic, on the other hand, only uses modal quantification.

First of all, basic modal principles can predict the unacceptability of combinations such as *moraš trebati* ‘must ought’ where both of the verbs express necessity and either deontic, bouletic or teleological flavour. These principles also predict the unacceptability of two possibility modal auxiliaries when they both convey deontic flavour or two necessity/possibility modals when they are circumstantial. In other words, modal principles predict the unacceptability of non-epistemic combinations in

which both the first and the second modal are of the same flavour and force. But what is meant here by saying they predict unacceptability? If two modal operators have the same force, the force is interpreted only once. However, as we observed above, we know that the meaning of DMCs is cumulative, therefore, the force needs to be interpreted both times. Therefore, structures in which both modal force and flavour are the same should not be acceptable since they would create modal concord, which is an unavailable reading of DMCs. This will shortly be explained in more detail.

The relevant axioms for stacking modal operators are (26), (27) and (28):

$$(26) \quad \Box A \rightarrow A$$

$$(27) \quad \Box A \rightarrow \Box \Box A$$

$$(28) \quad \Diamond A \rightarrow \Box \Diamond A \text{ (Garson, 2014)}$$

Example (26) claims that what is necessary is the case, (27) claims that what is necessary is necessarily necessary, and (28) claims that what is possible is necessarily possible. These are used to show that “iteration of the modal operators is superfluous” (Garson, 2014). From the combinations of principles in (26) to (28), it follows that a modal operator of the same kind can be replaced by the same operator.

$$(29) \quad \text{a. } \Box \Box \dots \Box = \Box$$

$$\text{b. } \Diamond \Diamond \dots \Diamond = \Diamond$$

The above modal principles ((26) to (28)) tell us that two universal quantifiers do not result in a double necessity meaning: when there are two universal quantifiers, the meaning remains the same as in structures where there is only one. In other words, when a modal operator is combined with another modal operator of the same type, only one of them is interpreted, creating modal concord. But modal auxiliary combinations resist modal concord, and result in a cumulative, rather than a concord meaning. This is how these modal logic axioms predict unacceptability — if we assume that a combination of modal auxiliaries needs to be cumulative then combinations in which (26) to (29) are attested must be unacceptable since

the resultative meaning is not cumulative. However, the data shows that there are acceptable examples in which two modal auxiliaries of the same force combine. Apart from the modal operator's force, what also seems to play a crucial role in modal auxiliaries is the modal flavour. The data shows that modal verbs with the same force can occur together without modal concord as long as their modal flavours are different. Therefore, using two modal auxiliaries where the two quantifications are the same and, crucially, where the modal flavours are the same is superfluous since it only amounts to the meaning of one modal quantifier. However, this does not necessarily happen when the modal force is the same, even though that is predicted by modal logic. This is due to the fact that modal logic does not have the capacity to capture both modal force and flavour, and therefore is not a straightforward representation of modal auxiliaries as we find them in natural languages.

On the other hand, the traditional Kratzerian (1981; 1991; 2012) theory of modality takes into account not only the modal force, but also the flavour. However, modal logic axioms only pay attention to quantification over possible worlds, yielding different results from what we find in natural language data. Therefore, a principle that would predict how the composition of DMCs works in natural language cannot rely only on modal force — it needs to take modal flavours into account too.

If we take a look at examples (22) to (25), it becomes clear that, in order to predict the acceptability of (22) and (23) and the unacceptability of (24) and (25), modal logic principles cannot be enough since these examples show that modal auxiliaries of the same force can indeed combine, as long as their modal flavour is different.

Based on these well-established modal principles and some of the assumptions about the cumulative reading of modal auxiliary combinations, I suggest the following grammatical constraint for DMCs:

- (30) **Anti-concord constraint (ACC):** Two modal auxiliaries within a single clausal domain cannot have the same force and flavour.

The constraint in (30) says that DMCs that have modals of the same force and flavour are not licensed, while all other possible combinations are.<sup>6</sup> While this constraint accounts for a large amount of Croatian non-epistemic data, it also leaves a considerable gap in the analysis. On the other hand, it also suggests an important next step in the analysis, that is, that modal force and flavour must play a crucial role in determining semantic restrictions in DMCs. The rationale behind the anti-concord constraint seems quite straightforward. It is redundant to use the same force and flavour when the same type of structure is used, i.e. a modal auxiliary.<sup>7</sup>

Further to this, there are several data points whose acceptability or unacceptability hinges on this constraint. First, having this constraint allows for structures where the same modal auxiliary appears more than once. Recall that in these structures, the flavours need to be different for the structures to be acceptable in languages that lexicalise modal force. Examples of this kind have been identified in the previous chapter, and one of these is repeated here as (31):

- (31) Context: The online student system is set up in such a way that the student is the only one who is able to see their grades. It says on the university website:

Samo student	<b>može</b>	<b>moći</b>	vidjeti
only student	may.PRES.3SG.∃DEONT	can.INF.∃CIRCUM	see.INF
svoje ocjene.			
their grades			
<i>It permitted only for the student to be able to see their grades.</i>			

This behaviour has also been identified in German and Dutch, which demonstrates that the ACC extends to other languages as well. Here I repeat the example

<sup>6</sup>In establishing a grammatical constraint I assume this constraint to be universal. While Croatian seems to be fairly straightforward in terms of modal concord and DMCs, some other languages allow similar modals to occur together without the modal concord effect. For example, in some non-standard English dialects, constructions such as *50 books you oughta should read before you die* are acceptable, even though both of these modals seem to be deontic necessity modals. However, this is certainly not a straightforward case since it might be that the context would show us that one of these modals is not, in fact, deontic. Given this data and (30) a deeper analysis is needed of the elements of modality.

<sup>7</sup>A possible hypothesis here is that one should see anti-concord even within other structural domains, e.g. the juxtaposition of two adverbs with the same modal force and flavour should be unacceptable as well.

from the previous chapter:

- (32) Ich weiss zwar, dass er das, was er behauptet, nicht kann ja  
 I know in.fact that he that what he claims NEG can.3SG MP  
 gar nicht **können kann**, er wäre denn noch größer als der  
 NEG can.INF can.3SG he were.3SG MP still greater than the  
 große Frangipani.  
 great Frangipani  
*I know for a fact that he can't do what he claims he can, can't possibly do  
 it. Why, that would make him greater than the great Frangipani.* (Süskind  
 (1986, p. 78) in Jędrzejowski & van de Vate (2013))

If the modal auxiliaries in these DMCs did not have different flavours, these structures would be unacceptable. Therefore, for these to work, there has to be a constraint on a concord relationship between two modal auxiliaries. Nevertheless, the data in (31) and (32) is not the only thing that motivates an anti-concord constraint. In what follows, I will show how the ACC motivates a categorisation of modal flavours in which modal flavours have important grammatical roles. Recall that combinations of deontic, bouletic and teleological flavour where force is the same are also not possible. Shortly, I will propose that this is also a product of the ACC and that this implies that these are not *real* flavours, at least not on a grammatical level.

However, before digging deeper into what this means for the categorisation of modal flavour and how these assumptions reflect on both SMCs and DMCs, we first need to establish what data is not accounted for by the ACC.

While the ACC accounts for all the unacceptable combinations in which modals of deontic, bouletic and teleological flavour and of the same force combine, there are still three important data points we need to account for. The crucial examples of unacceptable modal combinations come from groups of unacceptable DMCs:

- first, DMCs in which a deontic, bouletic or teleological (DBT) possibility modal takes the initial position and is followed by a necessity DBT modal,
- second, DMCs in which a circumstantial necessity modal comes in the initial position,

- and third, circumstantials that embed DBTs.

These are exemplified in (33), where a deontic possibility modal embeds a deontic necessity modal, (34), where a circumstantial necessity modal embeds a circumstantial possibility modal, and (35), where a circumstantial possibility modal embeds a deontic necessity modal, respectively.

- (33) #Djeca **mogu** **morati** zatvoriti vrata.  
 children may.PRES.3PL.∃DEONT must.INF.∇DEONT close.INF door  
*Children are allowed to have to close the door.*
- (34) #Ti **moraš** **moći** otvoriti vrata.  
 you must.PRES.3SG.∇CIRCUM may.INF.∃CIRCUM open.INF door  
*According to the circumstances, you have to be able to open the door.*
- (35) #Ivan **može** **morati** ući u cipelama u  
 Ivan can.PRES.3SG.∃CIRCUM must.INF.∇DEONT enter.INF in shoes in  
 stan.  
 flat  
*Ivan is able to be required to enter the flat wearing shoes.*

The DMC in example (33) consists of a deontic possibility modal in the initial position and a deontic necessity modal in the final position. The unacceptability of this combination is in line with some previous accounts such as Cinque (1999), Cormack & Smith (2002), Butler (2003) and Nauze (2008), who suggest that necessity modals need to scope over possibility modals. Based on this reasoning, it should come as a surprise that (34) is unacceptable, while (36) is acceptable. In (34) a necessity circumstantial modal embeds a possibility circumstantial modal and results in an unacceptable construction. On the other hand, in (36) a possibility circumstantial modal embeds a necessity circumstantial modal, creating an acceptable DMC. According to the previous literature cited above it is expected that necessity modals should be more natural in the initial position of a DMC.

- (36) Context: A group is going bird watching. Their leader tells everyone not to make a sound when they get close to a bird. Someone says:

Alergičari            **moğu**                            **trebati**  
 allergy-sufferers can.PRES.3PL.∃CIRCUM ought.INF.∀CIRCUM  
 kihnuti.  
 sneeze.INF  
*It is possible that the allergy sufferers will need to sneeze.*

Finally, example (35) is quite straightforward: it is a possibility circumstantial embedding a necessity deontic modal. It seems that deontics can embed circumstantials, as seen in (37), while the opposite order is not possible (in (35)).

- (37) Context: Ivan is a soldier. He is asked to do 100 push-ups but he fails. His sergeant says:

To je nešto            što uvijek **moraš**  
 that is something that always **must**.PRES.2SG.∀DEONT  
**moći**                            napraviti.  
**can**.INF.∃CIRCUM do.INF  
*That's something you must always be able to do.*

This means that in what follows several puzzles need to be solved, namely:

- What is the restriction that makes (33) unacceptable? Does this restriction apply across the board?
- What is the restriction that allows only some circumstantials to scope over other circumstantials? For instance, why is (36) acceptable and (34) is not? Does this restriction apply across the board? How does the ACC influence this question?
- What is the restriction that makes (35) unacceptable while (37) acceptable? Does this restriction apply across the board?

In the following section, I present an analysis that revisits some of the assumptions of traditional theories of modality in relation to the adopted view on modal flavours and possibly subflavours based on the DMCs that contain circumstantial, bouletic,

deontic and teleological modals in an attempt to solve the above puzzles. This analysis will preserve some of the assumptions previously adopted, such as that necessity modals scope over possibility modals, but will also offer a novel hierarchical approach within the non-epistemic group.

#### 4.4 The variety within the group

One of the most widely-accepted assumptions about modals is that they can assume different interpretations or flavours, such as epistemic, deontic, bouletic, teleological and circumstantial. As noted in the introductory section on modal flavour, Section 2.2.2, the existing literature agrees on only some of these categorisations. For example, while the ruling on what belongs to epistemic flavour seems to be unanimous across the literature, terminology and opinions on other non-epistemic flavours are more diverse. The inconsistency and disagreement on what the possible candidates are for modal flavours represents a substantial defect in the modal literature.

For example, within the Kratzerian tradition, going back to Kratzer (1981), the most common view is that deontic, bouletic and teleological modal flavours are different since they are based on different contextual information, that is, rules, wishes and goals, respectively. Most of the literature following this tradition does not specify whether there is an overarching commonality (and term) uniting these three flavours, and therefore they are taken as separate flavours. One exception to this is Portner (2009), who groups them together into the priority group of modals (goal-oriented modals). However, even Portner does not specify what it means for these modals to belong to the same group — more specifically, does this make them separate flavours within one flavour group, or is priority a flavour with deontic, bouletic and teleological as its subflavours? Moreover, it is not clear what the relevant grammatical categories are — priority modals or the more specific deontic, bouletic and teleological modals?

Therefore, Croatian DMC data and the restrictions exhibited by modal auxiliaries, especially under the grammatical constraint of the ACC, will be helpful

in answering these questions. Interestingly, DMCs containing different types of priority modal auxiliaries do not seem to yield different types of combinations, that is, we can make the same predictions about the behaviour of all three of these groups since they do not enter into different grammatical relationships, and therefore are not grammatically distinct. For example, a possibility teleological modal embedding a necessity teleological modal is an unacceptable structure, as is a possibility deontic modal embedding a necessity deontic modal.

- (38) Context: There is a party in Katarina's flat. The guest of honour is Katarina's boss Ivan. Katarina does not let guests enter her new flat with their shoes on, in order to keep the carpet clean. However, she makes an exception for Ivan since her goal is to get a promotion.

a. Ivan **mora** **smjeti** ući u  
 Ivan must.PRES.3SG.∀TELEO may.∃TELEO.INF enter.INF in  
 cipelama u stan.  
 shoes in flat  
*Ivan has to be allowed to enter the flat wearing shoes.*

b. #Ivan **smije** **morati** ući u  
 Ivan may.PRES.3SG.∃TELEO must.∀TELEO.INF enter.INF in  
 cipelama u stan.  
 shoes in flat  
*Ivan is allowed to have to enter the flat wearing shoes.*

- (39) Context: There is a party in Katarina's flat. The guest of honour is Katarina's boss Ivan. Katarina has a rule of not letting guests enter her new flat with their shoes on. However, she makes an exception for Ivan since he is her supervisor, and rules of etiquette say that bosses should be treated differently.

a. Ivan **mora** **smjeti** ući u  
 Ivan must.PRES.3SG.∀DEONT may.∃DEONT.INF enter.INF in  
 cipelama u stan.  
 shoes in flat  
*Ivan has to be allowed to enter the flat wearing shoes.*

- b. #Ivan **smije** **morati** ući u  
 Ivan may.PRES.3SG.∃DEONT must.∇DEONT.INF enter.INF in  
 cipelama u stan.  
 shoes in flat  
*Ivan is allowed to have to enter the flat wearing shoes.*

This might be due to the fact that the difference in these meanings is quite subtle, i.e. whether it is based on rules, wishes or goals, these all carry the same notion of obligation. This suggests that the grammar cares at least about the categories of knowledge (epistemic) vs. obligation (priority) vs. circumstance (circumstantial), but not about different types of obligations or priorities. Therefore, if these three flavours are taken as one, the ACC accounts perfectly for the unacceptability of the data in which these are combined (when the force is the same as well). Recall the examples from Chapter 3 in which combinations of deontic, bouletic and teleological modals result in unacceptable constructions, here repeated as (40) to (42).

- (40) #Prema carevim željama on **mora**  
 according to emperor's wishes he must.PRES.3SG.∇BOUL  
**trebati** pospremiti sobu da bi dobio čokoladu.  
 ought.PRES.3SG.∇TELEO clean.INF room to be.COND get chocolate  
*According to the emperor's wishes, he must need to clean the room to get a chocolate.*
- (41) #Prema carevim željama on **mora**  
 according to emperor's wishes he must.PRES.3SG.∇BOUL  
**trebati** pospremiti sobu jer je  
 ought.PRES.3SG.∇DEONT clean.INF room because be.PRES.3SG  
 takav zakon.  
 that-kind law  
*According to the emperor's wishes, he must need to clean the room because the law says so.*
- (42) #Da bi dobio čokoladu, on **mora**  
 to be.COND get chocolate he must.PRES.3SG.∇TELEO  
**trebati** pospremiti sobu jer je  
 ought.PRES.3SG.∇DEONT clean.INF room because be.PRES.3SG  
 takav zakon.  
 that-kind law  
*To get a chocolate, he must need to clean the room because the law says so.*

On the other hand, while these goal-oriented/priority modals tend to be separated into their respective subgroups, which are then called separate flavours, other modal meanings ranging from ability to disposition often tend to be subsumed into one group, that is, the circumstantial (Kratzer, 1981) or dynamic flavour (Portner, 2009). While this tendency is more prominent within work that is heavily based on Kratzer's tradition, authors such as Portner (2009) note that there are two groups of meanings within the dynamic group, i.e. volitional (ability, opportunity, dispositional) and quantificational (existential and universal). While Portner's analysis acknowledges these different dynamic meanings, it still raises similar questions as were raised by the priority group of modals — are these three levels of circumstantial categorisation grammatically different, that is, are these grammatical flavours that cause different restrictions or are these just subflavours without grammatical significance?

The Croatian DM data can help to answer some of these questions as well. For example, while a necessity circumstantial cannot occupy the initial position in a DMC, one of the possibility circumstantials can. Therefore, it seems that while all the priority modal subflavours seem to behave similarly in DMCs, this is not true for the group of modals that is usually summed up under the label *circumstantial* in the Kratzerian tradition, or *dynamic* modals in Portner's and Palmer's work.<sup>8</sup>

Furthermore, authors such as von Stechow (2006) and Kratzer (2012) use the term *circumstantial modality* for all modality that is based on what is possible or necessary given a particular set of circumstances, while others, like Portner (2009), make more prominent distinctions within the *dynamic* group of modals but still keep them together. In other words, there are theories that acknowledge these differences in a more substantial manner than others, but still remain rather unclear about what these differences mean. However, based on the Croatian non-epistemic + non-epistemic DMC data, I suggest that this is a more versatile group of modals than has so far been suggested in the literature and that these distinctions within the group are grammatically significant. In what follows, I will show that different

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<sup>8</sup>Throughout the text I will adopt the term *circumstantial* to refer to this group of modals for the sake of consistency.

circumstantial modals show different behaviour in DMCs. What is more, even in SMCs, they show a variety of meanings when the modal force changes.

Starting with constructions with no layered modality, examples (43)a. to c. show that interpretations of circumstantial modals are not uniform at all, that is, the propositions from the modal bases that modals rely on are not uniform. One can clearly see how these need to be interpreted on the basis of entirely different sets of propositions, in order to target the acceptable readings.

- (43) a. I **must** sneeze (based on a disposition).  
 b. I **can** sneeze (based on my ability).  
 c. I **can** go for a walk (based on external circumstances, e.g. the weather).

By comparison, the priority group of modals is much more uniform. For example, deontic interpretations of English *must*, *may* and *can* are quite similar even when there is a difference in force, and the propositions from their modal bases can stay the same and still make sense.

- (44) a. You **may** open the door (based on the rules of this household).  
 b. You **must** open the door (based on the rules of this household).  
 c. You **can** open the door (based on the rules of this household).

It is easy to see, at least in examples (44)a. to c., how priority modals that share a flavour, but differ in force, still rely on similar intuitions. For instance, we can see how all three modals could rely on the same set of propositions in the ordering source, i.e.  $p_1 = \textit{People open the door in Katarina's house in } w$ ,  $p_2 = \textit{People listen to Katarina in } w$ ,  $p_3 = \textit{People let people in in } w$ . Also, note that while the examples in (44) can all rely on *based on the rules of this household*, modal *must* in example (43)a. cannot be interpreted on the basis of *based on my ability* or *based on external circumstances*.

Furthermore, differences across the priority modal group can also be explored:

- (45) You **must** open the door because I say so, or else there are going to be consequences. (deontic)

- (46) You **must** open the door as I like it that way, or else I am going to get mad. (bouletic)
- (47) You **must** open the door to let the fresh air in, or else it is going to stay stuffy. (teleological)

Even though (45) to (47) are often classified as different flavours of modals, there is a similar intuition connecting them, i.e. the sense of obligation or priority that they share. What is more, DMC restrictions are not at all affected by the variation within the priority group, apart from the fact that they motivate modal concord restrictions. Therefore, I propose that these flavours ought to be treated as subflavours of the same flavour of modal since they behave uniformly in DMC combinations and are not grammatically distinct. These assumptions would then suggest that Portner's highest level of classification within his categorisation of modal flavours has a grammatically sensitive role, while the subflavours within it do not. Nevertheless, as we will see shortly, this rationale cannot be applied to the same level of categorisation for the dynamic group. On the other hand, this priority group categorisation does not go along the same lines as accounts such as Kratzer (1981, 1991), von Stechow (2006) and Rubinsteyn (2012), who keep these separate.

#### 4.4.1 Three types of circumstantials

Leaving the priority modals aside, I now go back to the flavour that seems to be crucial in understanding the underlying principles of DMCs in Croatian. The circumstantial modal group, which has often been considered a uniform group of modals, is far more versatile than expected (as pointed out above in (43)a. to c.) with much more prominent differences. In addition to some of the less complex data shown above, DMC data further supports the claim that there is a sharp contrast between the uniformity of the circumstantial and the priority group of modals:

- (48) #Ti **moraš** **moći** otvoriti vrata.  
 you must.PRES.2SG.∀CIRCUM can.INF.∃CIRCUM open.INF door  
*You have to, according to the circumstances, be able to open the door.*

- (49) Alergičari            **mogu**                            **morati**                            kihnuti.  
 allergy-sufferers can.PRES.3PL.∃CIRCUM must.INF.∀CIRCUM sneeze.INF  
*It is possible that the allergy sufferers will have to sneeze.*

In example (48) a necessity circumstantial *morati* embeds a possibility circumstantial *moći*, yielding an unacceptable construction. Without the formal apparatus, which is yet to come, let us say that the first modal in this case is intended to express the meaning that is most similar to the meanings modals have in sentences such as *I need to sneeze*; the second modal's meaning is clearer due to the way it is translated. On the other hand, in (49) a possibility circumstantial *moći* embeds a necessity circumstantial *morati*, yielding an acceptable construction. Here the meaning of the second modal is the same as the meaning of *morati* in (48). Note that these judgements are the opposite of what would be predicted by the ACC if circumstantials were considered to make up a single grammatical group.

This shows that it is difficult to make uniform claims about circumstantials as a flavour group since some can appear in initial position and some cannot. Additionally, note that *moći* in (48) does not seem to convey the same meaning as *moći* in (49). While *moći* in (48) expresses what one is able to do, *moći* in (49) expresses some kind of general possibility. Of course, notions like ability and pure possibility still need to be further explained.

As already mentioned, the various circumstantial meanings have been discussed within different theoretical frameworks for the past 30 years (e.g. Palmer (1979, 2001); Kratzer (2012)), and yet no common consensus has been reached, with the result that the group has mainly been referred to as circumstantial or dynamic without the analyses going deeper into possibly different flavours and, more significantly, the different behaviour of those flavours. The conclusion one can draw from these discussions is that there are certainly different types of circumstantial meanings and that they do have something in common, but there are also important differences. Some authors more than others lay emphasis on these differences, such as Portner (2009), who splits dynamic modals into subcategories but without going deeper into what the significance of these categories might be. Moreover, these arguments and

discussions have not been based on the grammatical status of modal flavours, and therefore might have been led astray by intuitions of meaning or extra-grammatical constructs.

Though the differences between modal flavours can often be very subtle, the manner in which different circumstantial flavours behave in DMCs might help us to distinguish between these different meanings and their status in a more clear-cut manner. In this section I will use Croatian DMCs to show how some of these differences between modal meanings might be more significant than others. In other words, I will try to fill the gap in the previous analyses by trying to determine whether different subcategories of modal meanings actually influence semantic restrictions and grammatical acceptability of DM structures. In order to make the terminology within these different levels of modal meaning categorisations clearer, I will use the term *modal flavour* for the grammatical flavours that cause different syntactic and semantic restrictions, and the term *subflavour* for the level of modal meaning that does not influence grammatical restrictions.

Recall that for Kratzer (1981, 1991, 2012), the semantics of modals specifies their quantificational force and structure, while the flavour is filled in from the context, i.e. epistemic modals are compatible with evidence in  $w$ , priority modals are compatible with rules/regulations/desires/goals in  $w$ .<sup>9</sup> As for the circumstantial modals, their flavour is defined as compatible with a particular set of circumstances in  $w$ . However, the data I will present shows that there is more to that; it is not just any particular set of circumstances, but (at least) three very specific ones.

Based on previous work by Palmer (1979, 2001), Kratzer (1981, 2012), Coates (1983) and Portner (2009), and Croatian DMC data, in this section I propose that there are at least three different grammatically distinct groups of circumstantials in Croatian.<sup>10</sup> The differences that will be outlined in the following sections suggest that the term *circumstantial flavour* should be replaced with what appears to be

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<sup>9</sup>The distinction Kratzer makes is between deontic, bouletic and teleological. Here I treat them as a single category based on the discussion in the previous section.

<sup>10</sup>And possibly more in other languages as well, since most of the other examples in the literature come from English.

three modal flavours which are distinct from each other. Nevertheless, they share some characteristics. According to Vetter (2015), the semantics of the circumstantial group of modals includes how things really are, and not how they should be or how we perceive them to be. In other words, in the sections to come, I will show that these three modal flavours indeed share some inherent characteristics, but should at the same time be treated as grammatically distinct groups.

In the following sections, I present data that supports the idea that the circumstantial group should be treated as three grammatically distinct subgroups and give suggestions on what might be the crucial differences among them and how they might be defined.

#### 4.4.1.1 Pure possibility

For the possibility meaning of *can*, Coates (1983) gives the following example:

(50) We believe solutions **can** be found.

Coates (1983) says this meaning of *can* is something more neutral than ability or permission, and adds that as opposed to these two, the possibility meaning of *can* is not associated with an agentive structure. Coates tries to capture its *neutrality* by claiming that this is an unmarked meaning “with respect to the two gradients of restriction and inherency” (Coates, 1983, p. 93). The modal *can* in (50) can be paraphrased as *it is possible for*, or *there is nothing to prevent us from finding the solutions* (Coates, 1983, p. 95).

On the other hand, while Portner (2009) does not make use of the term *possibility*, it seems that the closest group to Coates’ possibility *can* is the quantificational existential reading, as in:

(51) A spider **can** be dangerous. (Portner, 2009, p. 134)

(52) A dog **can** bite. (Portner, 2009, p. 210)

Similarly, Kratzer’s famous example *Hydrangeas can grow here*, which is usually marked as circumstantial modality, also belongs in this category. As opposed

to Coates (1983), Portner (2009) and Kratzer (2012), Palmer (2001) does not mention these types of examples.

A meaning similar to this one is accessible for both English *can* and Croatian *moći*. In Croatian, this flavour of *moći* appears both in SMCs ((53)) and DMCs ((55) and (54)).

- (53) Context: Two colleagues are talking about things that happen when you buy a beta version of a software system. One of them says:

Sustav **može** biti pun grešaka.  
 system can.PRES.3SG.∃CIRCUM be.INF full mistakes  
*The system can be full of mistakes.*

The interpretation of *moći* in (53) is along the same lines as that suggested by Coates for examples such as (50): *It is possible for the system to be full of mistakes.* However, example (54) shows that there is more to circumstantial meaning than just the expression of possibility.

- (54) Context: There is a hole in the wall. Ana says no human can pass through it because it is too small, and Ivan replies:

Djeca **možu** moći proći  
 children can.PRES.3PL.∃CIRCUM can.INF.∃CIRCUM pass.INF  
 kroz tu rupu.  
 through that hole  
*It is possible for children to be able to pass through that hole.*

The DMC in (54) consists of two occurrences of *moći* with different finiteness values. The first occurrence is a finite form of the modal that embeds infinitives of the modal and the main verb. This example is interesting for two reasons. First, it is the same modal auxiliary that appears twice. Second, both of the instances are circumstantial. The former is not that surprising: if modal auxiliaries are able to express many different flavours, and this is known to be the case, then it ought to be possible for the same modal to combine with itself as long as the two instances of the same modal convey two different flavours. This brings us to the latter point about both of the modals in (54) being circumstantial. If both of these are indeed

circumstantial, they should not be able to combine, due to ACC, and yet in fact they do combine, forming an acceptable structure. Therefore, it seems that these two circumstantials must somehow differ, or else it would make no sense to combine them. If they do not have different circumstantial interpretations, it should be enough to use *moći* just once in order to get the same interpretation. However, if the focus is switched from the traditional labels to the actual interpretations they assume, it becomes clearer that these convey different meanings or perhaps even different modal flavours. The first modal is consistent with the meaning already discussed in the previous example: *It is possible for the children to....*, while the second modal can be paraphrased as *be able to*.<sup>11</sup>

Like example (54), in example (55) the first modal has a similar possibility interpretation as the modals in (50) to (53). However, the second modal cannot be interpreted in the same way. The second modal does not express a possibility based on some external circumstances, but rather a necessity based on internal circumstances.<sup>12</sup>

- (55) Context: A group is going bird watching. Their leader tells everyone not to make a sound when they get close to a bird. Someone says:

Alergičari            **mo**gu                            **tre**bati  
 allergy-sufferers can.PRES.3PL.∃CIRCUM ought.INF.∀CIRCUM  
 kihnuti.  
 sneeze.INF  
*It is possible that the allergy sufferers will need to sneeze.*

Now that we have identified that data shows there is, at least, more than one circumstantial flavour, I will leave these flavours aside for the time being and turn to defining what type of meaning fits under the *possibility* flavour.

This modal flavour can be most simply paraphrased as *there is nothing to prevent x* and it seems more complex to define than ability, since it is often defined by what it is not, rather than what it is (Coates, 1983). Coates (1983) says that it certainly

<sup>11</sup>This flavour will be discussed in depth in the next section. At this point the aim is just to show that these two are indeed two different meanings.

<sup>12</sup>For the time being I leave the second modal at this, and come back to it in the following sections.

does not cover ability, therefore it covers the remaining circumstantial meanings. It depends on how the world is, that is, on external conditions or circumstances of  $w$ . Therefore, based on previous tendencies in the literature, such as Coates (1983), I call this the *pure possibility* flavour and define it in (56). This lexical entry relies heavily on assumptions from Kratzer's work.

$$(56) \quad [|\mathbf{mo}\acute{c}i|]^{c,f,g} = \lambda P_{e,st}. \lambda x_e. \lambda w_s. \exists w' \text{ compatible with external conditions} \in \max_{g(w)}(\cap f(w)): P(x)(w')=1$$

According to (56), the modal quantifies existentially over the set of all the possible worlds from the modal base compatible with external conditions, which is an intersection of the worlds in which all propositions in question are true ( $\cap f(w)$ ). These worlds are then ordered according to the propositions from the ordering source to give us maximally good worlds ( $\max_g(w)$ ). Crucially, the modal takes an argument of type  $\langle e, st \rangle$ . This lexical entry follows Kratzer's framework with a new flavour introduced into the modal paradigm. As already mentioned above, for Kratzer, the semantics of modals specifies the quantificational force and structure, while the flavour is filled in from the context. In (56), I propose to introduce a new grammatical flavour determined by *external conditions*, which are defined as the relevant circumstances in one's environment. Crucially, these conditions have to be external to one's body.<sup>13</sup>

Another twist is the change in semantic types which comes from the preliminary analysis. Recall from Section 4.2 that to capture the syntactic differences between epistemics and non-epistemics I proposed that non-epistemics and epistemics have different compositional types, i.e. that non-epistemics have a compositional type of  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$ , while epistemics are of type  $\langle st, st \rangle$ . This correctly predicted the grammaticality of DMCs in which epistemics embed epistemics or non-epistemics, or in which non-epistemics embed non-epistemics, and the ungrammaticality of non-epistemics embedding epistemics. Along those lines, since modal auxiliaries

<sup>13</sup>This poses an interesting puzzle concerning the meaning of "body". If the argument is a city or an abstract idea, this means that the human conceptual system seems to treat these too as "bodies" subject to circumstances external to them.

conveying circumstantial flavours, that is, pure possibility belong to the non-epistemic group, the proposed semantic type which is adopted from the preliminary analysis and based on Croatian SMC and DMC data is  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$ . Note that this type will be slightly adjusted in the final analysis.

#### 4.4.1.2 Ability

In the previous section, apart from focusing on the pure possibility flavour, I also briefly acknowledged the existence of another circumstantial flavour of modal *moći* which can be easily paraphrased as *to be able to*. That interpretation of modal *moći* is often used as the representative of the circumstantial flavour. It includes examples such as (57)a. and b. (from Coates (1983)). This has probably been the most prominent and most thoroughly researched type of circumstantial modal meaning in both linguistic and philosophical literature.

- (57) a. I **can** walk far.  
 b. I **can** only type very slowly as I am quite a beginner.

The majority of the previous literature (Palmer, 1979, 1983, 2001; Coates, 1983) discusses the ability interpretation of *can*, along with the differences between many other it possesses. Coates (1983) talks about *can* as having three distinct meanings: *permission*, *ability* and *possibility*. The latter two are usually put together under the heading of circumstantial meanings in mainstream modality theories, while the first is parallel to deontic meaning in Kratzer-like accounts. The third meaning seems to be parallel to the interpretation discussed in the previous section.

As for the ability flavour, according to Coates, the possibility of an action is determined by inherent properties of the subject. Based on English examples, Coates states that ability sentences usually share at least these characteristics: that the subject is animate and denotes an agent,<sup>14</sup> that the verb denotes an action and that the possibility of the action is determined by inherent properties of the subject (Coates, 1983, p. 89). Note that, like Coates, most of the literature agrees that

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<sup>14</sup>However, note that there are examples such as *The computer can print a thousand characters a second* and *A bullet can kill a man*.

this flavour only comes in combination with existential quantification. Furthermore, Coates also distinguishes between learned properties and inherent properties. The distinction appears to have no significance for the analysis of the existing Croatian DMC data (as can be seen in examples (58) and (59)) if these are defined as such, and therefore I am here opting for simpler terms. However, it stands as a fair point that this might be yet another flavour belonging to the circumstantial group.

(58) #Ivan **može** **moći** napraviti 10  
 Ivan can.PRES.3SG.∃LEARNED can.INF.∃INHERENT make.INF 10  
 sklekova.  
 push-ups  
*Ivan has the learned ability to have the inherent ability to do 10 push-ups.*

(59) #Ivan **može** **moći** napraviti 10  
 Ivan can.PRES.3SG.∃INHERENT can.INF.∃LEARNED make.INF 10  
 sklekova.  
 push-ups  
*Ivan has the inherent ability to have the learned ability to do 10 push-ups.*

Starting with Palmer (1979, 1983, 2001), the term *dynamic modality* has often been used when talking about ability contexts for *can* or willingness contexts for *will*. Palmer (1979) observes that this is not limited to the ability meanings of *can* but also involves the *need/necessity* meanings of *must/have to*.<sup>15</sup> Furthermore, it also includes the possibility meaning similar to the flavour discussed in the previous section, but he calls it *abilities/needs based on local circumstances*. Similar to Coates, Palmer also mentions languages such as Lisu and French which distinguish between two types of ability, *physical ability* and *knowing how*. For example, in Lisu ability includes *knowing how* and *physical ability* such as in (60) and (61).

(60) ása nya ami khwa **kwú-a**  
 Asa TOP field hoe mentally.able-*dec*  
*Asa is able (knows how) to hoe fields.* (Palmer, 2001, p. 77)

(61) ása nya ami khwa **kwhu-a**  
 Asa TOP field hoe able-*dec*  
*Asa is (physically) able to hoe fields.* (Palmer, 2001, p. 77)

<sup>15</sup>This will be discussed in the following section.

Among European languages there are other languages that behave similarly by using the verb *know* to differ between these two kinds of modality. Palmer (2001) uses French as an example, but Croatian uses the verb *know* in the same way.<sup>16</sup>

Furthermore, Bolinger (1989) talks about notions such as *extrinsic possibility* and *intrinsic potentiality*, where the former covers what we usually consider epistemic and deontic meaning, while the latter corresponds to the circumstantial group, that is, an intrinsic potentiality or ability, but does not include the other accessible flavours of circumstantiality.

For Portner (2009) ability is a subtype of volitional modality, which is slightly different from what Palmer (2001) suggests, which is that ability is a subcategory of dynamic modality, while volitive modality is another category of dynamic modality. This is perhaps just a difference in terminology but shows how difficult the identification of these flavours can be. Portner (2009) distinguishes between intrinsic ability and the situation in which one finds oneself. In his section on volitional modality, Portner (2009) talks about ability and opportunity together, while also acknowledging issues in defining certain instances of ability *can* by citing (62) as an example for which, in Portner's view, it is difficult to identify whether this is a quantificational reading or an ability reading.

(62) A student **can** fear his teachers. (Portner, 2009, p. 194)

While most authors consider ability a modal notion, Kenny (1975, 1976) and Hackl (1998) suggest otherwise. Kenny (1975, 1976) argues that Kratzer's system cannot account for ability meanings since it is not possible to represent it as a possibility operator within the modal logic system.<sup>17</sup> I will here assume the more prevalent position in the literature, claiming that ability meanings share certain features with other modality flavours.

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<sup>16</sup>I will not take the verb *know* as one of the combinatorial elements in DMC combinations since it is not a fully-fledged modal.

<sup>17</sup>See Portner (2009) and Horty (2001) for discussion.

As we have seen in the above discussion, there are not many things that different proposals agree on with respect to *ability*. In what follows, we will take a look at Croatian data to see how it relates to these conflicting proposals from the literature.

In Croatian, ability is a very common modal flavour, and can only be expressed by *moći*. The interpretation in (63) corresponds to Coates' inherent properties, Palmer's physical ability and Portner's and Bolinger's intrinsic ability. Though, if the propositions this modal relies on are changed, these can easily be interpreted as Coates' learned properties or Palmer's *knowing how* ability.

- (63) Context: Ivan works out regularly and is very fit. His muscles are strong enough to do 50 push-ups.

Ivan **može** napraviti 50 sklekova.  
 Ivan can.PRES.3SG.∃CIRCUM do.INF 50 push-ups  
*Ivan can do 50 push-ups.*

In DMCs, ability *moći* behaves differently from pure possibility *moći*.<sup>18</sup> For example, while (64)a., in which ability *moći* comes in the second position, is acceptable, the reverse order in (64)b. is not acceptable.

- (64) Context: There is a hole in the wall. Ana says no human can pass through it because it is too small, and Ivan replies:

- a. Djeca **mogu** **moći**  
 children can.PRES.3PL.∃CIRCUM.PPOSS can.INF.∃CIRCUM.ABIL  
 proći kroz tu rupu.  
 pass.INF through that hole  
*It is possible for children to be able to pass through that hole.*
- b. #Djeca **mogü** **moći**  
 children can.PRES.3PL.∃CIRCUM.ABIL can.INF.∃CIRCUM.PPOSS  
 proći kroz tu rupu.  
 pass.INF through that hole  
*Children are able to be possible to pass through that hole.*

<sup>18</sup>And as stated above, by *znati* 'know', but *znati* is not a fully-fledged modal.

The data in (64)a. and (64)b. serves as additional support for the need to distinguish between different flavours of circumstantials: if all of them are grouped under the same flavour, it is very difficult to account for differences in ordering.

To keep the terminology simple, I will follow the traditional approach and call this flavour the *ability* flavour, and define it as:

$$(65) \quad [|\mathbf{mo}\acute{c}i|]^{c,f,g} = \lambda P_{e,st}. \lambda x_e. \lambda w_s. \exists w' \text{ compatible with } x\text{'s skills or means} \in \max_{g(w)}(\cap f(w)): P(x)(w')=1$$

The semantic type  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$  is the same as the semantic type of pure possibility flavour, since these are both non-epistemic modals and combine with epistemics and non-epistemics in the same way. The ordering source for the ability flavour relies on skills, i.e., one's competence to do something well, or means, i.e. one's available resources.

#### 4.4.1.3 Disposition

In example (55) in Section 4.4.1.1, here repeated as (66), I have shown that there seems to be a third flavour within the circumstantial group, here exemplified in the second modal of the DMC (*trebati*):

(66) Context: A group is going bird watching. Their leader tells everyone not to make a sound when they get close to a bird. Someone says:

Alergičari	<b>mo<u>g</u>u</b>	<b>trebati</b>
allergy-sufferers	can.PRES.3PL.∃CIRCUM	ought.INF.∀CIRCUM
kihnuti.		
sneeze.INF		
<i>It is possible that the allergy sufferers will need to sneeze.</i>		

*Trebati* in (66) does not convey either of the previous two interpretations. It is not used to express ability, nor is it used to express circumstantial pure possibility. Previous literature mentions this type of modal interpretation/flavour. Kratzer (2012, p. 5) speaks briefly of a particular interpretation of *must*, of the kind that “helps us talk about the dispositions people have — when they can’t help sneezing

or must die”, while Vetter (2015) speaks of the same *must* — when someone must do something because they cannot help themselves.<sup>19</sup>

In Croatian, these types of examples include both *morati* and *trebati*. Both necessity modals in (67) have a similar interpretation, with a difference in modal strength:

(67) Context: Maja drank 3 cups of coffee this morning before leaving the house.

Maja **mora/treba** piškiti.  
 Maja must/ought.PRES.3SG.∇CIRCUM pee.INF  
*Maja needs to pee.*

The interpretation in (67) denotes an inner urge, something one has no influence over. The philosophical literature, such as (Vetter, 2015, p. 33), considers dispositional modal properties:

“In saying of a vase that it is fragile, of a person that she is irascible,..., we are not, or not primarily, saying something about what the vase, the person or the disease is actually doing, but rather about what it would or could do.”

The disposition we discuss here has a slightly different intuition behind it. In most modal dispositional sentences, such as (67), we are not just talking about a property one has whether it is going to be realised or not, but there is also a strong sense of it being realised in the very near future. It is an internal condition that one has no choice but to realise. These different interpretations of disposition suggest that there are inconsistencies in terminology in this group as well.

Portner (2009) groups dispositional modality with volitional dispositional modals, but does not say any more about them, apart from providing the following example:

(68) Mary **will** laugh if you tell her that. (Portner, 2009, p. 215)

This disposition seems to follow a different intuition from the one Kratzer talks about, but one closer to what Vetter (2015) discusses. This seems to be caused by a difference in terminology that comes from a different understanding of what it means to be disposed to do something. On the Kratzerian view, disposition refers

<sup>19</sup>This raises the interesting question of a possible agency requirement for disposition. These definitions suggest that disposition should be pragmatically incompatible with inanimates.

to something you need to do based on some set of internal circumstances, while the second perspective is more concerned with tendencies that do not need to be fulfilled. On the first perspective, there is a certain sense of immediacy, while that is not necessarily true of the second sense of disposition. I will here be concerned with the former sense of disposition and will use the term *dispositional* for the type of modality Kratzer (2012, p. 5) is talking about.

Therefore, the third, dispositional flavour of the circumstantial group of modals is defined as:<sup>20</sup>

$$(69) \quad [|\mathbf{morati}|]^{c,f,g} = \lambda P_{e,st}. \lambda x_e. \lambda w_s. \forall w' \text{ compatible with internal conditions} \\ \in \max_{g(w)}(\cap f(w)): P(x)(w')=1$$

Note that, as opposed to the two circumstantial meanings above, this meaning is defined as a universal quantifier, that is, a disposition must be true in all possible worlds, and not just some, as an existential quantifier would predict. Additionally, as opposed to *external conditions*, *internal conditions* are defined as those conditions or tendencies pertaining to one's body, rather than the environment. The semantic type  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$  is the same as the semantic type of the previous two circumstantial flavours.

It is also interesting to observe how for these three modal flavours there seems to be a lack of possibility/necessity pairs, that is, while pure possibility and ability can only be conveyed by a possibility modal auxiliary, disposition can only be conveyed by necessity modal auxiliaries. On one hand, one might even claim that this asymmetry is conceptually predictable, for example, that it is expected for pure possibility and ability to be expressed by a possibility modal since they do not assume quantification over all possible worlds. Disposition does, since it is something one has no power over. On the other hand, one might say that it has nothing to do with any conceptual rationale, but instead simply with the way these flavours are lexicalised.

<sup>20</sup>This is also based on Kratzerian tradition. The lexical entry for *trebati* should be the same, since this is also a necessity modal. In this thesis, I will not go into detail as to what the possible differences between *morati* and *trebati* are. For more on that topic see Werkmann (2014).

#### 4.4.2 Interaction with adverbs

Additional evidence supporting the idea that these three interpretations are three separate flavours of circumstantial modal auxiliaries comes from their interaction with adverbs. Before considering the interactions with different adverb classes within the circumstantial group of modals, it is necessary to explore what adverb interaction might tell us about how groups of modals that are traditionally considered as separate interact with different adverbial classes.

The evidence of priority modal auxiliaries shows that these are not very sensitive to different types of adverbs as long as the force stays the same.<sup>21</sup> This supports the idea that, while these are traditionally considered as three separate modal flavours, they are actually less distinct than initially suggested, as was already discussed above.

For example, if *necessarily* is introduced into sentences (70) to (72), there is no variation in whether *necessarily* adds any meaning to the sentence.

- (70) You **must necessarily** open the door because I say so, or else there are going to be consequences. (deontic)
- (71) You **must necessarily** open the door because I like it that way, or else I am going to get mad. (bouletic)
- (72) You **must necessarily** open the door to let the fresh air in, or else it is going to stay stuffy. (teleological)

Nothing changes even when other adverbs are introduced, such as *intentionally* or *competently*.

- (73) You **must intentionally/competently** open the door because I say so, or else there are going to be consequences. (deontic)
- (74) You **must intentionally/competently** open the door because I like it that way, or else I am going to get mad. (bouletic)

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<sup>21</sup>Probably due to modal concord effects.

- (75) You **must intentionally/competently** open the door to let the fresh air in, or else it is going to stay stuffy. (teleological)

To sum up, as long as the same modal is used, no matter if its meaning is deontic, bouletic or teleological, the associated acceptability judgments remain the same. This supports the idea that there are more similarities among these three than traditionally suggested. The same is true in Croatian.

As opposed to priority modals, there seems to be more variation within the circumstantial group. The data shows that even if the verb remains the same, acceptability judgements vary across flavours:

- (76) I **can** sneeze **competently**. (ability)
- (77) #Jane **can competently** be the actress we are looking for. (pure possibility)
- (78) I **can** sneeze **intentionally**. (ability)
- (79) #Jane **can intentionally** be the actress we're looking for. (pure possibility)

Beyond these seemingly very simple examples of adverb-modal interactions, even a more systematic perspective paints the same picture.

In his seminal work, Cinque (1999) suggests that adverbs belong to different adverbial classes, and that these adverbial classes are then hierarchically organised in the phrase structure. Furthermore, the order they adopt is claimed to be universal cross-linguistically. According to Cinque, there are three adverb classes connected to the notion of modality: *volition*, *obligation*, and *permission/ability*. Recall that Cinque's full hierarchy for modal heads looks like this:

- (80)  $\text{Mod}_{epistemic} > \text{Mod}_{necessity} > \text{Mod}_{possibility} > \text{Mod}_{volition} > \text{Mod}_{obligation} > \text{Mod}_{ability}$

Evidence from Croatian shows that this ordering might not work for all languages, especially because it does not take into account the relationship between force and flavour in DMC.<sup>22</sup> Therefore, Cinque's ordering will not be used to suggest

<sup>22</sup>A full discussion of Cinque's account can be found in Chapter 3, Section 3.2.3.2.

a phrasal structure for the Croatian modal system, but Cinque's modal adverb classes can still offer an interesting insight as to which adverbs might be used to test the behaviour of different circumstantial groups.

Cinque puts *intentionally, deliberately, accidentally, (in)voluntarily* in the volition group; *obligatorily, inevitably, per force, coercively* in the obligation group; and finally, *legitimately, competently, cleverly, clumsily* in the permission/ability group.

For example, adverbs from Cinque's volition group can go with pure possibility and ability flavours but do not yield acceptable sentences in combination with the dispositional flavour, as exemplified in (81) and (82).

- (81) Marko **može** **namjerno/ slučajno/ vješto**  
 Marko must.PRES.3SG.∃ABIL/PPOSS deliberately accidentally skilfully  
 kihnuti.  
 sneeze.INF  
*Marko may/can sneeze deliberately/accidentally/skilfully.*

- (82) #Marko **mora** **namjerno/ slučajno/ vješto**  
 Marko must.PRES.3SG.∇DISPO deliberately accidentally skilfully  
 kihnuti.  
 sneeze.INF  
*Marko must sneeze deliberately/accidentally/skilfully.*

There is an apparent issue with this. Since the distribution of modal force within the circumstantial group is asymmetrical, that is, not all flavours can have universal and existential force, it might be claimed that these mismatches with adverbs stem from the difference in force, rather than from a difference in flavour.

This issue can be avoided if two possibility circumstantials are compared. For example, look at the interaction of a pure possibility modal with what Cinque considers to be an ability modal adverb:

- (83) #Sustav kompetentno **može** napraviti probleme.  
 system competently can.PRES.3SG.∃PPOSS make.INF problems  
*The system can competently create many problems.*

- (84) Ja kompetentno **mogu** napraviti 10 sklekova.  
 I competently can.PRES.1SG.∃ABIL make.INF 10 push-ups  
*I can competently do 10 push-ups.*

Example (83) shows that not all the same adverbs can combine with both pure possibility *moći* and ability *moći*. For example, *competently* cannot combine with pure possibility, but can combine with ability (as seen in (84)), as external circumstances cannot be competent since this is only something that comes from one's internal makeup.

Another objection to this claim might be that the mismatch is not coming from the adverb's relationship with modal verbs, but rather from the adverb's relationship with the VP. I take these adverbs as scoping over the modal, though, of course, this might not always be seen clearly in the word order. However, this is the intended interpretation.

Even though these differences in acceptability between different adverb + auxiliary combinations might not tell us anything about the phrasal structure of modal heads, the fact that there are such differences provides support for the claim that the circumstantial group is not as uniform as initially suggested. In the following section I address the role of this circumstantial division in the final analysis of DMCs.

#### 4.4.3 Role of circumstantial flavours in modal ordering

The circumstantial data presented in the previous sections stands as strong evidence that the circumstantial group of modals should be split into three grammatically distinct flavours. Therefore, I now focus on examples such as (85)a. and (85)b., which can tell us more about why this new division of circumstantials is important for a DMC analysis.

Recall the DMC examples (64)a. and (64)b., repeated here as (85)a. and (85)b. The former is acceptable, while the latter is not. In (85)a. the order is pure possibility in initial position, followed by ability, and vice versa in (85)b. If these two are considered to represent the same flavour, or just non-grammatically distinct subflavours, it is not possible to explain why one structure is acceptable and the other is not. This also implies that these two flavours enter into a certain ordering relationship, which will be discussed shortly.

(85) Context: There is a hole in the wall. Ana says no human can pass through it because it is too small, and Ivan replies:

a. Djeca **mogu** **moći** proći kroz  
 children can.PRES.3SG.∃POSS can.INF.∃ABIL pass.INF through  
 tu rupu.  
 that hole  
*It is possible for children to be able to pass through that hole.*

b. #Djeca **mogu** **moći** proći kroz  
 children can.PRES.3SG.∃ABIL can.INF.∃POSS pass.INF through  
 tu rupu.  
 that hole  
*Children are able to be possible to pass through that hole.*

Therefore, it seems that not only are these indeed different flavours, but these examples also further support the idea that modal flavours play a very important role in ordering restrictions in DMCs.

In addition to the ordering restrictions between pure possibility and ability, another circumstantial modal, representing necessity, behaves differently from those in (85). According to the previous literature, necessity would be expected to scope over possibility.<sup>23</sup> However, the DMC in (86) is composed of a necessity ability modal embedding a possibility disposition modal, and yet this yields an unacceptable structure.

(86) #Ti **moraš** **moći** otvoriti vrata.  
 you must.PRES.3SG.∇DISPO may.INF.∃ABIL open.INF door  
*According to your internal conditions, you must be able to open the door.*

However, pure possibility and ability are able to embed disposition, even if it is necessity disposition, and the initial modal expresses possibility (which is often assumed to be an unacceptable ordering):

<sup>23</sup>This will be discussed in length in the final analysis.

- (87)    Alergičari            **mogu**                                    **trebati**  
 allergy-sufferers can.PRES.3PL.∃POSS/ABIL ought.INF.∇DISPO  
 kihnuti.  
 sneeze.INF  
*It is possible that the allergy sufferers/Allergy sufferers are able to need to sneeze.*

Therefore, if the circumstantial group is split into three separate flavours, the following ordering can describe the data above ((85) to (87)):

- (88)    pure possibility > ability > disposition

The hierarchy in (88) assumes, first of all, that pure possibility modal auxiliaries scope above ability or disposition modals. Second, an ability modal will scope under pure possibility and over disposition, while disposition remains in the lowest position. Additionally, a necessity modal would always scope over a possibility modal, but, crucially, the necessity > possibility ordering does not apply across flavours but rather within a flavour. Note, however, that within this group not all modal forces seem to be accessible to all modal flavours. For instance, pure possibility and ability are only found in possibility modals, and disposition only in necessity modals. This explains why a necessity modal can be positioned low in this hierarchy even though this is not expected. Of course, if there were both an ability necessity modal and a possibility dispositional modal, this analysis would predict a necessity > possibility ordering in that case, though not in the pure possibility case since it is not clear what would it mean for it to have universal force. Since not all modals convey all forces or flavours, for Croatian, the hierarchy in (88) results in this:

- (89)    pure possibility *moći* > ability *moći* > dispositional *morati/trebati*

The ordering in (88) and (89) only explains the lowest part of the DMC hierarchy. In the next section, I go back to the full set of data and present the full set of ordering restrictions for DMCs in Croatian.

Finally, it is important to emphasise that it has not been my intention here to cover the full variety of possible circumstantial modal flavours or to provide an exhaustive list of possible flavours, but rather only those that seem to play a distinct

role in DMC combinatorics. As seen in the introductory section, as well as in this chapter, the literature has identified many different meanings that could fall under the circumstantial/dynamic umbrella. I have shown that many different authors identify many different meanings. Some of the possible problems with these are that, first, the terminology employed is not consistent. Sometimes differences are small, such as whether the group is called circumstantial or dynamic, but talking about the same thing, and sometimes, using the same term for a different flavour of modality, such as in the case of dispositional modality. Another problem is that some authors refer to flavours, some to categories, and some to meanings. This also includes the issue that some of these terms are superordinate or subordinate to others. Dealing with all these issues is an extensive task and beyond the scope of this thesis.

Nevertheless, the aim of the above discussion was to deal with at least one of these issues, namely — are there some flavours that seem to be more prominent than others, and in what sense? To show some of these differences I have used DMCs that show how some certain modal flavours seem to trigger different semantic restrictions. Therefore, my aim was to show how some of the modal flavours identified are grammatically distinct, while some are not, which is by no means implying that other meanings should not be recognised. Additionally, in an attempt to clarify the terminology I used the term *subflavour* for modal meanings that do not seem to be grammatically distinct, and the term *flavour* for modal meanings that cause different grammatical relationships, identifying disposition, ability and pure possibility as modal flavours, and deontic, bouletic and teleological flavours as subflavours of the priority flavour.

## 4.5 The final ordering

### 4.5.1 Modal orderings: flavours and forces

While the previous section focused on the lower part of the hierarchy, I now turn to some more widely discussed assumptions in modal ordering. The assumption that epistemics scope over non-epistemics has been widely accepted in the literature. In

some earlier work, such as Kratzer (1976),<sup>24</sup> it was suggested that non-epistemics can scope over epistemics, but the majority of subsequent work has disputed this claim (Thráinsson & Vikner, 1995; Cormack & Smith, 2002; Butler, 2003; Nauze, 2008).

The context for Kratzer's 1976 example is crucial here: there is a despot who wishes to control information (discussed by Nauze (2008) and von Fintel & Iatridou (2009)). More specifically, the despot is interested in the science of a certain snail species, and has told scientists to be careful in their reports. He would say: *I decree that the reports have to be such that Paryphanta Hochstetteri may have sucker feet:*

- (90) Und auch in Zukunft **muss** diese Schnecke [...] Saugfüsse haben  
 and also in future must this snail suction.feet have  
**können**  
 might  
*And even in the future, this snail must possibly have suction feet.* (Kratzer, 1976, p. 14)

According to Kratzer (1976), the first modal in (90) is deontic, while the second modal is epistemic. Nauze (2008) argues that the explanation given for the epistemic reading actually shows the opposite of what it is supposed to show. The despot's intention was actually to say that "all the information to be provided in the future should be compatible with the snail having suction feet" (Nauze, 2008, p. 177):

- (91) It **must** be so that, according to the information provided, the snail **might** have suction feet. (Nauze, 2008, p. 177)

This means, according to Nauze (2008), that the second modal does not represent the uncertainty of the agent as would be expected of an epistemic modal.

On the other hand, von Fintel & Iatridou (2009) claim that there are English examples similar to Kratzer's German example:

<sup>24</sup>Kratzer (1976) is in German, but this data point did not make it into the English version of this paper, Kratzer (1977).



- (95) Context: Marija is not sure whether dogs are allowed on boats. She sees a man rowing in a boat and his dog swimming by the boat. The dog seems very happy to be in the water, so she is not sure if the dog is swimming because he wants to, or because he is not allowed in the boat. She says:

**Može**                      biti    da    psi    **moraju**  
 may.PRES.3SG.∃EPIST be.INF that dogs must.PRES.3PL.∇DEONT  
 plivati.  
 swim.INF  
*It may be that dogs have to swim.*

Examples (94) and (95) show that epistemics can scope over non-epistemics, no matter whether one or the other expresses necessity or possibility. Also, epistemics can scope over epistemics, and there are no restrictions on modal force ordering with respect to that ordering, i.e. *Mora biti da može biti...* is as acceptable as *Može biti da mora biti...* This is due to the fact that epistemics that embed epistemics are situated in separate clauses. Therefore, I agree with the prevalent opinion in the literature and propose that the global modal hierarchy is set up like this:

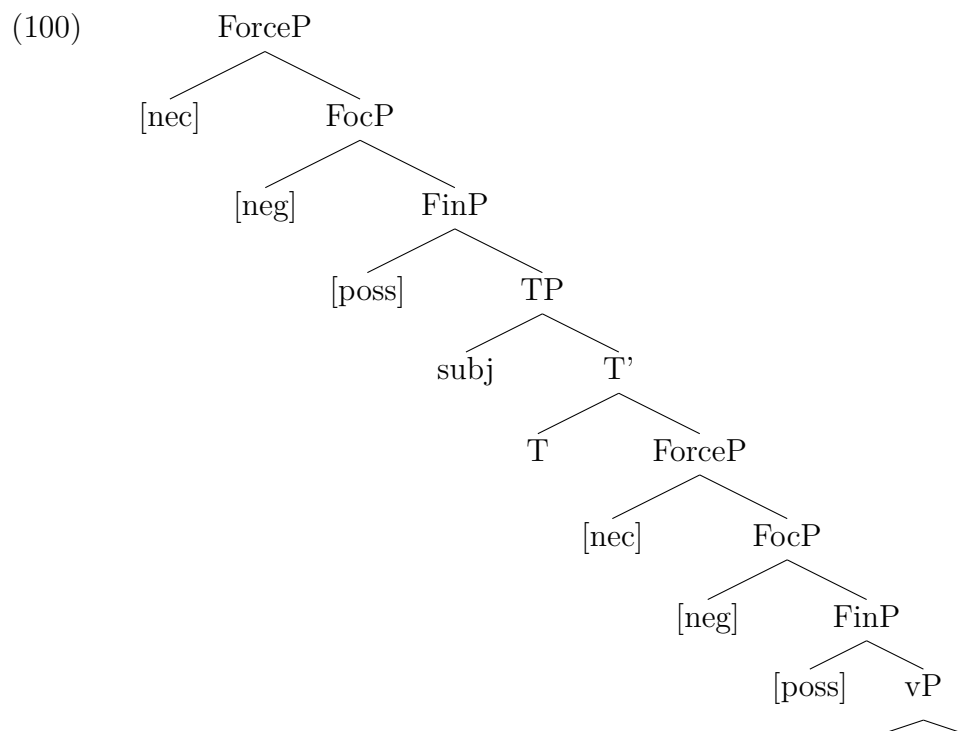
- (96) epistemic > non-epistemic

Recall that within the non-epistemic group, there were a few things to take into consideration; firstly, circumstantial modals, which have been dealt with in the previous section, secondly, priority modals, and thirdly, the relationship between these two groups. The crucial example for the priority modals puzzle is the following unacceptable example in which a possibility priority modal embeds a necessity priority modal:

- (97) #Djeca **smiju**                      **morati**                      puno se igrati.  
 kids    may.PRES.3PL.∃PRIOR must.INF.∇PRIOR a lot self play.INF  
*It is allowed for the kids to have to play a lot.*

According to (97), a possibility priority modal cannot scope over a necessity priority modal auxiliary, while the opposite order is possible, as in (98).





(Butler, 2003, p. 988)

According to Butler (2003), evidence for this claim lies in the fact that negation scoping over epistemic necessity is rarely acceptable to native speakers, while negation scoping over epistemic possibility and non-epistemic necessity is perfectly acceptable.

(101) %The registrar needn't have got my letter  
Scope: % negation > epistemic necessity<sup>26</sup>

(102) The registrar can't have got my letter  
Scope: negation > epistemic possibility

(103) The children needn't do that  
Scope: negation > root necessity

Butler (2003) claims that the ordering necessity > negation > possibility appears once immediately above vP, for non-epistemic interpretations, and once immediately above TP, for epistemic interpretations. Therefore, for Butler, necessity and

<sup>26</sup>Examples (101) to (103) are from (Butler, 2003, p. 984–985). In original, this is marked as \*/%.

possibility are generated in different positions. Again, I will not be making any claims with respect to negation and Croatian DMCs. However, Butler's proposal is appealing for two reasons. He suggests first that there is an ordering restriction between necessity and possibility, and second, that this restriction exists independently in epistemic and non-epistemic structures.

Cormack & Smith (2002) propose that there are two types of negation and two types of modals, that is, sentential and adverbial negation, and Modal<sub>1</sub> and Modal<sub>2</sub>. Necessity modals belong to the Modal<sub>1</sub> group and are merged higher than sentential (Pol[NEG/POS]) and adverbial negation (Adv[NEG]), while possibility modals merge lower than the sentential negation and scope, and therefore scope lower than sentential negation and higher than adverbial negation. Their account suggests that this is the sequence these follow:

(104) C T (Modal<sub>1</sub>) Pol(POS/NEG) (Modal<sub>2</sub>) (Adv[NEG])...

Cormack and Smith's (2002) suggestion that there are two modal positions and that necessity scopes higher than possibility might be relevant for the Croatian data.

Finally, while none of these authors make specific assumptions as to why the ordering is necessity > possibility, von Stechow & Iatridou (2009) suggest a working hypothesis in which universal modal verbs work as strong determiners and existentials as weak determiners. This would be in line with Heim (1982) and Diesing (1992), as will be further discussed in Section 5.5.

As we move from epistemics to non-epistemics, the last thing left to explain is the relationship between the two groups already established, the priority modals and the circumstantials, that is, pure possibility, ability and dispositional flavour. The relationship between these two groups seems to be fairly straightforward, with priority modals scoping above circumstantials. This has been noted in the literature as well (Nauze, 2008). This is shown in (105) and (106). In (105) a circumstantial scopes over a priority modal, resulting in an unacceptable structure, while in (106) the opposite ordering creates an acceptable structure.

- (105) #Ivan **može** **morati** ući u cipelama u  
 Ivan can.PRES.3SG.∃ABIL must.∀PRIO.INF enter.INF in shoes in  
 stan.  
 flat  
*Ivan is able to have to enter the flat wearing shoes.*

- (106) Ivan **mora** **moći** ući u cipelama u  
 Ivan must.PRES.3SG.∀PRIO can.INF.∃ABIL enter.INF in shoes in  
 stan.  
 flat  
*Ivan has to be able to enter the flat wearing shoes.*

Taking into account the above assumptions on modal flavours and forces with respect to Croatian DM data, I propose that the the final ordering is as follows:

- (107) epistemic (*necessity* | *possibility*) > priority (*necessity* > *possibility*) > pure possibility (*possibility*) > ability (*possibility*) > disposition (*necessity*)

To summarise, epistemic modals scope over non-epistemic modals. When epistemics combine in DMCs, there is no restriction on the ordering of modal force.<sup>27</sup> Furthermore, priority modals scope over circumstantial modals. When priority modals combine in DMCs, necessity needs to scope over possibility. In the lowest part of the hierarchy the ordering restriction on the flavours is pure possibility > ability > disposition.

#### 4.5.2 Inside the modal head

As was suggested in previous chapters, since modal flavour plays such a decisive role in ordering restrictions in DMCs, a successful analysis of these constructions needs to consider switching from a proposal in which the modal base and the ordering source are merely contextual parameters to one that assumes they are the arguments of the modal. If it is claimed that this puzzle is a compositional one and that these restrictions do indeed come from the semantics of the modal, then these need to be compositional pieces as well.

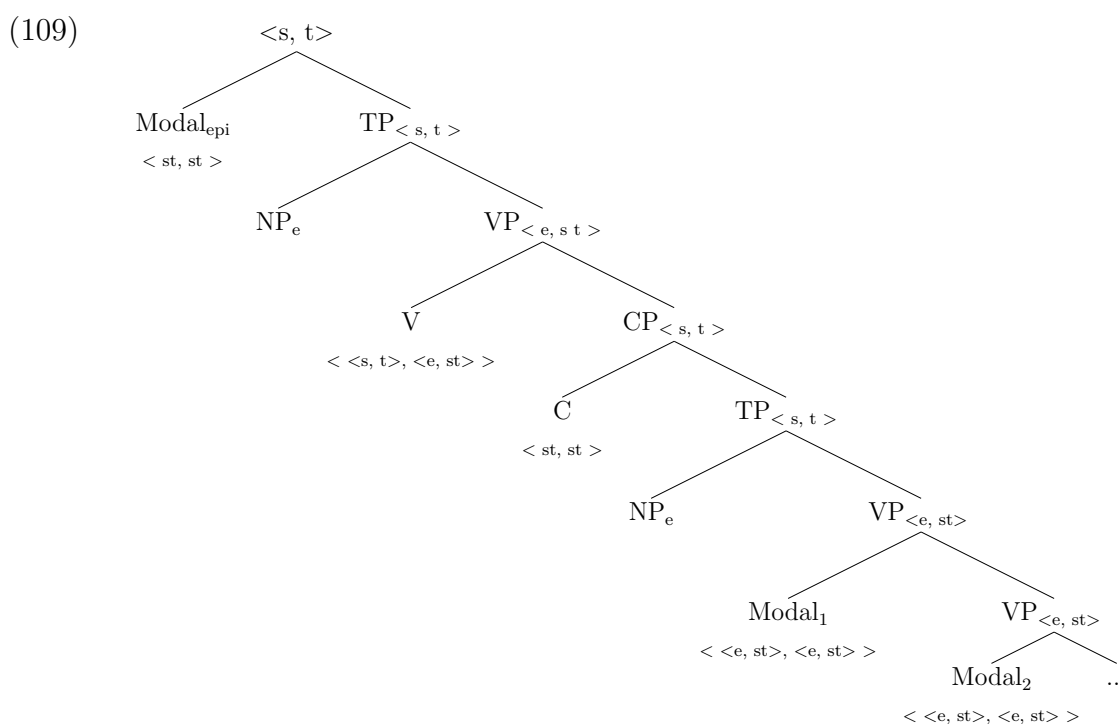
<sup>27</sup>This claim is based on Croatian, where there can only be one epistemic modal per clause. I assume that in languages where there can be multiple epistemics in a single clause they would follow the necessity > possibility ordering. Note that this could also be interesting evidence that Croatian epistemics appear in bi-clausal structures, which is why there is no necessity > possibility restriction when they combine.

Recall the epistemic + non-epistemic combinations. Epistemic verbs in Croatian embed other non-epistemic modal verbs in the same way as they embed non-modal verbs in SMCs, that is, an epistemic modal embeds a whole clause, while a non-epistemic modal embeds an infinitival VP. I assume here that the epistemics scope above TP, as many previous accounts have assumed (Piccolo, 1990; Cinque, 1999; Stowell, 2004; Hacquard, 2006; Borgonovo & Cummins, 2007; Hasty, 2012a; Hacquard, 2017), and embeds another CP where the non-epistemic modal positions are situated. These are non-static positions that are then filled in accordance with the proposed hierarchy. Another assumption that follows from this for Croatian is that since there is only one modal position in the higher CP it does not really matter for the epistemic modal whether it conveys necessity or possibility since that order is only important within a clause, or within a modal position, which is something I will discuss further in this section. However, this assumption does not have to be limited to Croatian: even in English, for instance, it is assumed that the epistemic head appears higher in the structure and scopes over an entire proposition. This then motivates the idea that there can be no more than one modal position above the proposition level, even in languages such as English. The non-epistemic modal positions are below TP. This applies for both SMCs and DMCs. I assume here that the syntax constructs the tree with syntactic heads that select their complements in a relative way such that this relative order always emerges.

To exemplify these assumptions, I use a complex bi-clausal multiple modal structure, that is, a triple modal structure where an epistemic modal embeds two non-epistemics, which is the sentence in (108).

- (108) Context: There are two men. One is a soldier, one is not. Somebody comes and says that one of them must be able to do 50 push-ups, but does not specify who. The person who is not a soldier says:

**Mora**                      biti    da    ti    **moraš**  
 must.PRES.3SG.∇EPI be.INF that you must.PRES.2SG.∇PRIO  
**moći**                      napraviti 50 sklekova.  
 can.INF.∃ABIL make.INF 50 push-ups  
*It must be that you have to be able to do 50 push-ups.*

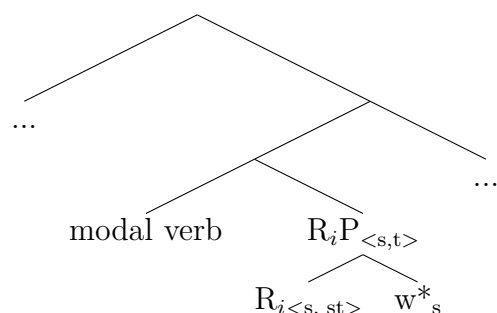


The semantic types in (109) are based on the findings from the preliminary analysis at the beginning of this chapter, which proposed different semantic types for epistemics and non-epistemics. It was also suggested that, since the data shows that DMC restrictions are highly dependent on the modal flavour, modal flavour should be specified in the syntax as an argument of the modal, rather than just a contextual parameter. This assumption is not completely novel in the literature (von Stechow & Heim, 2002; Arregui, 2014; Hacquard, 2017).

One approach suggests that modal flavour could be taken as an implicit argument that defines the domain of quantification. That argument is then projected syntactically and receives its value from the context (von Stechow & Heim, 2002). This

idea was first introduced due to contingency issues. According to von Fintel & Heim (2002), having no dependency on the evaluation world makes modal statements non-contingent. For example, if a world is taken to be a contextual parameter, the truth conditions for the modal sentence are world-independent. Such sentences are “non-contingent claims that are either true whatever or false whatever, and because of the plentitude of possible worlds they are more likely to be true than false” (von Fintel & Heim, 2002, p. 33). To fix this, von Fintel & Heim (2002) suggest introducing a free variable of type  $\langle s, t \rangle$ , which is the type Kratzer suggests for conversational backgrounds (Kratzer, 1991, 2012). This free variable obtains its value from the context, i.e. has the accessibility relation assigned from the context of utterance. The structure they suggest is in (110).  $R_i \langle 4, \langle s, st \rangle \rangle$  is context-dependent, while the second piece is where the evaluation world is determined.<sup>28</sup> Once the  $R_i$  and  $w^*$  combine by FA, the result is a constituent of type  $\langle s, t \rangle$ .

(110)



The other approach takes both the modal base and the ordering source as arguments. Recall that the difference between an epistemic and a non-epistemic modal does not only lie in syntax but, even more importantly, in the modal base, while the difference within different non-epistemic modals comes from the ordering source. According to Hacquard (2017), a modal combines with a modal base and an ordering source and thus provides an ordering based on certain ideals (e.g. rules in deontic modals, wishes in bouletic modals). The lexical entry suggested by Hacquard (2017, p. 46) for a necessity modal is:

<sup>28</sup>For any  $w \in W : \llbracket w^* \rrbracket^{w,g} = w$ . (von Fintel & Heim, 2002)

$$(111) \quad [[\mathbf{must}]]^w = \lambda f_{\langle s, st \rangle} \cdot \lambda g_{\langle s, st \rangle} \cdot \lambda q_{\langle st \rangle} \cdot \forall w' \in \text{Best}_{g(w)}(f(w)): q(w')=1$$

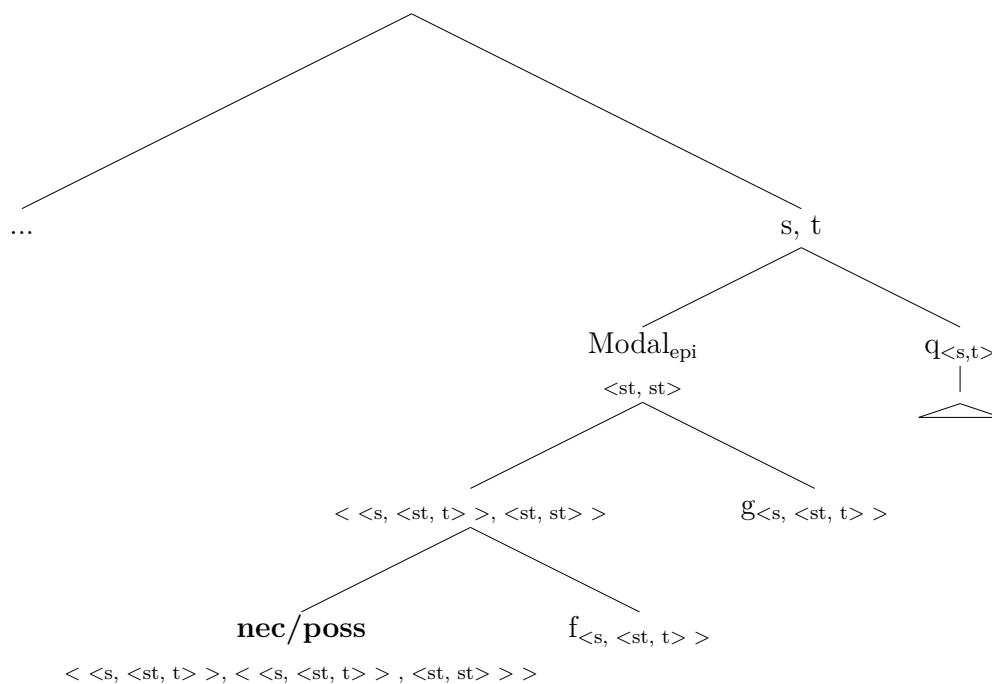
$$(112) \quad f_{\text{epistemic}}(w) = \lambda w'. w' \text{ is compatible with what is known in } w.$$

$$(113) \quad f_{\text{circumstantial}}(w) = \lambda w'. w' \text{ is compatible with the circumstances in } w.$$

While both of these approaches use similar strategies, the latter one seems more intuitive; that is, in the latter proposal the modal takes the modal base and the ordering source as arguments while the former proposal takes what seems to be neither a modal base nor an ordering source but something that is of the same type as a conversational background. This is not very intuitive and does not seem to capture the importance of the modal base and ordering source in the final semantics of the modal or their possible influence on other constituents of the structure. Therefore, I assume Hacquard's suggestion and explore it further based on Croatian DMC data.

I suggest there are two different kinds of modal heads — epistemic and non-epistemic. There are a couple of reasons to distinguish between these two. First of all, the epistemic head can only appear above tense, and has to be in the higher CP. Secondly, the epistemic modal base can, it goes without saying, only be epistemic. Once the epistemic modal base is filled, there cannot be a non-epistemic modal scoping over it. Example (114) is the structure I propose for epistemic modals (based on Hacquard and others), and example (115) is the appropriate lexical entry for the structure in (114).

(114)



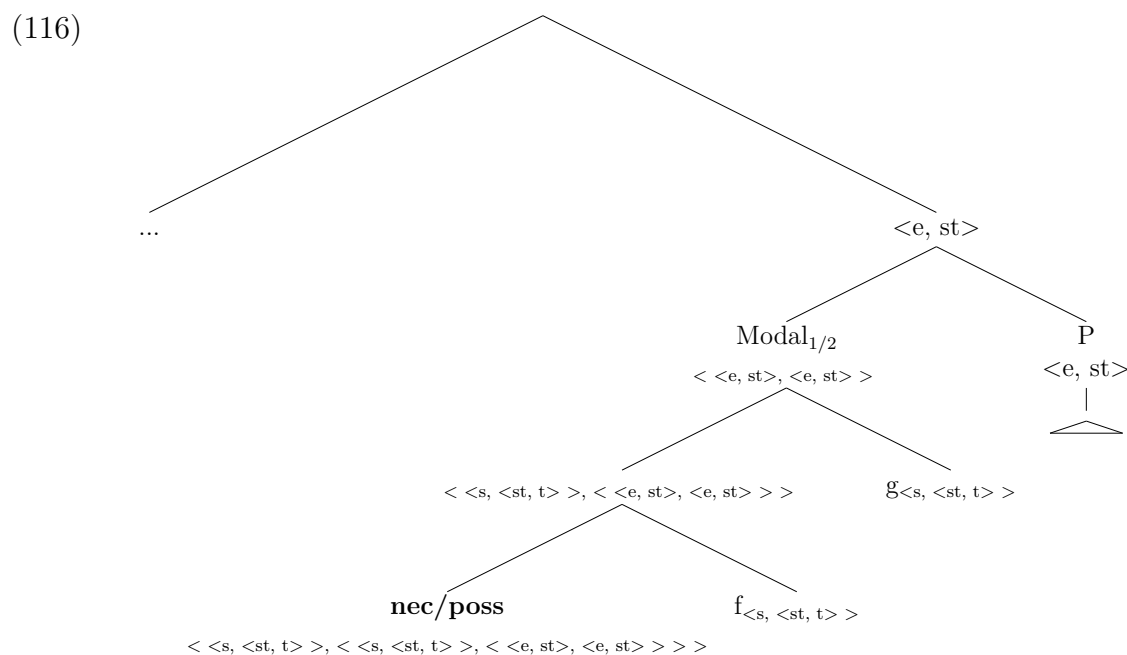
(115)  $[[\mathbf{morati}]]^w = \lambda f_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda q_{\langle st \rangle} \cdot \lambda w_s. \forall w' \in \text{Best}_{g(w)}(\cap f(w)):$   
 $q(w')=1$

In (115)  $f$ ,  $g$  and  $q$  are the modal base, the ordering source and the proposition, respectively, while  $nec/poss$  denote lexicalized force. Here I adopt a lexical entry that follows Kratzer's view (Kratzer, 1991, 2012) on the modal base type where the type is  $\langle s \langle st, t \rangle \rangle$ , instead of  $\langle st, t \rangle$  as Hacquard (2017) suggests. According to (115), an epistemic modal can quantify either universally or existentially over possible worlds, and it takes the modal base and the ordering source as arguments. Necessity and possibility are not specified in the syntax but rather lexicalized, at least in languages such as Croatian and English. In case of epistemic modals and layered modality, there can only be one modal force per clause, i.e. either necessity or possibility.<sup>29</sup> Also, note that a possible interesting assumption here might be that the morphology of a modal spans these heads, which means that there is no direct meaning function for  $[[\mathbf{must}]]$ , but instead the compositional meaning of

<sup>29</sup>Based on the Croatian data, I have no convincing reason to claim that there is a place for modal force in syntax as well. However, work by Rullmann et al. (2008) shows that there are languages, such as St'át'imcets, in which modal force varies while modal flavour is lexically restricted. This is something to be explored further in future scholarship.

these pieces is spelled out as ‘must’ phonologically.<sup>30</sup>

As for the non-epistemic modals, I assume, as was already suggested in the preliminary analysis, that they have a different semantic type from the epistemic ones. Based on these assumptions and Hacquard’s suggestion, this is my proposal for a non-epistemic modal head:



$$(117) \quad [[\mathbf{morati}_{priority}]]^w = \lambda f_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda P_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}_{g(w)}(\cap f(w)): P(x)(w')=1.$$

Recall, I am assuming that there are two of these positions below tense. Neither of these can have any other modal base apart from a circumstantial one. Both of these can convey either a necessity or possibility meaning and are filled in a relative way such that the relative order, which is based on the hierarchy in (107), is always assured. This, together with some of the previous assumptions about where these might appear in the syntax, goes to show that the modal hierarchy depends on both semantic as well as syntactic factors.

Therefore, based on the lexical entries from (115) and (117) and the modal heads in (114) and (116), the structure from (109) remains the same since the

<sup>30</sup>Husband, M., personal communication, 2017.

type of the modal heads does not change. Nevertheless, a new structure of the modal head is proposed and thus the lexical entries are different from what was initially suggested in the preliminary analysis. For a full derivation of a non-epistemic DMC see Appendix 2.

It can be suggested that for pure possibility, ability and dispositional modals, ordering source  $g$  is not necessary, since the ordering source is empty and does not serve the same purpose as in priority modals. However, I claim that for a complete compositional transparency, the ordering source needs to stay in the structure. This is necessary because if we start making distinctions between priority and circumstantial structures, we are adding additional differences that disrupt the unification of modal flavours. Even though epistemics and non-epistemics are already said to be different, there is no need to assume structural differences between priority and circumstantial modals since positing that an empty ordering source is there should not make any difference in the analysis, but is beneficial for the theory.

An additional piece of evidence for the above suggested syntax of modal heads comes from the constraint in (30), that is, the anti-concord constraint: *Two modal auxiliaries within a single clausal domain cannot have the same force and flavour*. This fits nicely in the hierarchy suggested above: if a modal force/modal flavour combination place is already taken, there cannot be another modal of the same force and flavour since that place is already full. In other words, once the position is full, the choice of the second modal is determined first based on the ACC constraint and, second, based on the hierarchy suggested above. Finally, an important point that has to be made here about the syntax of modal auxiliaries concerns the claim that a non-epistemic double modal structure is, in fact, a mono-clausal structure. It has been traditionally considered that single modal structures are mono-clausal structures (Rizzi, 1982; Burzio, 1986; Picallo, 1990; Cinque, 1988, 2004; Wurmbrand, 2015). Evidence that supports this claim for Croatian DMCs comes from Wurmbrand (2015) who reports on different data from the literature. For instance, Progovac (1993) notes that Croatian shows CP-blocking effects in certain constructions:

- (118) Milan {?ga} želi da {✓ga} vidi.  
 Milan {?him} wants that {✓him} see.PRES.3SG  
*Milan wants to see him.*

Similar effects can be found in modal structures. In epistemic structures in Croatian clitic climbing is not possible, while it is possible in non-epistemic ones.

- (119) Petar ju mora vidjeti.  
 Petar.NOM her.ACC must.PRES.3SG see.INF  
*Peter has to to see her.*
- (120) {\*ju} Mora biti {\*ju} da {ju} Petar vidi.  
 her.ACC must.PRES.3SG be.INF her.ACC that her.ACC Petar see.INF  
*It must be that Peter sees her.*

We can see here that clitic climbing is only possible for non-epistemic modals, since it seems that in the epistemic case the clitic cannot cross the clause boundary. This supports the claim that non-epistemic structures in Croatian are mono-clausal, while epistemics are bi-clausal. Note here that epistemic structures are quite special since they are impersonal so one might also claim that this is why the clitic cannot be moved up to the higher CP. However, this is highly unlikely since it seems that other *da* structures that are bi-clausal behave similarly.

Croatian epistemic + non-epistemic DMCs show CP-blocking effects as well.

- (121) Mora biti {\*ju} da {✓ju} Marko može  
 must.PRES.3SG be.INF her.ACC that her.ACC Marko can.PRES.3SG  
 odsvirati.  
 play.INF  
*It must be that Marko can play it.*
- (122) Mora biti {\*tu melodiju} da {tu melodiju}  
 must.PRES.3SG be.INF that.ACC melody.ACC that that.ACC melody.ACC  
 Marko može odsvirati.  
 Marko can.PRES.3SG play.INF  
*It must be that Marko can play that melody.*

It seems that clitic movement and inter-clausal scrambling is blocked in examples (121) and (122) because the clausal boundaries block them. However, these are fine in non-epistemic + non-epistemic combinations.

- (123) Marko **mora**                    **moći** odsvirati pjesmu.  
 Marko must.PRES.3SG can.INF play.INF song.ACC  
*Marko must be able to play it.*
- (124) Marko ju            **mora**                    **moći** odsvirati.  
 Marko her.ACC must.PRES.3SG can.INF play.INF  
*Marko must be able to play it.*
- (125) **Mora**            ju            **moći** odsvirati.  
 must.PRES.3SG her.ACC can.INF play.INF  
*Marko must be able to play it.*

For the non-epistemic + non-epistemic DMCs in (123) to (125) to be bi-clausal structures such free movement of the clitic should not be possible. This implies that non-epistemic DMCs are indeed mono-clausal which fits well with the assumptions that have been made as part of the ACC.

## 4.6 Conclusion

This chapter looked at how different layers of modality combine in Croatian. Based on the data, I first presented a novel type-compositional analysis that accounts for the possible combinations of Croatian DMs with respect to two larger groups of modals, epistemic and non-epistemic. I suggested that epistemic modal auxiliaries in Croatian embed other non-epistemic modal auxiliaries in the same way as they embed non-modal verbs in SMCs. However, to capture certain syntactic differences between epistemics and non-epistemics I assumed that non-epistemics and epistemics have different compositional types, in other words, that non-epistemics have a compositional type  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$ , which under some analyses is considered to be a control structure (Chierchia, 1984), while epistemics are of type  $\langle st, st \rangle$ . This type-based approach predicts correct results for DMCs in which epistemics embed epistemics and non-epistemics, and non-epistemics embed non-epistemics. It also correctly predicts the ungrammaticality of non-epistemics embedding epistemics.

Though this account predicts the ways in which Croatian modals can combine type-theoretically at the syntax-semantics interface, the question that still remained unsolved at that point is that of further semantic restrictions on non-epistemic

DMCs. These have rarely been in focus in previous research. For instance, authors such as Elsmann & Dubinsky (2009) and Hasty (2012a) do not deal with this type of data and only offer purely structural explanations on why epistemics need to scope over non-epistemics. Some accounts, such as Cinque (1999) and Nauze (2008), try to account for modal restrictions within the non-epistemic group but, since their primary focus is not on DMCs, they do not provide a full proposal which accounts for all possible restrictions.

Since the preliminary analysis dealt primarily with the relationship between the two big groups of modal auxiliaries, epistemic and non-epistemic, the main focus of the rest of this chapter was non-epistemic structures and their ordering restrictions. The two main findings emerging from the Croatian data were, first, that there seems to be an anti-concord constraint within single-clause DMCs, and second, that there seems to be a hierarchical relationship between different flavours and forces of modality.

The former finding was set up as a constraint that blocks modal auxiliaries from combining if they are of the same force and flavour. For instance, it was shown that a priority necessity modal cannot combine with another priority necessity modal, while the structure is acceptable if it combines with a priority possibility modal auxiliary.

This constraint motivated some other interesting findings. Once the constraint was set up, it was pointed out that some circumstantial modals that combine to give acceptable structures seemingly do not respect the constraint. However, this proved not to be true. All DMCs respect the anti-concord constraint, while a complication comes from the fact that modal auxiliaries are categorised in flavours that might not be grammatically relevant categories. Therefore, my analysis explored some of the new grammatical flavours within the circumstantial group, i.e. pure possibility, ability and disposition. The data show that these flavours play a crucial role in the hierarchy of modal layers by making up the basis of the lower DM hierarchy: pure possibility scopes the highest, over ability and disposition, in that order. Even

though there is lexical asymmetry within these groups, the hypothesis is that within each group, modal auxiliaries also follow the necessity > possibility ordering.<sup>31</sup>

When it comes to modal flavours, the data also showed that some other traditionally identified modal flavours do not seem to play as prominent a role as the circumstantial flavours do. In other words, while pure possibility, ability and disposition play a crucial role in the proposed modal hierarchy, deontic, bouletic and teleological flavours do not seem to influence DM restrictions. Therefore, I proposed to consider these the priority group of modals, identifying the priority flavour as the grammatically relevant flavour, as opposed to the non-grammatical subflavours, that is, deontic, bouletic and teleological modal auxiliaries. The priority modal data further suggested that priority modality scopes above the circumstantial group, and also that they can indeed combine within the priority group, as long as the necessity > possibility ordering is respected. Finally, the well-known assumption that epistemics scope above the non-epistemic group still holds and was also included in the analysis: I have adopted a previous view from the literature that epistemics scope above tense, while non-epistemics scope below it.

Apart from the novel modal hierarchy, my account suggested that there is only one modal position in the higher CP in Croatian, while there seem to be two below tense in the embedded CP. This analysis does not affect how single modals behave and is, at the same time, successful in explaining how DMCs combine. Finally, since both modal force and modal flavour seem to be crucial in how modal meanings come about but also how modals combine with each other, I suggested that the previous analyses in the literature in which the modal takes the modal base and the ordering source best fit the suggested restrictions. Due to these assumptions about the modal head, the final lexical entries for epistemic and non-epistemic modals were adjusted.

To summarise, some of the important implications of these chapter are that, first, some of the traditional candidates for modal flavours might not be as grammatically distinct as initially suggested and that some distinctions between modal flavours seem to be more fundamental than others. Due to the state of

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<sup>31</sup>Excluding pure possibility, as already mentioned.

terminology and classification within the modal flavour literature, this could play an important role in contemporary discussions on which modal flavours there are and which of them actually are distinct modal flavours, by showing that some modal meanings influence semantic restrictions in DMCs while others do not seem to play a grammatically relevant role. Based on these assumptions, in Table 4.1 I present the updated overview of Croatian fully-fledged modal auxiliaries and their forces and grammatical flavours.

**Table 4.1:** Revised overview of Croatian fully-fledged modal auxiliaries

Modal auxiliary	English translation	Modal force	Possible readings
MORATI	must, have to	necessity	epistemic, priority, disposition
TREBATI	ought to, should	necessity	priority, disposition
SMJETI	be allowed to, may	possibility	priority
MOĆI	may, can	possibility	epistemic, priority, pure possibility, ability

The second important implication has to do with the relationship between two crucial modal pieces: modal force and flavour. The DMC data shows that while modal force and flavour seem to be independent from one another, forming separate hierarchies, they both influence the semantic relationships that a modal auxiliary has with other modal auxiliaries.

Nevertheless, establishing that both modal force and flavour play an important role in semantic restrictions on DMCs raises additional questions: first of all, why are force and flavour hierarchically arranged in the proposed order? That is, is there any conceptual rationale behind the hierarchy proposed in this chapter? And second, how do these pieces come together compositionally in DMCs? These are some of the important ideas I discuss in the next chapter.

# 5

## Motivating the Hierarchy

### Contents

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### 5.1 Introduction

In the previous chapter I showed how Croatian data motivates a modal hierarchy that defines possible combinations in DMCs. Starting from the most basic division of modal flavours, i.e. epistemic vs. non-epistemic, and moving on to different non-epistemic flavours, i.e. priority vs. pure possibility, ability and disposition, it was proposed that all these affect the ordering of modal elements in DMCs by

forming a modal hierarchy that takes into account modal force and flavour. While this was certainly not the first account to suggest a modal hierarchy (Cinque, 1999; Nauze, 2008), it was the first one to do so through an extensive study of DMCs. Through the interaction of constituents of DMCs, I showed how semantic restrictions found in these constructions motivate the following hierarchy:

- (1) epistemic > priority > pure possibility > ability > disposition

However, if we leave off at this point, there is a danger of this analysis being merely descriptive and failing to offer any deeper conceptual insight into why the hierarchy works the way it does. In other words, why is the hierarchy this way, rather than any other? This seems to be a problem for many cartographic analyses which map the actually occurring functional projections (Cinque, 1999). Even though the evidence we find in these types of analyses is extremely valuable, it cannot and should not be where the analysis stops. While the uniformity found in these analyses suggests that there is something fundamental about these hierarchies (Ramchand & Svenonius, 2014), the existing analyses usually say little about the possible rationale behind them. This is problematic since if we are assuming that these hierarchies are based on innate universal factors, we are also implying that there is some sort of logical rationale behind them. Otherwise, they might simply be taken as stipulations without any conceptual grounding.

That being said, we can identify several missing pieces to the puzzle I am trying to solve in this thesis. First of all, what is the deeper conceptual rationale behind the hierarchy in (1)? Obviously, this is not a simple question to answer and includes several smaller puzzles, i.e. is there a semantic-logical rationale behind the epistemic + non-epistemic ordering or is this purely syntactic, as some authors suggest? Is the rationale the same for all ordering pairs or can it differ, and if it can differ, is there a rationale behind these differences? And last, but not least, how do these notions connect to the compositional manner in which DMs combine, and what are some of the basic compositional principles involved in the composition of DMCs?

As previously mentioned, there has been a substantial amount of work in the modal literature claiming that epistemic modals have to scope higher than non-epistemic modals (Cinque, 1999; Cormack & Smith, 2002; Butler, 2003). Most of the time this ordering constraint is thought to be structural in nature. For instance, it has been widely claimed that epistemics scope above TP, while non-epistemics scope below TP; thus non-epistemics could never scope above epistemics (Picallo, 1990; Cinque, 1999; Stowell, 2004; Hacquard, 2006; Borgonovo & Cummins, 2007; Hasty, 2012a; Hacquard, 2017). However, most of this evidence comes from the relationship modals have with, for instance, tense and aspect, rather than from their semantic qualities.

Along similar lines, recent work by Ramchand & Svenonius (2014) suggests that there are three fundamental domains, i.e. CP, TP and VP, which have their conceptual primitives in propositions, situations and events, respectively. Further to that, epistemic modality is said to sit in the propositional domain, and non-epistemic modality in the situational domain. Additionally, epistemic modality quantifies over “situations with fixed world and time variables, but free speaker-oriented variables”, while non-epistemic modality quantifies over “situations with free-world and time variables” (Ramchand & Svenonius, 2014, p. 170). This is one of the first substantial attempts to explain the conceptual rationale behind the ordering.<sup>1</sup> The Ramchand & Svenonius (2014) analysis sets us off in the right direction, but does not give us enough. While the aim here is to explain why epistemics scope over non-epistemics, we also need to be able to explain why there are ordering restrictions within the non-epistemic group. Non-epistemics are not traditionally thought of as being structurally different, nor do they seem to be. Therefore, it seems that a purely syntactic rationale would not provide a plausible explanation for these orderings.

Therefore, the aim of this chapter is to tie up these loose ends and answer these two puzzles: first, what is the semantic-logical rationale behind the modal hierarchy, and second, how does this affect the way modal auxiliaries combine with respect to the compositional principles?

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<sup>1</sup>The Ramchand & Svenonius (2014) proposal will be further discussed in Section 5.4.

Steering away from the idea that these hierarchies are based purely on syntactic factors, I propose that there is a deeper conceptual nature of these modals that influences the hierarchy and it is determined by the propositions in their modal bases, at least in the case of circumstantial modals. Furthermore, I also discuss why it might be difficult to compare the three big flavour groups, that is, epistemic, priority and circumstantial, and offer a new insight into what this might mean for the modal theory and DM hierarchy in general. In addition to the conceptual rationale behind the flavour hierarchy, I also discuss the force ordering restrictions and offer an explanation on why a possibility > necessity ordering is unacceptable. Finally, I address the question of compositionality of DMCs, focusing on the manner in which the meanings of two modals in a given DMC combine, as well as what different hypotheses would mean for the relationship between the modal bases.

## 5.2 Circumstantial flavours

In Section 4.4 I explored extensively the three circumstantial flavours, i.e. pure possibility, ability and disposition, as the key flavours for pinning down the nature of semantic restrictions in non-epistemic DMCs in Croatian, as well as the manner in which they have been defined in the previous literature. In this section I aim to show that the hierarchy within this group is not coincidental, but rather conceptually motivated, and is therefore likely to extend cross-linguistically. This section also carries implications for what we consider to be grammatical vs. non-grammatical modal flavours by conceptually supporting some of the claims I have made about this dichotomy in the previous chapter.

Recall the final hierarchy in (107) on page 153, here repeated as (2). Within the circumstantial modal group, pure possibility embeds ability, and ability embeds disposition:

- (2) epistemic (*necessity* | *possibility*) > priority (*necessity* > *possibility*) > pure possibility (*possibility*) > ability (*possibility*) > disposition (*necessity*)

In Section 4.4.1 pure possibility was defined as relying on external circumstances. These circumstances represent how the world really is, without any ordering

restrictions. In other words, this is how the world needs to be for something to be possible.

Let us take a look at example (3). Modal auxiliary *can* in (3) is a pure possibility *can* that relies on external circumstances. Furthermore, predictions about this example would depend entirely on the propositions in the modal base since the ordering source is empty. To exemplify, for (3) the modal base could contain the propositions in (4), depending on what is relevant. The modal base takes into account the relevant circumstances that hold in this world (Kratzer, 2012). It consists of propositions which are all true in the actual world but also in an infinite number of possible worlds. Therefore, the modal base gives an intersection of the worlds in which all our propositions are true. Crucially, the meaning of *can* in (3) depends only on the modal base  $f(w@)$  (since the ordering source is empty), and the way the propositions in it are interpreted depending on the flavour in question (Werkmann, 2014).<sup>2</sup>

- (3) Context: The Ramones are trying to solve a riddle they found in a newspaper. It is a difficult riddle, but they believe there is a solution, since all riddles have solutions.<sup>3</sup>

The Ramones believe a solution **can** be found.

$$(4) \quad f(w@) = \begin{array}{l} f_1 = \{w \in W \mid \text{The Ramones have a riddle in } w.\} \\ f_2 = \{w \in W \mid \text{Riddles have solutions in } w.\} \end{array}$$

Recall that the hierarchical proposal mentioned above suggested that, based on Croatian DMC data, pure possibility needs to come higher than ability.<sup>4</sup> Example (5) contains an ability modal *can*.

<sup>2</sup>The following discussion will strongly rely on Kratzerian modal theory (1981; 1991; 2012).

<sup>3</sup>Note that the genericity found in propositions such as *Riddles have solutions in w* might be problematic. In a way, it might be called *cheating* if a sentence that itself requires access to some kind of possible world analysis is a proposition of the modal base. This is something that needs to be addressed in future scholarship.

<sup>4</sup>Examples that support this claim can be found in Section 4.4.3.

- (5) Context: The Ramones are trying to solve a riddle they found in a newspaper. It is a difficult riddle but solving riddles has been Joey's hobby since he was a child so he has become quite good at it.<sup>5</sup>

Joey Ramone **can** find a solution.

$$(6) \quad f(w_{@}) = \begin{array}{l} f_1 = \{w \in W \mid \text{The Ramones have a riddle in } w.\} \\ f_2 = \{w \in W \mid \text{Riddles have solutions in } w.\} \\ f_3 = \{w \in W \mid \text{Joey Ramone is good at solving riddles in } w.\} \\ f_4 = \{w \in W \mid \text{Joey Ramone has deductive reasoning skills in } w.\} \end{array}$$

Ability relies on internal circumstances, which I have defined as skills or means, i.e. one's internal competence to do something well or one's available resources.<sup>6</sup> If it is claimed that somebody is able to do something, it also must be true that this is a possibility in the actual world. In other words, for somebody to be able to do something, the external circumstances also need to be such that the ability can be fulfilled. For example, for somebody to be able to do 10 push-ups, the state of the environment needs to be such that they can do 10 push-ups, for instance, the force of gravity should not keep them glued to the ground. However, this does not imply that there is an inner disposition that makes them do 10 push-ups. In modal base terms, that means that the propositions in it will reflect pure possibility ((3)) as well as ability ((5)), but crucially, not necessarily disposition ((7)). In the case of pure possibility, this means that the propositions would not necessarily reflect ability.

This takes us to the lowest circumstantial flavour, disposition. To have a disposition to do something, one has to be able to do it as well, and it has to be possible based on the external circumstances. This means that, in order to have a disposition, the conditions for pure possibility and ability need to be fulfilled. Therefore, the propositions in (8) reflect what the circumstantial modal base for (7) depends on.

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<sup>5</sup>Note that *Joey Ramone is good at solving riddles in w* could be problematic for the same reason as *Riddles have solutions in w* in (4).

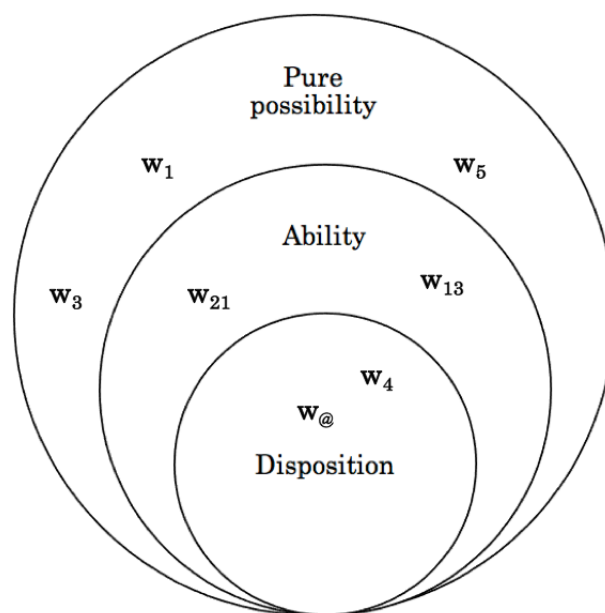
<sup>6</sup>For more details on what is considered internal competence/resources see Section 4.4.1.

- (7) Context: It is May and there is plenty of pollen in the air. If a person is allergic to pollen, then when pollen gets into their nose, it creates irritation. Joey Ramone is allergic to pollen.

Joey Ramone **needs** to sneeze

$$(8) \quad f(w_{@}) = \begin{aligned} f_1 &= \{w \in W \mid \text{It is spring in } w.\} \\ f_2 &= \{w \in W \mid \text{Joey is allergic to pollen in } w.\} \\ f_3 &= \{w \in W \mid \text{Joey did not take his allergy pills in } w.\} \\ f_4 &= \{w \in W \mid \text{Joey's nasal passage is not obstructed in } w.\} \\ f_5 &= \{w \in W \mid \text{Joey has lungs, a nose and a mouth in } w.\} \\ f_6 &= \{w \in W \mid \text{Joey's nose itches in } w.\} \end{aligned}$$

In a way, this hierarchy represents a set/subset relationship for the intersection of the worlds in which all the relevant propositions are true (see Figure 5.3). The most restricted modal base is the dispositional circumstantial modal base since the propositions it relies on are more specified or restricted and therefore it gives the most restricted intersection of possible worlds. On the other hand, ability is less restricted than disposition but more restricted than pure possibility. Finally, in the case of pure possibility the intersection of the worlds in which all relevant propositions are true is bigger in comparison to the intersection of worlds for the ability and dispositional flavour.



**Figure 5.1:** The proposed subset relationship

The important point that needs to be raised here is that this proposal by no means intends to suggest that when these modal verbs combine they enter a subsecutive relationship. This proposal has to do with the conceptual reasons why some meanings need to scope over the others, telling us something about the intersection of possible worlds that the modal base gives and the relationship between the flavours, but it does not aim to tell us anything about how any two modal auxiliaries combine. In other words, even though there is a subsecutive relationship between pure possibility, ability and disposition modal bases, this does not mean that when two modal auxiliaries combine, they do so in a subsecutive manner.<sup>7</sup>

The subsecutive relationship between sets of possible worlds does not mean that every pure possibility modal also implies a disposition meaning, in the manner in which *all* implies *some*. In other words if *John can sneeze*, this does not mean that *John needs to sneeze*. It just means that they will share all of the possible worlds in which the relevant propositions for both modals are true, but the interaction between the modal bases and the final interpretation of the modal meaning is different for each one of these flavours. In other words, each of these gets interpreted with respect to something else that it picks up from the context, either external circumstances, abilities, or internal circumstances for the pure possibility, ability and disposition flavour, respectively. This idea will be further explored in Section 5.6 where I say more about what this means for the compositional theory of modal verbs.

Moreover, this suggestion could also be used to explain why circumstantial flavours, even though they exhibit different grammatical properties in DMCs, still, in a way, belong to the same group. On one hand, they all use a circumstantial modal base with an empty ordering source, which results in the subset relationship I have just discussed. On the other hand, they are interpreted with respect to different types of propositions, which makes them different flavours and not just subflavours of the same flavour.

The suggestion that these are interpreted based on different propositions raises an interesting puzzle with respect to the Question Under Discussion (Ginzburg,

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<sup>7</sup>This issue will be discussed in more depth in Section 5.6.

1996; Roberts, 1996; Büring, 2003). A possible explanation for the relationship between these modal bases could be that while these modal bases might share some of the propositions in the modal bases, there are only certain propositions that are under discussion when the modal is interpreted. More specifically, although the flavours themselves might have a subsective relationship, the fact that disposition is not implied by pure possibility, even though they are in a subsective relationship, has to do with what is currently under discussion, namely, which propositions from the modal base are under discussion. In other words, the semantics of questions takes a question to be a set of propositions, and the QUD thus makes a set of propositions the most prominent. This might be what the modal base is sensitive to during conversation. This is an interesting issue but will have to be explored in future scholarship.

Finally, the relationship proposed in Figure 5.3 has important implications for the grammatical vs. non-grammatical distinction of modal flavours I have proposed in the previous chapter. Recall, it was proposed that while there are many different categorisations of circumstantial modal flavours, the DMC data shows how some might be more prominent than others since the semantic restrictions operating on DMCs seem to be influenced by the three flavours proposed in my analysis. On the other hand, while these flavours seem to be independent grammatical categories, the question remains — what does it then mean to be circumstantial and is this also a level where grammatical restrictions appear? The relationship discussed in this section aims to address at least a part of this question. The circumstantial group needs to have its place in theoretical approaches to modality, but as an overarching category for the three grammatical modal flavours, that is, pure possibility, ability and disposition, since they certainly seem to be targeting different propositions in their modal bases as well as putting different focus on different propositions, which, as was mentioned, ties in well with the notion of QUD. A resulting question worth pursuing here is how some of the other proposed circumstantial meanings, such as learned ability (Palmer, 2001; Coates, 1983), fit into this paradigm; that is, would these be grammatical or non-grammatical modal flavours?

## 5.3 Priority modals

### 5.3.1 Priority vs. circumstantial group

Staying within the domain of non-epistemic modals, our next goal is to determine how these assumptions fit with what we know about priority modals. A priority modal relies on a circumstantial modal base, as well as on an ordering source, whose propositions are based on priorities (rules/wishes/goals). According to the Croatian DMC data and other cross-linguistic data (see the hierarchy in (2)), these scope higher than pure possibility, ability and disposition modals.

The neatest proposal on the relationship between pure possibility, ability, disposition vs. priority would be one that follows a similar rationale to that seen in the previous section. Such a proposal would also accord with the traditional view that a modal theory needs to be of a unifying nature. However, in this section I focus on possible reasons for this ordering and propose that priority modals are, at least on some level, inherently different from circumstantial modals, since they have a non-empty ordering source, and that these differences might be more substantial than has been traditionally suggested. Along these lines, I steer away from the set/subset type of rationale, and suggest a different approach. I propose that even though there seems to be a plausible explanation for why the circumstantial group exhibits certain ordering restrictions, these do not necessarily have to apply to the priority group of modals since they seem to be too different to compare in these terms. The emptiness or non-emptiness of the ordering source makes these two groups intrinsically different in their semantic nature, since the modal pieces that make up their meanings are fundamentally different.

Let us now take a look at what it means to be a priority modal. For instance, a deontic priority modal has a circumstantial base and a deontic ordering source, which consists of propositions (in this case rules) that are used to order the worlds from the modal base from best to worst, as in (10) and (11) (Werkmann, 2014). In other words, the modal base  $f$  in (10) defines the worlds in which all propositions

are true, while the ordering source  $g$  uses the propositions inside it to order the worlds from the modal base.

- (9) Context: Joey is driving a car and approaching a red light. The rules say that you should go when the green light is on and stop when the red light is on. Not doing so can result in a fine.

Joey **must** stop at the red light.

$$(10) \quad f(w_{@}) = \begin{aligned} f_1 &= \{w \in W \mid \text{Joey is driving his car in } w.\} \\ f_2 &= \{w \in W \mid \text{Joey is in control of his vehicle in } w.\} \\ f_3 &= \{w \in W \mid \text{Joey is approaching a traffic light in } w.\} \\ f_4 &= \{w \in W \mid \text{There are pedestrians crossing the street in } w.\} \end{aligned}$$

$$(11) \quad g(w_{@}) = \begin{aligned} q_1 &= \{w \in W \mid \text{Cars stop at red light in } w.\} \\ q_2 &= \{w \in W \mid \text{Drivers are careful in } w.\} \\ q_3 &= \{w \in W \mid \text{Cars pass inspections in } w.\} \\ q_4 &= \{w \in W \mid \text{Drivers do not harm pedestrians in } w.\} \end{aligned}$$

Since priority modals use the same modal base as pure possibility, ability and disposition, this ought to be the first step in determining the rationale behind their hierarchy. However, we might hit a hurdle right at the beginning if we follow the same reasoning as we did with circumstantial flavours. The main issue that arises here is that it seems intuitively most acceptable to assume that pure possibility should actually scope higher than priority since it seems to be more general and less restricted. Furthermore, intuitively, we might say that if there is a priority to do something, it must be possible to do it, and not vice versa. Nonetheless, there is one thing we should take into account — while pure possibility, ability and disposition employ only a modal base, priority modals utilise a non-empty ordering source as well as the modal base.

This means that, when the manner in which possible worlds are restricted in case of circumstantial and priority modals is considered, it seems that something different is happening with priority modals. While there is a certain sense in which priority modal auxiliaries are more restricted, it is not that the intersection of all the worlds in which these propositions are true is becoming smaller, it is rather that these worlds are ordered, and therefore to say that they are more restricted is not

in fact correct. This is something that does not happen in case of circumstantial modals since they do not utilise the ordering source. Therefore, a priority modal picks up on the same propositions as a circumstantial one, but then orders the worlds with respect to the ordering source.

This further suggests that even though these flavours share this common part of modality, namely the relationship between the modal base, ordering source and force, there seems to be something inherently different about them. In other words, the difference between the priority flavour and the three circumstantial flavours does not seem to be the same as the difference between the three circumstantial flavours since the three circumstantial flavours only rely on the propositions from the circumstantial modal base, without being influenced by an additional ordering source.

The question that naturally follows from this claim concerns the ambiguity most modal lexical items have: if modal flavours are so inherently different, then why are they lexicalised in the same form? There must surely be something they all share. The answer to that is that there certainly is - the nature of the relationship between the modal force and the modal flavour that makes up the modal meaning, that is, the contextual information that feeds into the modal meaning, determining the modal interpretation.

However, theories of modality have traditionally leaned towards a completely unifying theory of modality (Kratzer, 1981, 1991, 2012). The rationale behind these tendencies is that there must be a reason why all these different meanings came to be in one lexical item. Recall that, for instance, English *must* can carry many different flavours. In a way, the fact that these different modal flavours are lexicalised in the same word in languages such as English seems to be something that is not a given, and does not say a great deal about how modality works, since there exist languages in which the force varies, and the flavour is lexicalised (Rullmann et al., 2008). These languages then stand as convincing evidence that flavours of modality might not be as inherently similar as initially suspected. In a way, it would not be surprising to find that there exists a language in which both force and flavour have to be lexicalised separately, for example, there could exist a possibility priority

modal, a necessity priority modal, a possibility circumstantial modal, and a necessity circumstantial modal. While in English or St'át'imcets these are covered by two lexical items, in this possible language there would be four. Therefore, it is very difficult to make suggestions on why these might come higher than circumstantials in the same way as I made those assumptions within the circumstantial group. These are, in a way, different categories, and therefore, the rationale for ordering among the groups might be different from that applying within the groups.

The claim that a completely unifying account might not be the way to go is further supported by the proposal I made in Chapter 3, where I suggested that non-epistemics and epistemics need to be of different types due to their structural differences. This was also suggested in previous work by Hacquard (2006) and others. In other words, if non-epistemics and epistemics are inherently different, even though they are lexicalised in the same word, it is not unreasonable to claim that there should be similar differences between priority vs. pure possibility, ability and disposition.

Despite the differences between the two groups, there are accounts that suggest the same hierarchical restrictions, but do not really go into the specifics of why these need to be ordered as they are. For instance, Nauze (2008), who calls priority modals participant-external and circumstantials participant-internal modals, offers a possible explanation as to why priority modals have to scope over circumstantial modals. Nauze suggests that participant-internal modality takes into account “the possibilities of the account state” (Nauze, 2008, p. 233), while the participant-external ones operate as regular declarative sentences with an additional consistency check which is based on the goal-oriented modality. One could imagine how this would then work for priority vs. ability and disposition, but it is not clear what happens with pure possibility, which intuitively seems closer to participant-external, although, on the other hand, it has nothing to do with goal-oriented modality. Perhaps a plausible explanation would be to declassify the pure possibility flavour from circumstantial to participant-external. However, it is not clear how to then achieve the intended ordering since these would then be classified as belonging to the same flavour. Another way around this is to focus on the grammatical

consequences of these classifications and not necessarily on where pure possibility belongs within the traditional categories. Indeed, pure possibility is independent and logically structured between priority and ability.

While Nauze's suggestion might work with some slight modifications, I suggest a different approach in which we keep these flavours in the same categories as were suggested in the previous chapters, that is, priority vs. pure possibility, ability and disposition. If a modal has an empty ordering source and, therefore, no ordering of the possible worlds, it will scope low, due to its non-restricted nature. On the other hand, if possible worlds are ordered by a set of rules, wishes, and goals, the modals scope higher. This would also fit nicely with the fact that epistemics scope higher, assuming the analysis of Hacquard (2011) in which epistemics have non-empty ordering sources, as opposed to von Stechow (2006) who says they can but do not have to have ordering sources. In a way, this could be an argument against the assumption that epistemics does not have to have ordering sources since then we would expect them to scope very low.

Another reason for a priority modal to have to scope higher comes from the notion that for an ordering source to be able to order possible worlds, there must be possible worlds that can be ordered. This implies that a circumstantial modal base scopes lower than the ordering source since the ordering source operates over the worlds from its circumstantial base. In other words, ordering sources that are non-empty, in this case containing propositions in form of priorities, need to scope higher than those which are empty, since the latter would *not care* about possible worlds since they do not order anything.

A possible compositional problem with this rationale lies in the fact that these should pick up on two different modal bases and not just one. What was just discussed should only matter inside the modal head, since every modal should have its own modal base and its own ordering source, and inside the modal head the ordering source would always be higher than the modal base, and would never order what is not inside that modal head. This means that there needs to be a syntactic restriction blocking ordering sources with priorities in a different way.

For instance, it could be assumed that modal heads that have non-empty ordering sources have restrictions on how low or high they can appear.

Finally, some of the notions discussed in this chapter also carry important implications for the grammatical vs. non-grammatical distinction I discussed in the previous section. The priority flavour is here taken as the level where there are grammatical differences and contrasted to the three other grammatical flavours, i.e. pure possibility, ability and disposition. In the previous section I have noted how one of the reasons why the three circumstantial flavours need to be considered grammatical flavours lies in the differences in propositions in their modal bases and in what is currently a QUD. On the other hand, for priority modals it does not seem to be that important that there are differences in types of propositions in ordering sources, or perhaps, these differences are not as prominent or grammatically relevant as those in the modal bases of different circumstantial modals. This stands as another difference between priority vs. pure possibility, ability and disposition and as an important question that would be worth revisiting in future work.

### 5.3.2 Additional evidence from adverb position

In this section I aim to provide additional support for the ordering rationale discussed previously. I aim to demonstrate that there are restrictions that block priorities from being accessed lower than a certain sortal domain. It will be shown that non-empty ordering sources need to scope higher than empty ordering sources, which can then serve as evidence that does not hinge on what is happening inside the modal head and which further supports the idea that what is more strict or ordered needs to scope over what is not strict or not ordered.

This additional piece of evidence to support the above suggested ordering comes from adverb interaction with small clauses in place of a subject. A *small clause* is a an XP YP constituent that has a predication relation where the predicate does not have a fully inflected verb, but rather an adjective phrase, noun phrase, prepositional phrase or uninflected verb phrase (Basilico, 2003), or in other words, “clausal structures lacking INFL and copula” (Chomsky, 1981). Since these small

clauses can have a different number of constituents on different syntactic levels, they can be helpful in determining whether there are actually any restrictions on where different modal elements can combine. Moreover, I will use adverbs to examine the manner in which the layers of modality are structurally constrained, since modal auxiliaries have specific syntactic requirements that block them from appearing in certain kinds of small clauses.

We have already established that different adverbs appear with different modal flavours. Therefore, if different adverbs have restrictions on the modal auxiliaries they can appear with, and we know that there are syntactic restrictions on where adverbs can scope, it might be useful to take a look at how adverbs behave in small clauses of different kinds.

In the first couple of examples small clauses are functioning as subject small clauses with an *-ing* participle as a predicate and with a *to*-infinitive as the predicate.

- (12) a. Involuntarily making a cake is how Mary always starts her day.  
 b. Skilfully making a cake is how Mary always starts her day.  
 c. Potentially making a cake is how Mary always starts her day.  
 d. \* Mandatorily making a cake is how Mary always starts her day.  
 e. \* Surely making a cake is how Mary always starts her day.
- (13) a. To involuntarily make a cake is Mary's priority every morning.  
 b. To skilfully make a cake is Mary's priority every morning.  
 c. To potentially make a cake is Mary's priority every morning.  
 d. \* To mandatorily make a cake is Mary's priority every morning.  
 e. \* To surely make a cake is Mary's priority every morning.

In (12)a. to c. and (13)a. to c. the adverbs target circumstantial modality, that is, disposition, ability and pure possibility, respectively. We can see here that these seem to go well with *-ing* and *to*-infinitive small clauses. However, there seems to be a cut-off point between pure possibility and priority modality. Examples (12)d. and (13)d., which target priority modality, seem odd. Examples (12)e. and (13)e., where epistemic modality is targeted, seem completely unacceptable. Syntactically

the cut-off point then seems to be just before a small clause becomes a full IP clause. In other words, if we assume (14) to represent the small clause in (12), and (15) to represent (13), then it appears that priority modality cannot appear below SpecIP, which means it needs a *subject-containing* constituent.

(14) [<sub>VP</sub> making a cake]

(15) [<sub>I</sub> to [<sub>VP</sub> make a cake]]

On the other hand, once the SpecIP position is filled, a priority-targeting adverb seems to work, as in (16) and (17). Note, however, that (16)e. and (17)e., which target epistemic modality, are still not acceptable.

- (16) a. Mary's involuntary making of a cake is an unsurprising event.  
 b. Mary's skilful making of a cake is an unsurprising event.  
 c. Mary's potentially making of a cake is an unsurprising event.  
 d. Mary's mandatory making of a cake is an unsurprising event.  
 e. \*Mary's certain(ly) making of a cake is an unsurprising event.

- (17) a. For Mary to involuntarily make a cake is unsurprising.  
 b. For Mary to skilfully make a cake is unsurprising.  
 c. For Mary to potentially make a cake is unsurprising.  
 d. For Mary to mandatorily make a cake is unsurprising.  
 e. \*For Mary to surely make a cake is unsurprising.

This means that once the structure is as in (18) and (19), priority modality starts to be accessible.

(18) [<sub>IP</sub> Mary's [<sub>I</sub> [<sub>VP</sub> making of a cake]]]

(19) [<sub>IP</sub> For Mary [<sub>I</sub> to [<sub>VP</sub> make a cake]]]

Finally, once the clause is a full CP with a finite predicate, all flavours of modality seem to be accessible, as in (20).

- (20)
- a. That Mary involuntarily made a cake is unsurprising.
  - b. That Mary skilfully made a cake is unsurprising.
  - c. That Mary potentially made a cake is unsurprising.
  - d. That Mary mandatorily made a cake is unsurprising.
  - e. That Mary surely made a cake is unsurprising.

These examples are interesting for several reasons. First, they give a different perspective on the Ramchand & Svenonius (2014) approach. Their approach suggests that there are also cut-off points for where certain flavours of modality can appear in the syntax. To motivate this they introduce three sortal domains. The issue with their analysis is that it is not completely clear what these sortal domains represent, and what tests one could do to identify what types of constituents scope within which domains.

Furthermore, this approach only suggests a cut-off point for epistemics vs. non-epistemics, and based on DMC data, we should assume that there should be a cut-off point between priority and circumstantial as well.<sup>8</sup> As discussed above, one of the possible reasons why priority needs to scope over circumstantial modality is that circumstantials only use a circumstantial modal base, without an ordering source, and priority modals use both a circumstantial modal base and an ordering source. This is compatible with the examples above which imply that circumstantials scope lower than priority modals. Note that this actually says more about where an ordering source needs to be situated than about where a modal base needs to be situated. The examples above support the idea that an ordering source cannot scope lower than a TP, which is why priority modality is not compatible with (12)a. and b., and (13)a. and b.

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<sup>8</sup>Also, one might expect that there is a cut-off point between all the grammatically relevant flavours, i.e. the three circumstantial flavours, but it seems that the small clause is too *big* to reveal those.

## 5.4 Epistemic vs. non-epistemic

Even though priority modals and circumstantial modals exhibit certain differences, traditionally they are considered to belong to one group of modals, that is, the non-epistemics. It was established in previous sections of this chapter that these differences might be more robust than is traditionally assumed. Nevertheless, it is important to emphasise that these share the circumstantial modal base. That being said, most of the traditional approaches to modal flavour groups suggest that epistemics vs. non-epistemics is certainly the most prominent modal dichotomy.

Epistemic modality is usually defined as relying on information about the world and how that information changes as we share what we know (von Fintel & Gillies, 2007). Epistemic modality includes the judgement of the speaker, i.e. how a certain proposition is being judged (van der Auwera & Plungian, 1998). According to von Fintel (2006), epistemics have an epistemic modal base, as opposed to the circumstantial modal base that the non-epistemics have, and they either have no ordering source or an ordering source based on plausibility or stereotypicality.<sup>9</sup> For example, for the sentence in (21) the modal base would be the one in (22):

- (21) Context: My new neighbour Joey is very eloquent and handsome and is always nicely dressed. Sometimes I see paparazzi in front of his house.

Joey **might** be an actor.

- (22)  $f(w_{\text{@}}) =$
- $$\begin{aligned} p_1 &= \{w \in W \mid \text{Joey is followed by paparazzi in } w.\} \\ p_2 &= \{w \in W \mid \text{Joey lives in LA in } w.\} \\ p_3 &= \{w \in W \mid \text{Joey goes to film festivals' red carpet events in } w.\} \\ p_4 &= \{w \in W \mid \text{Joey is handsome and eloquent in } w.\} \end{aligned}$$

The modal in (21) is interpreted based on the propositions in (22) that here represent pieces of information/knowledge. Going back to Kratzer (1981; 1991; 2012), a neat modality theory needs to be unifying, as has briefly been discussed in the previous section. In other words, since we use the word *must* in both

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<sup>9</sup>Note that while Hacquard (2011) says that epistemic modal bases are evaluated with respect to a stereotypical ordering source, von Fintel (2006) says they can, but do not have to have an ordering source.

epistemic and non-epistemic contexts, Kratzer suggests that this is a matter of context dependency, and that structurally these are the same, except for a difference in modal base. However, there are many other theories that suggest that this difference goes beyond the nature of the propositions in the modal base and that epistemics need to structurally scope higher than the priority modals.

For example, one recent proposal, briefly mentioned in the introduction to this chapter and in the previous section, comes from Ramchand & Svenonius (2014) who say that while epistemics express judgement about the entire proposition (and therefore, have to scope higher), non-epistemics express a necessity/possibility which operates on a lower situation or perhaps event level. Similarly, Hacquard (2006, 2017) suggests that there is a difference in height of interpretation that is based on Cinque's hierarchy (1999). According to Hacquard, epistemics scope above tense and must be interpreted with respect to "the local time of evaluation" (Hacquard, 2017, p. 5). Non-epistemics, on the other hand, scope lower than tense, which is why their time of evaluation is provided by the tense itself. These are just some of the recent studies dealing with this topic, but the topic has been discussed at length by numerous authors such as Ross (1969), Perlmutter (1968), Bybee et al. (1994), and Palmer (2001).

Even though the structural differences between epistemics and non-epistemics are often the most prominent ones in the literature, there are some important differences in terms of the modal base as well. Priority modals and circumstantial modals have a circumstantial modal base, while epistemics have an epistemic modal base, and do or do not have to have an ordering source.<sup>10</sup> In other words, besides being structurally different, they are also different in terms of modal bases. In this section, I do not intend to give a new proposal on the difference between epistemics and non-epistemics, since my work is more interested in how they behave in DMCs than in how they differ with respect to each other. However, these differences show that these two groups of modals are very distinct, and therefore, it is difficult to

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<sup>10</sup>As already mentioned, there is some disagreement on this issue in the literature.

provide an explanation which would go along the same lines as the one provided for modals within the non-epistemic group.

Nevertheless, an explanation based on types of constituents that can represent propositions vs. events seems to be the most straightforward one (even though this is a very different approach from the one suggested for the circumstantial group). Since epistemics scope over propositions, and non-epistemics over events, non-epistemics are structurally blocked from scoping over epistemics in DMCs. For the Croatian examples the structural explanation seems extremely appealing since epistemics are, in fact, structurally different from non-epistemics. This is in line with my preliminary analysis in Section 4.2 where I propose an analysis that is not of an unifying nature, that is, I propose that these different flavours have different semantic types.

On the other hand, it seems that this syntactic explanation actually lies on the syntax-semantics interface. If we go back to what van der Auwera & Plungian (1998) say about epistemics, that is, that they include the speaker's judgement, it is quite straightforward to understand why it is logically implausible for a priority modal to embed an epistemic modal. Speakers can only judge propositions, and not situations/events. Therefore, even without the structural block, a non-epistemic > epistemic structure would be logically implausible since it is not clear what it would mean for an event or a situation to scope over a proposition. This means that even though both of the modal groups establish similar relationships with their modal bases, they establish them with propositions of a different kind, which then influences their mandatory ordering.

This also goes to show that even though they are lexicalised in the same lexical item, the differences between epistemics and non-epistemics are substantial, and might even point us towards suggesting that epistemics and non-epistemics belong to different categories of auxiliaries. My intention here is not to say that these auxiliaries have nothing in common. However, it seems that, apart from the fact that most of the time they tend to be lexicalised in the same lexical item, and even more importantly, we use them to express necessity and possibility, they work on completely different conceptual grounds from non-epistemics.

## 5.5 Universal vs. existential

At this point, I have explored a possible rationale behind the flavour hierarchy observed in DMCs. However, a full account cannot be complete without addressing the force hierarchy as well. In what follows I will address some of the previous proposals that have explored the necessity > possibility ordering, while focusing on the missing piece within these proposals, that is, why necessity needs to scope over possibility, and additionally, whether there are some deeper semantic restrictions that block necessity modals from scoping below possibility modals.

According to the hierarchy I have proposed, universal modal quantifiers always scope over an existential modal quantifier within a single flavour, at least when it comes to modal auxiliaries. As von Stechow & Iatridou (2009) note, while different authors such as Cinque (1999), Cormack & Smith (2002), and Butler (2003) suggest that necessity scopes higher than possibility, no account provides an explanation as to why that might be so. They briefly mention that a possible analysis might be one in which necessity modals act as presuppositional strong determiners, while possibility modals act as non-presuppositional weak ones, which are ordered according to what they dub “a Heim (1982)/Diesing-like ordering” (von Stechow & Iatridou, 2009, p. 14).

The Heim/Diesing analysis mentioned by von Stechow & Iatridou (2009), when applied to modals, suggests that necessity modals resemble *strong* determiners such as *the*, *all*, *every* and *each*, and possibility modal resemble *weak* determiners such as *a*, *no*, and *some* (Milsark, 1977). Diesing (1992) suggests that strong and weak determiners differ in terms of quantifier raising. To be more specific, strong determiners are raised and adjoined to IP, and much as in the proposal in Heim (1982), they create a tripartite quantificational structure consisting of an operator (the quantifier), a restrictor, and a nuclear scope (Diesing, 1992).<sup>11</sup>

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<sup>11</sup>Diesing’s (1992, p. 61) term *restrictive clause* has been changed here to *restrictor* because the restrictor is not always clearly a clause. For instance:

- (i) Every woman walked: every x [woman x] [walk x]

Conversely, there is no raising in the case of weak determiners on their cardinality reading. When they stay within the VP, they behave like cardinality predicates that introduce variables which adopt existential force by existential closure. However, this is only true of the weak determiners' non-presuppositional reading. On their presuppositional reading they behave similarly to strong determiners, raising to the IP and forming the same tripartite structure (Diesing, 1992). Diesing (1992) further elaborates on Ioup (1975) who suggests that there is a variation on the scope of determiners. Going from left to right, the hierarchy moves from preference for wider to narrower scope:

(23) each > every > all > most > many > several > some > a few

Diesing suggests that this is also implied by her syntactic account. Quantifier raising ensures that the strong presuppositional determiner always has the IP as its scope domain, while the cardinal reading bounds weak determiners to remain within the VP due to the existential closure. Therefore, on this reading weak determiners have to stay within the VP. If this proposal is applied to necessity and possibility modals, as suggested in von Stechow & Iatridou (2009), this implies that necessity modals have to scope over possibility modals due to their wider scope and the ability to scope outside of the VP.

I propose that in addition to Diesing's syntactic explanation, there is an alternative solution to this issue, which relates specifically to the semantics of modal auxiliaries. Take a look at an example of a Croatian DMC in which a necessity modal auxiliary embeds a possibility modal auxiliary of the same flavour.<sup>12</sup>

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<sup>12</sup>This example is from: <http://www.krapinsko-zagorska.hns.hr/index.php/sample-sites-2/zupanijska-organizacija/3819-andelko-topolovec-novi-predsjednik-sjeverozapadno-hrvatskog-regionalnog-saveza-hns-a>, accessed 5 Feb 2017.

- (24) Context: The president of a political party is giving a speech. While emphasising the importance of the democratic process in the party, as well as everyone's right to a different opinion, she utters this sentence:

HNS je stranka u kojoj se **smije** i  
HNS is party in which self may.PRES.3SG.∃PRIOR and  
**mora** **smjeti** jasno izreći svoj  
must.PRES.3SG.∀PRIOR may.INF.∃PRIOR clearly say.INF own  
stav.  
attitude  
*HNS is a party in which one is allowed to and must be allowed to  
express one's opinion clearly.*

This example is interesting for a couple of reasons. First of all, it can offer a deeper insight into why it might be logically implausible for an existential to scope over a universal quantifier, and second, and less important at this point of this discussion, it shows the difference in meanings between using an SMC and a DMC in this context. The former point concerns the *mora smjeti* 'must may' structure. In this structure, both of these modals convey a priority flavour. Recall, if both modals share a flavour, then the force needs to be different. In previous sections I have shown that if this happens, the necessity modal needs to scope over a possibility modal, since the opposite order, i.e. *smije morati* is not acceptable to native speakers. In the context of this particular example, the first modal *morati* scopes over *smjeti izreći*, while the second modal *smjeti* scopes over *izreći*. As they are both priority modals, they both depend on rules/regulations; however, they depend on a different set of rules.

To be more specific, the set of propositions from the ordering source of the first modal includes propositions like *Political parties have rules of behaviour in w*, *Members respect the code of conduct in w*, *Liberal parties care about freedom of speech in w*, and for the second modal these are *Members express their opinions in w*, *Members' opinions are important in w*, *Members have different opinions in w*, *Non-members do not express their opinions in w*. Therefore, the strong necessity modal refers to the necessity of there being a rule about the possibility of expressing one's opinion. On the other hand, the possibility modal does not say anything

about the necessity of the existence of such a rule but rather about the possibility of saying something, or alternatively, of not saying something.

To understand the rest of the discussion, we need to revisit some examples from Chapter 2 that are traditionally used to show the difference between necessity and possibility modals (von Fintel & Iatridou, 2008).

(25) \*You **must** express your opinion and you **must** not express your opinion.

(26) You **may** express your opinion and you **may** not express your opinion.

These types of sentences are unacceptable in the case of necessity modals and acceptable in the case of possibility modals. The reasons seem quite straightforward: if the quantification is over all possible worlds, then it is unacceptable to have the opposite claim in the same utterance. However, if the quantification is over some worlds only, then it should be fine, since the first claim is only true in some of the possible worlds.

Following this line of thought, if we apply this to the issue of the DM ordering of the force, it clarifies why the ordering must be universal > existential, that is, necessity > possibility. In the unacceptable ordering, the existential *smjeti* only quantifies over some of the possible worlds. However, the logical problem appears when the universal *morati* needs to determine its domain of quantification since it is given both the worlds in which one does not have to express one's opinions and in which one has to express one's opinions, which is logically implausible, as seen in (25). On the other hand, in the acceptable ordering this problem does not occur since the domain the existential *smjeti* quantifies over consists of all the possible worlds in which you are allowed to express your opinion and you are also allowed not to express your opinion, which is logically valid. However, one might claim that this issue could be avoided if there is some sort of formal apparatus that specifies that the necessity modal would only take into account the *p* worlds. Yet, this does not happen in natural language. This is connected to another issue. If it is problematic for the necessity modal to quantify over *not p* worlds, then it might be problematic for a single necessity modal to quantify over all the possible worlds since it will not

be able to rule out the problematic ones. I claim here that this is only an issue for double modals since in a single modal constructions the necessity modal is not given two relevant sets of worlds, it is given all the possible worlds, but the modal only quantifies over all the possible worlds in which all the propositions from the modal base are true. In the case of double modals, one quantification has already taken place, and therefore, the modal is given two sets of worlds which are relevant. It seems here that in these DMC cases, the necessity modal has no way of excluding the problematic worlds since there seem to be two relevant sets, and one of them is not compatible with truth conditions. In case of single modal constructions, this does not seem to be a problem, since no relevant sets had been determined.

Crucially, this ordering only matters in cases where both modals are of the same flavour. It seems that when the flavours are mixed, for example, ability + disposition, possibility modals can scope over necessity modals. This suggests that this order only has to be respected when the modal relies on the same contextual information, i.e. when the relationship between the modal base and the possible worlds is interpreted with respect to the same contextual information. For example, if the first modal is an existential quantifier relying on skills/means, as in the case of the ability modal, and the second modal is a universal modal relying on internal conditions, as in the case of a disposition modal, then there seems to be no logical clash ruling out the existential > universal ordering, perhaps because the modal base involves different propositions.

To summarise, in this section we have seen how some of the previous accounts predict this ordering. It was shown that while they predict it, they do not say anything about why this is the correct ordering, and not the reverse. My aim was to show that there is a semantic-logical rationale compelling necessity to scope over possibility, which has to do with the compositionality of modals as quantifiers over possible worlds and the compositional issue the opposite order would create.

## 5.6 Compositionality of double modality

### 5.6.1 How and why did we get here?

To recapitulate, by this point many different aspects of the phenomenon of layered modality have been explored. The concept and some of its basic characteristics were introduced through Croatian DMC data together with an overview of the previous literature that dealt with this phenomenon, with a special emphasis on the ability of these analyses to deal with the Croatian data. Once the missing pieces were identified, an initial analysis was suggested. This analysis was a type-compositional analysis that focused on both semantic and syntactic properties of DMCs. Nevertheless, this initial analysis left many questions open. The final analysis focused on restrictions within the non-epistemic group of modals and resulted in a modal hierarchy. Finally, the analysis would not have been complete without considering the possible rationale behind the hierarchy.

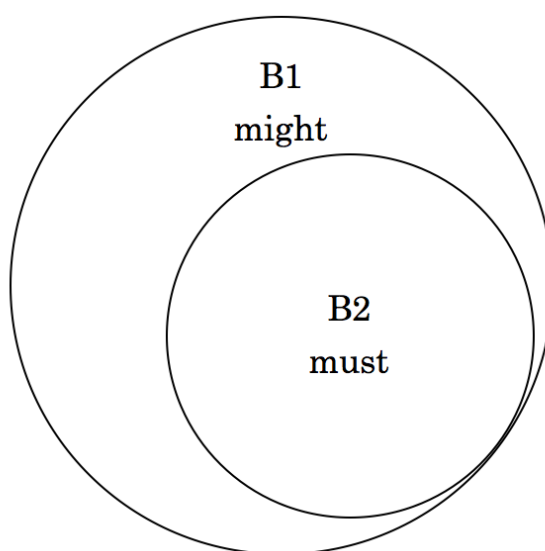
This takes us the topic of this section. While the previous chapters explored several different characteristics of layered modality, there is still one crucial element of this phenomenon that has not been addressed. The proposed analysis suggested that, when combining, modal auxiliaries respect a certain modal hierarchy. This meant that there are restrictions based on which flavours/forces can combine and which flavours/forces can scope where. The question I am interested in answering in this section is how modal auxiliaries combine.

Let us say that two modal auxiliaries combine according to the restrictions proposed, and result in a grammatically acceptable structure containing two modal auxiliaries. This is where problems appear: knowing what restrictions modal auxiliaries need to obey to create acceptable structures does not tell us anything about how their meanings combine and how we get the final meaning of a DM structure. The aim of this section is to address this issue by exploring how different modal pieces interact with each other and combine to result in a cumulative meaning that we get in a DMC. Answering this question is of great significance for a full account of layered modality: due to the complex nature of modal auxiliaries, which



hypotheses, the subset hypothesis is the more plausible one. Nevertheless, we should not be hasty in rejecting the more intuitive intersection hypothesis. Therefore, I will start by critically exploring the manner in which the subset hypothesis is able to deal with DMC data, and then move on to the intersection hypothesis, aiming to pin down which of these better accounts for the manner in which DMCs combine.

If we decide to opt for the subset proposal, this would mean that the set of possible worlds which is the intersection of the worlds in which all propositions from the modal base of the second modal ( $B_2$ ) are true, is a subset of the set of possible worlds which is the intersection of the worlds in which all propositions from the modal base of the first modal ( $B_1$ ) are true, as shown in Figure 5.2.



**Figure 5.2:** Option 1: Subset hypothesis

For examples (28) – (30),<sup>14</sup> this would mean that the set of possible worlds in which all the propositions from the *have to* modal base are true is a subset of the set of the worlds in which all the propositions from the *might* modal base are true.

<sup>14</sup>I will here use the English DMC *might have to*, which, as previously discussed, is the semantic equivalent of *might must*, although, *have to* is not a fully-fledged modal auxiliary. The English example is used for the ease of following the argumentation.

(28) Context: The UK voted to leave the EU. Citizens of non-EU countries, such as the US, pay an administrative fee to enter the EU. Based on what they know about other non-EU countries and on the fact the UK is going to become a non-EU country, and on what the rules are for members of non-EU countries if they visit the EU, somebody utters this sentence:

Brits **might have to** pay to visit Europe.<sup>15</sup>

(29) Brits **might** pay to visit Europe. ( $B_1$ , flavour: epistemic)

(30) Brits **have to** pay to visit Europe. ( $B_2$ , flavour: priority)

The first reason why we might opt for this hypothesis is the fact that a subset relationship assumes a partial order on sets — an asymmetrical relation (Bagaria, 2017). Since an ordering is a given in this type of a relationship, by assuming this hypothesis we avoid the issue we would have with the intersection relationship, namely, that an intersection relationship is not traditionally considered as having ordering restrictions. Even though there is a way around that issue within the intersection hypothesis, this still seems like a neater, more intuitive solution, at least with respect to the ordering issue. I will say more about this issue in the next section.

On the other hand, while the ordering issue might be a reason to opt for the subset hypothesis, this hypothesis might raise a difficulty of its own. The problem with the subset assumption arises from the fact that a subset relationship implies that  $B_1 \cap B_2 = B_2$ .<sup>16</sup> The issue here is that this would assume that a certain priority modal auxiliary, even in an SMC, always takes into account the possible worlds in which propositions that are relevant to an epistemic modal are true. In other words, there should be no worlds which are compatible only with a priority modal without also being compatible with an epistemic modal.

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<sup>15</sup>The example is from <http://www.mirror.co.uk/news/politics/brits-might-pay-just-able-9901996>, accessed on April 4, 2017.

<sup>16</sup>Where  $B_1$  is the set of possible worlds which is the intersection of the worlds in which all propositions from the modal base of the first modal are true, and where  $B_2$  is the set of possible worlds which is the intersection of the worlds in which all propositions from the modal base of the second modal are true.

This cannot be right, since it creates problems for both SMs and DMs. In the SM case this type of analysis would mean that an epistemic modal in an SMC, such as *It may be raining*, would also imply that there are rules which say that *it is allowed to be raining*. This is clearly not the case. This feeds directly into the discussion from the previous section on how modal bases and ordering sources interact to result in a certain type of flavour. Only one of these relationships can be realised for an SM modal base, therefore, the claim that an epistemic contains all the other modal flavours *within itself* is very difficult to support.

In a way, this assumption is also not in accordance with the idea that there are substantial differences among the flavours, since this would mean that epistemic modals imply all the other flavours. If that were the case, the claim that there are substantial differences between epistemics and non-epistemics would be hard to uphold.

Moreover, it also presents issues for DMCs. If an epistemic automatically implied a non-epistemic, this would mean that when saying

(31) Brits **might** pay to visit Europe.

one could also be saying

(32) Brits **might have to** pay to visit Europe.

and there would actually be no need to say (32) since every epistemic modal would then imply the non-epistemic alternatives. This is obviously incorrect.

This would also cause problems for non-epistemic combinations. For instance, let us take a look at (24), here repeated as (33), and the same example in an SM case in (34).

(33) HNS je stranka u kojoj se **smije** i  
 HNS is party in which self may.PRES.3SG.∃PRIOR and  
**mora** **smjeti** jasno izreći svoj stav.  
 must.PRES.3SG.∀PRIOR may.INF.∃PRIOR clearly say.INF own attitude  
*HNS is a party in which one is allowed to and must be allowed to express  
 one's opinion clearly.*

Example (33) is a non-epistemic combination containing a necessity modal in the initial position and a possibility priority modal in place of the second modal. Both of these modals are priority modals and, therefore, have a circumstantial modal base. The propositions in these modal bases would be something like:  $f_1 = \textit{Political parties have members in } w$ ,  $f_2 = \textit{Political parties are different in } w$ ,  $f_3 = \textit{HNS is a political party in } w$ ,  $f_4 = \textit{Members of political parties have opinions in } w$ . This means that the modal base gives a set of all or some worlds (for *morati* and *smjeti*, respectively) in which these propositions are true. Nevertheless, the modal base is not the only conversational background that priority modals take into account. In addition to different modal force, these modals also differ in terms of the priorities (in this case rules) that are used to order the set of the worlds that the modal base gives. *Morati*'s ordering source (example (33)) relies on propositions such as  $g_1 = \textit{Political parties have rules of behaviour in } w$ ,  $g_2 = \textit{Members respect the code of conduct in } w$ ,  $g_3 = \textit{Liberal parties care about freedom of speech in } w$ . Based on these propositions, the worlds from the modal base are ordered. On the other hand, *smjeti* is sensitive to a different set of propositions, such as:  $h_1 = \textit{Members express their opinions in } w$ ,  $h_2 = \textit{Members' opinions are important in } w$ ,  $h_3 = \textit{Members have different opinions in } w$ ,  $h_4 = \textit{Non-members do not express their opinions in } w$ , and uses these to order the set of possible worlds. This means that even though the modal bases are based on the same circumstantial propositions, the possible worlds are ordered differently based on different ordering sources. If the subset interpretation is assumed, it is not clear which ordering would then be respected - the first or the second modal's. These examples show how, even when two modals have the same flavour, and therefore might be picking out the same worlds, the meanings of these modals depend on different priorities, which order the worlds in a different way.

If we follow the same methodology as above where epistemic + non-epistemic combinations were explored, the following example might be interesting:

- (34) HNS je stranka u kojoj se jasno **mora** izreći svoj  
 HNS is party in which self clearly must.PRES.3SG.∀PRIOR say.INF own  
 stav.  
 attitude  
*HNS is a party in which one must express one's opinion clearly.*

Example (34) is the same construction without the second modal, that is, the possibility modal *smjeti*. This example supports the claim that *morati* in (34) does not mean or imply *mora smjeti* in (33), as would be predicted by the subset hypothesis, since it does not depend on the same propositions from the ordering source. Since the second modal does not appear, the first modal is interpreted only with respect to its own ordering source and therefore produces a different ordering of the worlds from what is found in the case of a DMC.

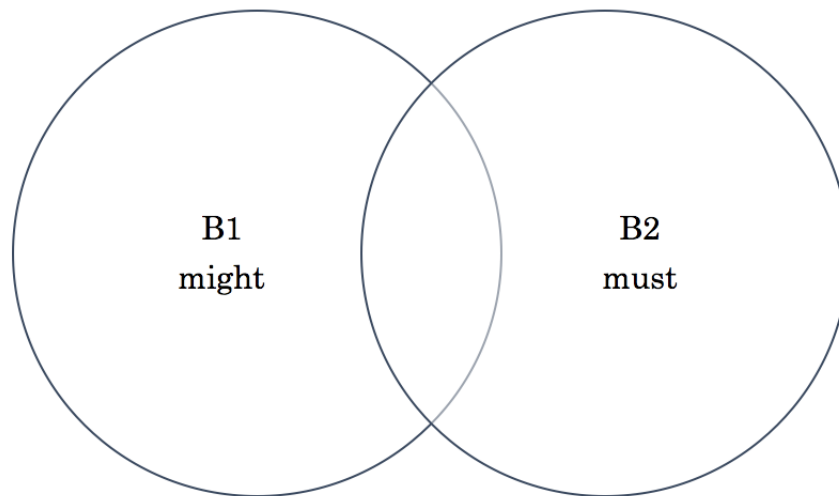
To summarise, based on some of the assumptions discussed in previous sections, such as the relationship between different circumstantial flavours and the asymmetrical ordering relationship, it might seem that the most obvious solution for the DMC compositionality puzzle is a subsecutive relationship. Nevertheless, I have shown that that type of proposal is flawed. Due to the fact that a subsecutive relationship would assume a strict relationship between two modal auxiliaries in a DMC, where the first modal would imply that all the same propositions matter for the second modal, the subsecutive relationship does not seem to be the right option since the resultative meaning of DMC seems to be cumulative, rather than subsecutive.

### 5.6.3 Intersection hypothesis

The intersection hypothesis is exemplified in Figure 5.3 below, which is based on example (28) from the previous section. The assumption is that  $B_1$  is an intersection of all/some of the worlds<sup>17</sup> in which the relevant propositions are true.<sup>18</sup>  $B_2$  is the same. The only difference here is that, since this is a priority modal, it is based on a modal base and an ordering source, but it results in a similar set, that is, the intersection of all the worlds in which the relevant propositions are true.

<sup>17</sup>Depending on whether the first modal expresses necessity or possibility.

<sup>18</sup>Based on a traditional Kratzerian modality theory (1981; 1991; 2012).



**Figure 5.3:** Option 2: Intersection hypothesis

Based on the intersection hypothesis, this would mean that the meaning of a DM, for instance, *might must*, would in the end be a product of both of the modal bases, in other words, an intersection of the worlds that are picked out by both modal bases. Therefore, when two of the modals combine there are worlds in which the propositions are only true for the *might* case and some in which they are only true for the *must* case. Crucially, there is also an intersection of those worlds - these are the worlds in which the propositions are true for both cases, *might* and *must*.

To illustrate the assumptions stated above, I will focus on the English example used in the previous section, here repeated as (35).

(35) Brits **might have to** pay to visit Europe.<sup>19</sup>

Let us first take a look at what these two modals mean in SMCs, examples (36) and (37), and then move on to the implications their SM meanings have for their compositionality in a DMC. If you look at the following two examples, you will notice that for (36) to be true, there does not need to be a rule or regulation that says British people must pay to enter the EU. Moreover, if you know for a fact that no British people have ever paid, (37) can still be true; there only needs to be a rule that says something like: *Brits pay when entering the EU*. On the other

<sup>19</sup>Same context as in (28).

hand, for (35) to be true, there needs to be some evidence suggesting the possibility of British people paying as well as some sort of rule.

(36) Brits **might** pay. ( $B_1$ , flavour: epistemic)

(37) Brits **have to** pay. ( $B_2$ , flavour: priority)

To explore the intersection hypothesis it is important to illustrate these contexts even further and to spell this out in terms of modal bases. For (36) and for its epistemic modal *might*, the modal base is spelled out in (38).

(38)  $f(w_{@}) =$

$$\begin{aligned} p_1 &= \{w \in W \mid \text{The EU is considering adopting a similar waiver} \\ &\quad \text{system to the US in } w.\} \\ p_2 &= \{w \in W \mid \text{To travel to the US, one pays } \pounds 11 \text{ as a EU citizen} \\ &\quad \text{in } w.\} \\ p_3 &= \{w \in W \mid \text{After Brexit, British people will have the same} \\ &\quad \text{status in the EU as EU citizens have in the US in } w.\} \end{aligned}$$

For (37) and for its priority modal *have to*, the modal base is spelled out in (39) with its ordering source in (40).

(39)  $f(w_{@}) =$

$$\begin{aligned} f_1 &= \{w \in W \mid \text{There are travel fees in } w.\} \\ f_2 &= \{w \in W \mid \text{EU citizens pay to get into the US in } w.\} \\ f_3 &= \{w \in W \mid \text{British people will soon not be EU citizens in } w.\} \end{aligned}$$

(40)  $g(w_{@}) =$

$$\begin{aligned} q_1 &= \{w \in W \mid \text{The same rules apply for people of the same status} \\ &\quad \text{in } w.\} \\ q_2 &= \{w \in W \mid \text{People respect fees in } w.\} \\ q_3 &= \{w \in W \mid \text{Non-EU people do not cross EU borders without} \\ &\quad \text{paying fees in } w.\} \end{aligned}$$

At first look, the differences between an epistemic and a circumstantial modal base seem very subtle. It appears as if the facts or evidence we are considering in (38) do not differ from the circumstances in (39). However, as Hacquard (2011) points out, even though the differences are not readily apparent, these different modal bases involve “reasoning from qualitatively different kinds of premises”, which “leads to truth conditional differences” (Hacquard, 2011, p. 18). If we follow Hacquard’s reasoning here, example (36) is evaluated according to the epistemic modal base, and example (37) with respect to a circumstantial modal base and the ordering source. For instance, if one knows for a fact that no British people will ever pay to go

to the EU, (36) is false. However, one can still utter (37) since the circumstances do not depend on one's knowledge of the world, but rather on what the circumstances are and how are they evaluated with respect to the deontic ordering source in (40).<sup>20</sup>

This brings us to the first potential problem with the intersection hypothesis. It seems to be very difficult to find propositions that would be in the circumstantial modal base, and that at the same time could not be a part of the epistemic modal base. This might be problematic since, in a way, it implies that there would not be any possible worlds that are only compatible with a circumstantial modal base, while not being compatible with an epistemic modal base. However, this issue seems to be solved by the above reasoning (Hacquard, 2011). When interpreting the flavour of a modal, we do not only take into account the propositions in the modal bases but also the ordering sources, and crucially, whether these propositions are interpreted as the circumstances or facts we need to have knowledge about. Based on Hacquard's reasoning, it does not matter if it is difficult to differentiate between circumstances and knowledge, or if it is difficult to find propositions that would not be in both modal bases at the same time, due to the fact that the different modal bases motivate reasoning from different kinds of premises, which then, as already stated above, results in different truth conditions (Hacquard, 2011).

Another point that can be made to support this assumption has to do with the way we perceive and talk about the world. Since epistemic propositions are facts/evidence/knowledge one has about the world, propositions from a circumstantial base must also fall under that category. Even when not using an epistemic modal, one can only say things one knows, otherwise one is breaking the conversational maxims. In other words, when using non-epistemic modals, we also rely on the things we know about circumstances in the world. However, this should not be an issue for this theory. In a way, this issue cannot be a genuine concern since it is just a fact about how we perceive the world. Additionally, it can also be dealt with using some of the assumptions already discussed above. Even though all these are things we know to be true of the world, we evaluate them differently

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<sup>20</sup>Hacquard (2011) bases her reasoning on *Hydrangeas might be growing here* and *Hydrangeas can grow here*. In this paragraph, I follow her reasoning.

according to their intended interpretations. Therefore, this is not a real issue for the intersection assumption if we follow the proposed reasoning.

The second major issue for the intersection hypothesis comes from the manner in which modals are compositionally combined and from some of the logical principles they need to follow. When I talked about the meanings of both of the modals above, I first deconstructed their meanings separately and inspected them as SMCs. That approach might be problematic for our theory. By first looking at both modals in their SM meanings and then combining them in a DMC, we are actually combining *Brits might pay* and *Brits have to pay* compositionally. In other words, the resultative meaning of a DM *might have to* would be a conjunction of  $B_1$  AND  $B_2$  ( $B_1 \wedge B_2$ ), that is, the set that results from their conjunction.

However, this might be an issue. From an intuitive point of view, the meaning of (35) is not (36)  $\wedge$  (37), that is, *Brits might pay and Brits have to pay* but rather  $B_1$  [ $B_2$ ], that is, *Brits might [have to [pay]]*. It seems that an intersective/conjunctive approach is unable to predict the fact that there is an ordering restriction, and while the intersection hypothesis would predict that the meaning of a DM is the meaning we get if we compose the meanings of both of the modals, it misses an important intuitive point: the epistemic modal has to come higher in this composition. This issue might suggest that, in fact, the intersection hypothesis is wrong altogether, and that we should turn to the subset hypothesis for a more truthful depiction of the DM composition.

Nonetheless, we should not dismiss the intersection hypothesis too quickly. Even though the earliest syntactic theories considered coordination, and therefore conjunction, a symmetric structure, subsequent work has shown that this cannot be the case. The asymmetry phenomenon was initially pointed out by Ross (1967), who noted that *and* makes up a unit with the second sentence in a conjunct structure, and never with the first sentence. Note the following contrast:

(41) John left, **and** he didn't even say good-bye.

(42) John left. **And** he didn't even say good-bye.

(43) \*John left **and**. He didn't even say good-bye.

The asymmetry phenomenon was further discussed by authors such as Munn (1993) and Progovac (1998). Munn (1993) argues that the two constituents of a coordination structure do not have to have the same syntactic status, and claims that the first constituent is structurally the more prominent one. To support this claim, Munn uses evidence from extraposition, variable binding and prosody (Munn, 1993), similar to (41) to (43) (Ross, 1967). For instance,

(44) John bought a book yesterday, **and** a newspaper.

(45) \*John bought a newspaper yesterday a book **and**.

(46) \*John bought a book **and** yesterday, a newspaper. (Munn, 1993, p. 15)

Munn argues that (45) shows the unacceptability of extraposition of the first conjunct and the conjunction, while (46) is evidence for the fact that if they move, the second conjunct and *and* need to move together. For Munn (1993), this is evidence that the second conjunct and the conjunction are a maximal projection.<sup>21</sup> In addition to these arguments Munn also argues that there is a Principle C restriction on coordination which suggests that the first conjunct c-commands the second one. For instance, while (47) is acceptable, (48) is not.

(47) John<sub>i</sub>'s dog **and** he<sub>i</sub>/him<sub>i</sub> went for a walk.

(48) \*He<sub>i</sub> **and** John<sub>i</sub>'s dog went for a walk. (Munn, 1993, p. 16)

Finally, Munn concludes that a coordinated structure needs to be an asymmetrical hierarchical adjunct structure, in which the second conjunct right adjoins to the first conjunct, together with its &P (Munn (1993), as summarised by Progovac (1998)).

Progovac (1998) suggests that there is strong evidence cross-linguistically that conjunctions are functional heads heading Coordination Phrases, and that the first conjunct is structurally separate from the rest of the structure, while the second conjunct is the one forming a unit with the conjunction. However, Progovac

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<sup>21</sup>For the full reasoning behind this argument see Munn (1993), page 15.

(1998) makes a very strong claim that there is no clear evidence of c-command.<sup>22</sup> Therefore, Progovac, together with Munn, presents strong evidence that the existence of ordering restrictions in intersective relationships should not be surprising.

While the coordination literature only deals with what we usually consider coordination structures, it can help us shed new light on how we normally perceive coordinated or intersective structures. It suggests that we should not necessarily consider them as symmetrical, but rather as asymmetrical. This opens up a space for a theory where DMCs can be considered intersective since it can accommodate the fact that there is always an ordering restriction between the two constituents, that is, modal auxiliaries, in a DMC. It is important to emphasise that the semantics of coordination here, even though it is structurally asymmetrical, still conjoins two parts of a meaning. This means that the conjunction itself can have intersective semantics and be structurally asymmetrical.

In summary, while an intersective analysis might not, at least at first glance, appear to be the initial go-to option, it seems that this type of analysis has a lot to offer. While it intuitively captures the cumulative meanings of DMCs, as was shown in examples above, there might be some issues with the nature of the propositions the modals rely on and the strict ordering restrictions DMCs exhibit. The first issue is fairly easily solved by following the reasoning proposed by Hacquard (2011). Second, as the literature shows, it is not unusual for intersective relationships to actually have ordering restrictions, as was shown with the examples containing *and* (Progovac, 1998; Munn, 1993).

#### 5.6.4 The modal base puzzle

It seems that the subset hypothesis struggles in dealing with both SMCs and DMCs since it is not able to predict how meanings really compose in both types of modal structures. Therefore, the preferred proposal is the intersection hypothesis. The intersection hypothesis seems to work quite well for structures where epistemics and non-epistemics interact, but also for structures in which non-epistemics interact,

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<sup>22</sup>For more on the syntax of coordinated structures see Progovac (1998), who thoroughly summarises different approaches to this issue.

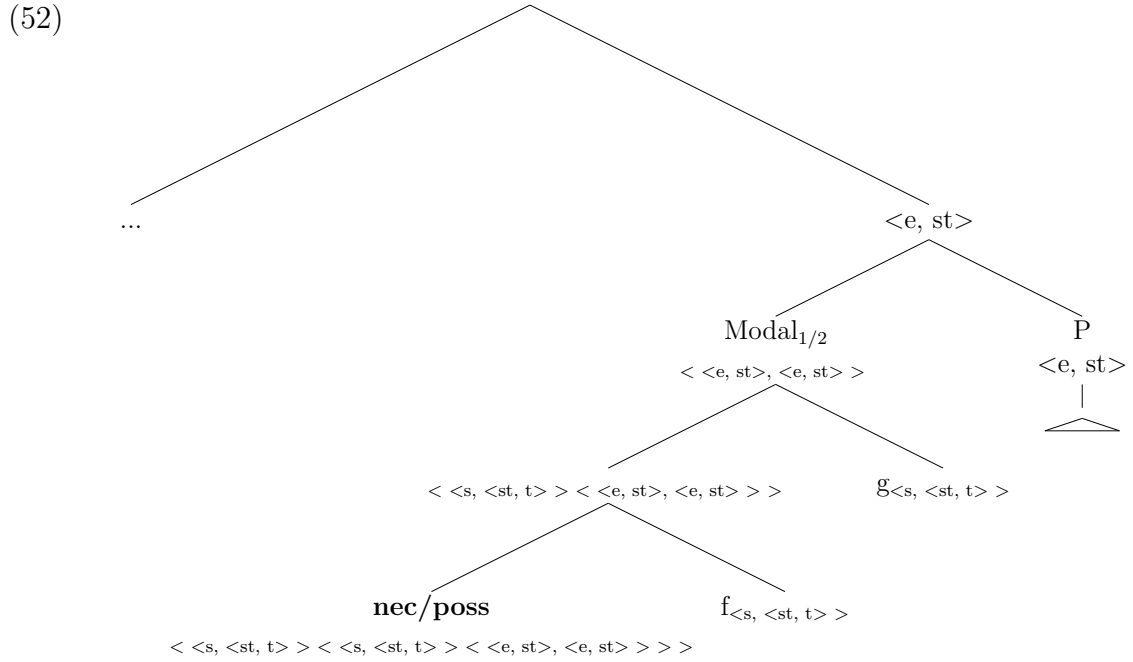




$$(51) \quad [[\mathbf{morati}]]^w = \lambda f_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda q_{\langle st \rangle} \cdot \lambda w_s \cdot \forall w' \in \text{Best}_{g(w)}(\cap f(w)):$$

$$q(w')=1$$

Example (52) is the structure I proposed for non-epistemic modals, followed by the lexical entry for (52) in example (53).



$$(53) \quad [[\mathbf{morati}_{priority}]]^w = \lambda f_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda P_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in$$

$$\text{Best}_{g(w)}(\cap f(w)): P(x)(w')=1.$$

As previously suggested in Section 4.5.2, examples (51) and (53) show that an epistemic or non-epistemic modal can either universally or existentially quantify over possible worlds, and will take the modal base and the ordering source as arguments  $f$  and  $g$ , respectively. They are of the same type as any conversational background, that is,  $\langle s, \langle st, t \rangle \rangle$ . Crucially, the epistemic modal takes a proposition (type  $\langle s, t \rangle$ ) as an argument. On the other hand, a non-epistemic modal takes an  $\langle e, st \rangle$  argument.

Assuming this type of analysis, where the modal base and the ordering source are taken as arguments, would not be compatible with the assumption that, when the flavours are the same, there is only one modal base and one ordering source. It is not clear what would then happen with the syntactic position of the modal base of either the first or the second modal, depending on which one we want to

get rid of. Furthermore, we need to keep in mind that the assumption we adopt for these types of constructions still need to make sense in the case of SMCs. This is then problematic since the traditional accounts of SMCs are not able to account for a proposal that suggests modals are able to rely on *foreign* modal bases.

Thus, a solution in which both modal bases appear as syntactic arguments seems to be more plausible. However, since they are of the same type and they have a place in the syntactic structure of the modal, even when the flavours are the same, perhaps they enter a certain concord relationship, where only one modal base is actually interpreted. This is in accordance with what we know about combinations of modal auxiliaries and adverbs. These have a very strong tendency to enter into a concord relationship. On the other hand, modal auxiliaries exhibit a very strong tendency to resist modal concord, which might actually be an argument against the suggestion that modal bases enter a concord-like relationship.<sup>23</sup>

While a concord relationship might be plausible for modal bases in the case of two modal auxiliaries with same modal bases, this cannot be a valid claim for the relationship between ordering sources. As noted on page 197, the modals in (49) actually rely on different rules, and therefore the ordering source propositions must be different. The difference in ordering source priorities also comes from the fact that there is an ordering restriction for DMCs and that changing the order of the auxiliaries in a DMC would result in a different interpretation. Recall the discussion on the structure of DMCs. In a DMC such as *mora*<sub>M1</sub> *smjeti*<sub>M2</sub> *izreći*<sub>V</sub>, M<sub>1</sub> scopes over M<sub>2</sub>[V] while M<sub>2</sub> scopes only over V. These modals, therefore, need to be interpreted with respect to different propositions from the ordering source.

## 5.7 Conclusion

In this chapter I have covered two significant issues in the analysis of DMCs. First, I have explored the possible conceptual rationale behind the hierarchy, starting with the reasons for the ordering of circumstantial flavours which seem to exhibit

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<sup>23</sup>However, if it is assumed that modal auxiliaries must have their own modal bases as arguments, then there is an interesting puzzle as to the way in which modal adverbs access these when they are in concord relationships.

a certain subset relationship among their modal bases. The relationship between these seems to suggest that the most restricted modal base is the dispositional one, relying on the most specified set of propositions. Note that some of the important pieces of evidence here were that to be disposed to, for instance, sneeze, you also need to be able to do so and it needs to be possible for you to do so. The second flavour is ability, which stands in the middle — less restricted than disposition, but more restricted than pure possibility.

I have also proposed a motivation for the ordering of the priority vs. circumstantial groups. One of the possible interpretations is that these modal heads need to be syntactically different. Another alternative is that they do not need to be syntactically different, but then there needs to be a restriction on a non-empty ordering source appearing anywhere below SpecTP. This also implies that an empty ordering source scopes lower, in the same sortal domain as the circumstantial modal base. This was further supported by evidence from small clauses and modals targeting specific modal flavours.

Furthermore, the most commonly discussed relationship between epistemics and non-epistemics was explored, showing that this ordering is not only structural but conceptual as well, that is, based on the fact that it is only logically possible to judge propositions, rather than events/situations.

I have also explored the rationale behind the necessity > possibility ordering by exploring some of the previous accounts proposed, and offering a new insight based on the compositional semantics of modal auxiliaries. This was based on evidence from unacceptable orderings. In possibility > necessity DM, the possibility modal in the initial position quantifies over only some of the possible worlds, which causes an issue for the second modal's quantification since it is given both the worlds for  $p$  and  $not\ p$ .

The second substantial topic I addressed was the issue of the types of compositional principles and/or relationships that modal auxiliaries obey/enter when combining into DMCs. I have suggested that this relationship ought to be an intersection of modal bases, rather than a subsection. This was supported by the fact that the intersection hypothesis supports the intuitive meaning of DMCs as

well as some well known characteristics of coordination previously discussed in the literature. On the other hand, while a subsecutive analysis might be a plausible starting point, due to what was discussed with respect to the relationship among circumstantial flavours, it seems that this type of analysis makes some incorrect assumptions, i.e. that the first modal implies that all the same propositions matter for the second modal as well. This is problematic since the meaning of DMs is cumulative, rather than subsecutive.

Finally, I have also addressed the question of the number of modal bases in same-flavoured DMCs, coming to the conclusion that both modal bases need to be there, even if they are the same, but suggesting that there is a possibility of a concord-like relationship between the modal bases.

# 6

## Conclusion and Future Directions

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### 6.1 Summary of the thesis

The aim of this thesis has been to deal with the question of ordering restrictions among modal auxiliaries, or in other words, to explore whether there are ordering restrictions among modal auxiliaries; and if so, whether these have any semantic consequences, and finally, what the conceptual rationale is behind these restrictions. To address these questions, I have looked at Croatian double modal data to identify possible ordering restrictions. The data showed that these restrictions depend on both on force and flavour. The pursuit of these questions has also led me to look deeper into the issue connected with modal flavours and their status. The result of this investigation was an analysis that assumes a hierarchy of modal flavours and forces that motivates the ordering restrictions found in DMCs.

One of the main motivating factors for this thesis was the fact that while the question of ordering restrictions among modal elements seems to be of interest for many scholars, it had never been approached through the study of combinations of modal auxiliaries. In Chapter 3 I showed that while there is a substantial body of literature that deals with this and similar problems, there seems to be no analysis that takes into account both modal force and flavour and also deals with DMs. There have been different approaches to this issue. One of the early studies on this phenomenon was Di Paolo (1989), who worked on English DMCs and claimed that there is nothing predictable in the possible combinations of DMs and that they are simply a matter of stipulation. Most of the later studies found this position unconvincing, showing that, at least, some combinations are predictable, and generally claiming that there are at least some syntactic restrictions. These were studies such as Battistella (1995), Thráinsson & Vikner (1995), Close (2004), Elsmann & Dubinsky (2009) and Hasty (2012a). Most of these proposals explore combinations of modal auxiliaries in which epistemics embed non-epistemics, and therefore leave aside combinations in which non-epistemics combine. These studies deal with syntactic restrictions, which is not unexpected since they deal with epistemic + non-epistemic combinations. However, they say nothing about the possibility that these restrictions are being driven by the semantic nature of modal auxiliaries, that is, their modal force and flavour. On the other hand, there are studies, such as Cinque (1999) and Nauze (2008), that focus on different modal flavours, and not just on the two big groups of modal flavours. These studies approach the issue from a more typological perspective, both providing modal hierarchies as the final result. It is important to note here that these hierarchies are not based on combinations of modal auxiliaries, but rather on combinations of modal auxiliaries with different modal elements. I have also shown that studies on modal concord (Geurts & Huitink, 2006; Zeijlstra, 2007; Anand & Brasoveanu, 2010; Grosz, 2010; Huitink, 2012) might also play an important role in thinking about ordering restrictions even though they are concerned with a slightly different phenomenon.

The second part of Chapter 3 looked at Croatian DMCs. It focused on the modal auxiliaries *morati* ‘must’, *trebati* ‘should, ought to’, *smjeti* ‘may’ and *moći* ‘may, can’, and their logically possible combinations, that is, epistemics embedding epistemics, epistemics embedding non-epistemics, non-epistemics embedding non-epistemics, and non-epistemics embedding epistemics. The initial findings of this chapter showed that while the first three of these combinations are acceptable, the last is not.

The literature reviewed in Chapter 3, together with the data set, raised some interesting questions which were dealt with in Chapter 4. Chapter 4 is one of the two central chapters of the thesis and aimed to identify and analyse ordering restrictions among modal auxiliaries. The initial analysis focused on restrictions in combinations of the two big groups of modal auxiliaries. It was suggested that in order to correctly predict the acceptability of these combinations, an analysis that assumed different structures for epistemics and non-epistemics was required. The proposal was that the compositional type of epistemics is  $\langle st, st \rangle$ , while non-epistemics are  $\langle \langle e, st \rangle, \langle e, st \rangle \rangle$ . This was the initial step in the analysis. However, the relationship between these two groups was not the primary concern of this chapter. The main focus was on DMCs in which non-epistemics embed non-epistemics since this was a question that has not yet been answered in the previous literature. The first part of the analysis dealt with the anti-concord constraint which says that modal auxiliaries cannot combine if they are of the same force and flavour. The importance of this constraint lies in the fact that, first of all, it correctly predicts the acceptability and unacceptability of many possible combinations, and second, and even more important, it carries important implications for categorising modal flavours and helps in identifying which flavours might be more prominent, that is, more grammatically relevant than others. It drives a division of circumstantial flavour into pure possibility, ability and disposition, and also suggests that deontic, bouletic and teleological flavour do not have different grammatical effects and can therefore be considered one unified priority flavour. Setting things up this way enabled us to establish the final hierarchy in (1):

- (1) epistemic > priority > pure possibility > ability > disposition

I also proposed that restrictions of modal auxiliaries cannot be based purely on modal flavour. Modal force plays a crucial role as well, that is, the data shows that the order, crucially within a flavour, needs to be necessity > possibility when two modal auxiliaries combine. Finally, I was concerned with what was happening inside the modal head, that is, if modal force and flavour play such an important role in modal orderings then we would want an analysis that would have them as arguments of the modal, rather than just contextual parameters.

Finally, Chapter 5 was concerned with the conceptual foundations of the proposed analysis. This was important since, without a proper conceptual explanation, there was a danger of leaving the hierarchy as purely descriptive without actually explaining the reasons behind it. The first part of the chapter dealt with the rationale for the hierarchy. I focused on different relationships between different modal groups, starting with the relationships within the circumstantial group, and then moving on to their relationship with the priority group and the relationship between non-epistemics and epistemics. I suggested that there is a subset relationship within the circumstantial group that depends on the propositions in the modal base. This type of relationship is specific to this group of modals. Since priority modals have an ordering source, they are somewhat distinct from circumstantials. Therefore, I have proposed that the reason why priority modals scope over circumstantial modals comes from the fact that modals with non-empty ordering sources need to scope higher than those with empty ordering sources which implies that there might be a restriction on the syntactic domains where ordering sources can appear.

As for the relationship between epistemics and non-epistemics, I propose that it is not only the syntax that makes these combine in the order epistemic > non-epistemic. The restrictions are also based on the fact that one cannot judge events or situations, but rather only propositions. Finally, I discussed the force ordering and the logical assumptions behind it. I proposed that the reason why necessity scopes over possibility emerges from the following puzzle. If a possibility modal in initial position quantifies existentially, that is, over only some of the possible worlds, the second position modal is given both worlds in which  $p$  and  $not\ p$  are

true, which is a logical problem for universal quantification. This is problematic since then it is not clear over which set the second position modal quantifies.

Last but not least, I discussed the compositional nature of DMCs and suggested that out of the two possible manners in which these can combine, i.e. subset and intersection relationship, the intersection hypothesis seems more appealing. The issue with the subset relationship lies in the fact that it would imply that the same propositions are taken into account for both modals, while there are propositions in the first modal that do not matter in the second modal. This is problematic since it assumes that the meaning of the second modal is already contained in the meaning of the first modal. I finished this chapter with a discussion of the compositional nature of the modal head and provided evidence for the analysis that suggests that there are two modal bases appearing in DMCs when two modal auxiliaries of the same flavour combine, and crucially, as suggested in Chapter 4, they are the arguments of the modal, rather than contextual parameters.

In sum, this thesis proposes a modal hierarchy based on the semantic restrictions that occur in DMCs, which relies heavily on the basic modal pieces, modal flavour and modal force. It also touches on questions of compositionality and previous theories of modal flavours.

## **6.2 Looking ahead**

### **6.2.1 Cross-linguistic evidence**

Given that the modal hierarchy established in this thesis is based primarily on Croatian, one might claim that this theory is limited in its cross-linguistic application. Nevertheless, based on Chapter 5, it is reasonable to speculate that these assumptions extend cross-linguistically. Unfortunately, a wide-reaching cross-linguistic study is beyond the scope of this thesis. Nonetheless, for instance, there is a good amount of evidence that epistemics need to scope over non-epistemics, based on their syntax and semantics. The non-epistemic cases are slightly more complex since the differences in their structure are not as transparent as with epistemics vs. non-epistemics, and due to the fact that there is unquestionably a large amount

of variability in how different languages lexicalise modal flavours. For instance, English *might* only conveys epistemic meanings, while *must* conveys a wide variety of meanings. The way modal auxiliaries lexicalise modal flavours does not only vary within languages, but cross-linguistically as well.

The ordering restrictions established in this thesis are shown in Table 6.1.

**Table 6.1:** Summary of ordering restrictions

M1	M2				
	epistemic	priority	pure possibility	ability	disposition
epistemic	+	+	+	+	+
priority	-	+	+	+	+
pure possibility	-	-	-	+	+
ability	-	-	-	-	+
disposition	-	-	-	-	-

Several questions emerge from Table 6.1. First, some of the gaps, i.e. unacceptable combinations, are based on the fact that Croatian lexicalises different flavours in different modal auxiliaries, which may not be the case in other languages. The questions that come out of this are: which flavours are these and would they affect the hierarchy?

One thing to look at are languages which are similar to Croatian in the manner in which they form DMCs, for instance, other Slavic languages, such as Polish and Bulgarian, or Germanic languages, such as German and Dutch. It would be necessary to identify possible discrepancies in the hierarchy. For example, if these exist, are they due to the expected asymmetrical ambiguity of modal auxiliaries, or something else? It is my hypothesis that if there are discrepancies, they will be due to the way modal flavours are expressed in different languages, since there is so much variety cross-linguistically. Another interesting prediction might be that if both epistemic and circumstantial flavours are lexicalised in a single lexical item, priority flavour should be available as well, that is, that modals must lexicalise without a gap in the hierarchy. This would be in line with some previous assumptions in the literature on adjectival comparative/superlative forms. For instance, Bobaljik

(2012) notes that it is a universal phenomenon that a superlative representation will always contain a comparative representation, while it is unattested for a language to have only the basic adjective form and the superlative form. Similarly, one could hypothesise that a similar thing should happen with lexicalisation of modal flavours.

It would also be worth examining languages that lexicalise modal meanings in a completely different way, such as St'át'imcets (Rullmann et al., 2008) and Nez Perce (Deal, 2011). One of the hurdles in studying these languages is the fact that they do not have modal auxiliaries per se, but rather modal clitics. Nevertheless, it would be interesting to see if these languages respect the proposed hierarchy. Furthermore, since these languages lexicalise force, rather than flavour, it also needs to be explored whether, if there are DMCs in these languages, they are consistent with the proposed order, i.e. necessity > possibility.

Even though I assume that the proposal made in this thesis is far-reaching, in order to explore all the nuances displayed by DMCs cross-linguistically, a detailed study of DMCs from different languages is necessary, especially with regard to non-epistemic + non-epistemic combinations.

### **6.2.2 Learnability of DMCs**

When we think about DMCs cross-linguistically, it seems that some DM structures are possible in most of the languages, such as priority > ability, and some do not appear at all, such as non-epistemic > epistemic. When it comes to the developmental theory of multiple modal structures, one hypothesis would be that the unacceptable orderings are historically inaccessible, while another hypothesis could be that not all modal orderings are in fact equally learnable. When we talk about something being learnable, we need to take into account the following hypotheses. First of all, it might not be learnable because it is not grammatically possible at all. On the other hand, it may not be learnable due to reasons external to the grammar, such as processing and mental load.

Among the recent studies that test the learnability of certain structures is Hunter & Lidz (2012), who claim that testing the acquisitional capabilities of children can

tell us a great deal about the meanings/structures they are able to “entertain as hypotheses” (Hunter & Lidz, 2012, p. 1). More importantly, their ability to take into consideration one hypothesis over another also has important implications for the type of structures that are actually permitted by the language faculty. Hawkins (1987) also notes that a linguistic proposal that is compatible with theories of how structures are acquired and their error patterns is undoubtedly a more favoured analysis than one that is not compatible with the acquisition evidence.

While typological generalisations and gaps can serve as important guidelines in learnability studies, we cannot be sure that the gaps come from the fact that these structures are grammatically impossible. For instance, as Bowerman (2011, p. 591) points out:

“The properties of natural languages are shaped and constrained by the perceptual, conceptual, communicative, and processing capacities of human language users — capacities that young humans share and presumably draw on in working out the structure of the language they hear. So typology can give rise to testable hypotheses about the acquisition process and suggest possible interpretations of findings.”

In other words, besides the rationale that was already discussed, some DMCs might be blocked due to some of the learnability constraints found in L1 acquisition, which means that a learnability study could serve as valuable evidence that would support some of the ideas that were discussed in Chapter 5 where the rationale behind the hierarchy was discussed. Obviously, these two notions, the rationale that was discussed in Chapter 5 and the learnability constraint, may be related at some deeper level.

With respect to DMCs and their possible orderings, there are two possible outcomes. Either all combinations are equally learnable or there are some that cannot be acquired at all. The former hypothesis supports a pragmatic account in which some combinations are unattested due to pragmatic restrictions, though there is nothing grammatical keeping them from combining. Note that it also might be that they are learnable but it is a historical accident that the unacceptable orderings are unattested. This would also support the idea that though some combinations

are yet to be recorded, they could occur in some possible language. The latter would support the idea that there are strong grammatical restrictions against some combinations and therefore these do not exist in any possible language. However, these could be because the unattested combinations are either grammatically impossible or there is a learnability constraint external to the grammar. It is important to emphasise that once a learnability study shows that something is not learnable, there is practically no way in which it can be determined whether it is grammatically impossible or unattested due to an extralinguistic constraint.

An initial pilot study was conducted to test whether adult learners (7 native speakers of British English) can learn the unattested ordering. The aim of this study was to explore whether it is equally difficult to learn epistemic > non-epistemic order vs. non-epistemic > epistemic order. The experiment was set up as an artificial language learning paradigm, in which the first part of the experiment was the training phase during which the participants were presented with contexts that were followed by sentences in which a new word would appear. The contexts supported either an epistemic ((2)) or a priority reading ((3)). The training phase was followed by the testing phase, in which the participants were first tested on SMCs ((4)) and then on DMCs ((5)).

- (2) Context: I don't know Mary very well, but I always see her driving a very expensive car and wearing nice jewellery.  
Sentence: Mary **dout** surely be very rich. (target reading: epistemic)
- (3) Context: John's mum is serious about leaving the kitchen tidy. Whenever he leaves a dirty plate in the sink, she complains.  
Sentence: John **plad** obligatorily clean up after himself. (target reading: priority)
- (4) Whenever I see Dora, her hair looks amazing. Her nails are always done beautifully too.  
Which sentence does Jim like?

- a. Dora **dout** spend a lot of time in the beauty salon.
  - b. Dora **plad** spend a lot of time in the beauty salon.
- (5) Sandy sometimes doesn't want to stay with her nanny. When Sandy doesn't want to stay with her nanny, her mum stays at home since people don't leave toddlers alone at home.
- Which sentence does Jim like?
- a. Sandy's mum **dout plad** cancel the date.
  - b. Sandy's mum **plad dout** cancel the date.

The initial data found conflicting results. While participants do exceptionally well in the SMC testing case, there seem to be some odd effects in the DMC case. After the experiment, the design and intuitions were discussed with participants. The participants consistently reported on one modal being a *strong* one, and the other one being *weak*. These intuitions correlated with non-epistemic and epistemic readings, respectively. To a non-naïve observer, this might seem odd since we tend to use strong and weak to talk about force, while the naïve speakers appeared to use these to talk about flavour. However, there seems to be something else happening here. Modal flavours end up being very subtle and ambiguous in languages such as English, while modal force is the element that is lexicalised. Therefore, it should not come as a surprise that native English speakers are in fact more sensitive to modal force than to modal flavour. In other words, for the epistemic case, without being prompted, participants correlated it with something like *might*, *may* or *can*, while for the non-epistemic cases they usually used *must*. Therefore, it seems that participants are connecting priority to necessity, due to the notion of rules, and epistemicity to possibility, due to the fact that this is based on evidence and, therefore, never completely certain.

Even though some tendencies do appear to emerge from the initial data, there is still a fair amount of obscurity in these results. It may be that the methodology is not targeting the right modal notion, since participants never reported on what we would consider epistemic vs. non-epistemic concepts, but rather on something along

the lines of the difference between necessity and possibility. Second, there might be some interference since adults were tested as initial participants. Instead of learning new meanings directly, adults often base their assumptions on translations, which is highly problematic for this type of study. Finally, it might also be that there are more striking differences between other modal flavours, such as ability and epistemicity, since there is a bigger gap between them in the modal hierarchy that was proposed in Chapter 4. Opposing these two or other flavours might yield clearer results. All these puzzles remain as subjects for future research.

### 6.2.3 Different types of layers of modality

The data discussed so far has been based on DMCs that consist of two modal auxiliaries. In these cases the auxiliaries were all in the indicative mood. However, in Croatian modal auxiliaries can combine with conditional mood morphology<sup>1</sup> to express a different meaning.<sup>2</sup>

Conditional mood in Croatian is used widely, in both conditional ((6)) and non-conditional sentences ((7)).

- (6) Kada **bi** mi netko ponudio dvije kune, ja  
 when be.COND.3SG me someone offer.PTCP.3SG.M two kunas I  
**bih** uzeo te dvije kune.  
 be.COND.1SG take.PTCP.3SG.M those two kunas  
*If someone would give me 2 kunas, I would take those 2 kunas.*<sup>3</sup>

- (7) Ne znam što **bih** jeo.  
 not know.PRES.1SG what be.COND.1SG eat.PTCP.SG.M  
*I don't know what to eat.*

<sup>1</sup>This mood marker has been traditionally considered conditional morphology, but it appears in a wide range of contexts, including counterfactual conditionals. Therefore, the terminology used across the literature varies. While traditional Croatian descriptive literature calls it conditional mood, other authors, such as von Fintel & Iatridou (2008), use the term counterfactual morphology, while authors like Szucsich (2010) refer to it as subjunctive mood.

<sup>2</sup>My interest in this topic and some of my initial ideas about it were formed during the discussions I had with Ana Arregui and María Luisa Rivero while I was working on my MA thesis at the University of Ottawa (Werkmann, 2014). My DPhil thesis was initially aimed at explaining the relationship between conditional mood and modality but more fundamental issues got in the way.

<sup>3</sup>Examples are from the Croatian National Corpus, which is available at <http://www.hnk.ffzg.hr/>

Barić et al. (1997) claim that the conditional mood in Croatian is used when expressing absolute or relative present to denote an uncertain or mitigated claim. This uncertainty is also present when the conditional mood is used with a modal verb.

This means that the uncertainty is characteristic for both contexts — with and without modals. The difference lies in the fact that in some modals, there is uncertainty already present in the lexical item (even before the addition of conditional morphology), while this is not the case for the non-modal structures (Werkmann, 2014). For the modal contexts, Barić et al. (1997) provide examples from the Croatian literary corpus:

- (8) Možda **bih** se mogao upustiti u analizu te  
 maybe be.COND.1SG self may.PTCP.SG.M engage.INF in analysis that  
 pjesme.  
 poem  
*Perhaps I might engage myself in the analysis of that poem.*

Though Barić et al. (1997) do not provide a context here, it seems that the meaning of the modal is circumstantial, possibly pure possibility or ability. In (8) the already-present possibility of the modal *moći* is further *strengthened* by the use of conditional morphology, in other words, the proposition is actually made less *likely* than would be the case without the use of conditional morphology (Werkmann, 2014).

Other authors also comment on the relationship between modality and conditional mood. Szucsich (2010, p. 402) notes that the “subjunctive marker” can appear in combination with deontic and epistemic modality and result in the weakening of this modality. Szucsich (2010) provides the following examples (without contexts):

- (9) **Moraš** pospremiti sobu.  
 must.PRS.2.SG tidy.up.INF room.F.SG.ACC  
*You have to tidy up your room.*
- (10) **Morao bi** pospremiti sobu.  
 must.LPT.M.SG sbjv.2.SG tidy.up.INF room.F.SG.ACC  
*You ought to tidy up your room.*<sup>4</sup>

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<sup>4</sup>Glosses and translations are as they appear in Szucsich (2010) with added bolding.

Furthermore, in a cross-linguistic study of different counterfactual and subjunctive structures, von Fintel & Iatridou (2008) present the following data from Croatian.<sup>5</sup>

- (11) **Morao bi** pospremiti sobu, ali na sreću ne moraš.  
 must.PCPL would.2SG clear.INF room but on luck not must.2SG  
*You ought to tidy up your room, but luckily, you don't have to.*<sup>6</sup>
- (12) \***Moraš** pospremiti sobu, ali na sreću ne moraš.  
 must.2SG clear.INF room but on luck not must.2SG

In their paper von Fintel & Iatridou (2008) propose *a theory of secondary ordering sources* based on domain quantification (in line with Kratzer (1981, 1991, 2012)) in which they claim that the conditional morphology *turns* a strong necessity modal into a weak necessity modal. The secondary ordering source, which the strong modals do not utilise, picks out and ranks only the best of the already ordered worlds by the first ordering source. For instance, a weak priority modal is sensitive to an additional set of rules which are less “coercive” (von Fintel & Iatridou, 2008, p. 119), in addition to the laws and regulations they would share with a strong necessity modal.

However, native speaker intuitions<sup>7</sup> on the data in (11) suggest otherwise: the strong necessity nature of *morati* is not converted into a weak necessity when conditional morphology is added. According to these native intuitions, the weakening of *morati* is not actually strong enough to make (11) grammatical, as claimed in von Fintel & Iatridou (2008). In other words, saying that conditional morphology and its secondary ordering source weaken a strong necessity modal to the level of a weak necessity modal does not seem to capture native speaker judgements.

I propose that the *uncertainty* of conditional mood can be explained if we assume that it is an additional modal layer (Werkmann, 2014). On one hand, for non-modal structures this means that the conditional mood is the only modal operator which causes mitigation and uncertainty that Barić et al. (1997) talk about, similarly to the

<sup>5</sup>Glosses and translations are as they appear in von Fintel & Iatridou (2008) with added bolding.

<sup>6</sup>Note that, in accordance with their claim, they translate *bi + morao* as *ought to* instead of *must*.

<sup>7</sup>Supported by consultation with several native speakers of Croatian, as well as by my native speaker intuitions.

presence of an existential modal operator. On the other hand, in modal structures it serves as an additional modal operator (Werkmann, 2014), adding another layer of existential modal quantification. These constructions, at least semantically, could be similar to the double modal structures I have explored in this thesis.

Therefore, any future research that aims to explore layering of modality in terms of conditional/subjunctive mood needs to address several important issues. First of all, what are the modal force and flavour of this *new* modal? Based on what we know about how the Croatian modal system works, modal force, rather than flavour, should be lexically fixed for this modal.<sup>8</sup> Furthermore, based on what we know about the conditional mood and its meaning from previous literature, conditional mood is said to cause mitigation and uncertainty, which are certainly not notions we would associate with necessity. Therefore, I propose to treat *bi* as an existential quantifier. In other words, *bi* acts as an additional layer of possibility, which either adds possibility to already-existing possibility, for example, when combined with *moći* or *smjeti*, or adds a level of possibility to an existing level of necessity, when combined with *morati* or *trebati*. In non-modal structures, it adds the only level of modal possibility. As for the flavour, there are several options. The first one is to assume that it does not have any. The issue with this assumption is that it is not clear what makes it a modal operator and how it is different from any other quantifier, since modality depends quite heavily on the interaction between force and flavour. The second option is that it does not have modal flavour of its own but somehow *adopts* the modal flavour of the modal it combines with. This option seems more appealing since the basic intuition is that *bi* does not add something different in terms of flavour, but rather expresses whichever flavour is already present in the modal auxiliary. Also, we know that cross-linguistically modals are quite flexible in how they express force or flavour (Rullmann et al., 2008; Deal, 2011). This suggestion raises interesting concerns in terms of the anti-concord restrictions discussed in the previous chapter. One question that immediately arises concerns how different or similar combinations of conditional mood and modal auxiliaries

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<sup>8</sup>Though some modals may be flavour-specific in such languages, such as *might* in English.

are from the usual DMCs, especially with respect to the anti-concord restrictions and other restrictions within DMCs. I suspect these interact with each other in a slightly different manner due to the fact that they are not *real* modal auxiliaries, and therefore the modal concord restrictions, as well as other restrictions discussed in the previous chapter, might not apply to them in the same way. Third, where does this conditional modality come in terms of the hierarchy assumed in the previous chapter? I assume it is probably located between epistemic and priority modality since the data shows that it cannot be combined with epistemics.<sup>9</sup>

This shows that there are many open questions concerning other types of structures that might carry modal meanings or effects, and many, if not even more, speculative answers to these. The relationships between conditional mood and SMCs and DMCs certainly represent fruitful ground for future scholarship.

### 6.3 Final remarks

Structures denoting modal meanings unquestionably hold a very special status in the way we talk about the world around us. Human language uses different modal elements to encode our ability to talk about possibility and necessity. Pinning down the manner in which we encode these notions is definitely a complex task, and the one that has been looked at from many angles in the past 40 years.

What is more, it is possible to stack different modal elements to create layered structures in which one modal element embeds another one. This was the main subject of interest in this thesis. It was my aim to provide an account that can explain how human language encodes the embedding of modal structures. More specifically, I addressed questions concerning the restrictions that guide combinations of modal auxiliaries and the logical-conceptual reasons why the modal hierarchy is set up the way it is. In addition to targeting these two big questions, I was also concerned with what the manner in which modal auxiliaries combine can tell us about modal flavour and force, their status in a modal head and their

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<sup>9</sup>Why it is restricted in this manner even though it does not appear to have a particular modal flavour remains a question for future research.

grammatical status. When thinking about modal pieces, i.e. modal flavour and force, I also discussed the compositionality of DMCs and the principles that guide the grammar to create these structures.

While the above-mentioned puzzles have already been addressed in this thesis, some additional issues have been identified in the final chapter. These cannot be taken lightly and need to be addressed in future scholarship if our aim is to provide a complete account of layered modality — one that is concerned with both the structural and cognitive theory of such structures. Therefore, among other things, future directions will need to address questions of cross-linguistic typological variability, which may be tightly connected to learning constraints that are hypothesised to be found in DMCs. In addition to this, it would be necessary to explore other structures that could also fall under the umbrella of layered modality, which might tell us more about its nature.

# Appendices

# A

## Additional examples of DMCs

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Before using this appendix please refer to the methodological note, section 1.4, specifically for the note on unacceptable examples.

## A.1 *Morati* as the first modal

**Table A.1:** Summary of restrictions for DMCs where *morati* is in the initial position (repeated from Chapter 3)

M2	M1			
	<i>morati<sub>deont</sub></i>	<i>morati<sub>boul</sub></i>	<i>morati<sub>teleo</sub></i>	<i>morati<sub>circum</sub></i>
<i>morati<sub>deont</sub></i>	-	-	-	-
<i>morati<sub>boul</sub></i>	-	-	-	-
<i>morati<sub>teleo</sub></i>	-	-	-	-
<i>morati<sub>circum</sub></i>	+	+	+	-
<i>trebati<sub>deont</sub></i>	-	-	-	-
<i>trebati<sub>boul</sub></i>	-	-	-	-
<i>trebati<sub>teleo</sub></i>	-	-	-	-
<i>trebati<sub>circum</sub></i>	+	+	+	-
<i>smjeti<sub>deont</sub></i>	+	+	+	-
<i>smjeti<sub>boul</sub></i>	+	+	+	-
<i>smjeti<sub>teleo</sub></i>	+	+	+	-
<i>moći<sub>deont</sub></i>	+	+	+	-
<i>moći<sub>boul</sub></i>	+	+	+	-
<i>moći<sub>teleo</sub></i>	+	+	+	-
<i>moći<sub>circum</sub></i>	+	+	+	-

*morati<sub>deont</sub>* + *morati<sub>deont</sub>*

- (1) #Prema zakonu on **mora** **morati** pospremiti sobu  
 according to law he must.PRES.3SG.∇DEONT must.INF clean.INF room  
 prema pravilima posla.  
 according to rules job  
*According to the law, he must have to clean the room according to the rules of the job.*

---

*morati<sub>deont</sub>* + *morati<sub>boul</sub>*

- (2) #Prema zakonu on **mora** **morati** pospremiti  
 according to law he must.PRES.3SG.∇DEONT must.INF.∇BOUL clean.INF  
 sobu prema majčnim željama.  
 room according to mother's wishes  
*According to the law, he must have to clean the room according to his mother's wishes.*

---

*morati<sub>deont</sub>* + *morati<sub>teleo</sub>*

- (3) #Prema zakonu on **mora** **morati** pospremiti  
 according to law he must.PRES.3SG.∇DEONT must.INF.∇TELEO clean.INF

sobu da bi dobio čokoladu.  
 room that be.COND get chocolate  
*According to the law, he must have to clean the room to get a chocolate.*

morati<sub>deont</sub> + morati<sub>circum</sub>

- (4) Context: Ivan is an actor. The rules of the set and the movie industry are that actors are to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.

On **mora** **morati** kihnuti u tom  
 he must.PRES.3SG.∇DEONT must.INF.∇CIRCUM sneeze.INF in that  
 trenutku.  
 moment  
*He must have to sneeze at that moment.*

morati<sub>deont</sub> + trebati<sub>deont</sub>

- (5) #Prema zakonu on **mora** **trebati** pospremiti  
 according to law he must.PRES.3SG.∇DEONT ought.INF.∇DEONT clean.INF  
 sobu prema pravilima posla.  
 room according to rules job  
*According to the law, he must need to clean the room according to the rules of the job.*

morati<sub>deont</sub> + trebati<sub>boul</sub>

- (6) #Prema zakonu on **mora** **trebati** pospremiti  
 according to law he must.PRES.3SG.∇DEONT ought.INF.∇BOUL clean.INF  
 sobu prema majčinim željama.  
 room according to mother's wishes  
*According to the law, he must need to clean the room according to his mother's wishes.*

morati<sub>deont</sub> + trebati<sub>teleo</sub>

- (7) #Prema zakonu on **mora** **trebati** pospremiti  
 according to law he must.PRES.3SG.∇DEONT ought.INF.∇TELEO clean.INF  
 sobu da bi dobio čokoladu.  
 room that be.COND get.PTCP chocolate  
*According to the law, he must need to clean the room to get a chocolate.*

morati<sub>deont</sub> + trebati<sub>circum</sub>

- (8) Context: Ivan is an actor. The rules of the set and the movie industry are that actors are to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.



To je nešto što uvijek **moraš** **moći**  
 that is something that always must.PRES.2SG.∇DEONT may.INF.∃DEONT  
 napraviti.  
 do.INF  
*That's something you must always be allowed to do.*

$\text{morati}_{deont} + \text{moći}_{boul}$

- (13) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the rules of the society peeing is something that needs to be allowed by the teacher's wishes:

To je nešto što uvijek **moraš** **moći**  
 that is something that always must.PRES.2SG.∇DEONT may.INF.∃BOUL  
 napraviti.  
 do.INF  
*That's something you must always be allowed to do.*

$\text{morati}_{deont} + \text{moći}_{teleo}$

- (14) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the rules of the society peeing is something that needs to be allowed with the aim of student being focused on the class:

To je nešto što uvijek **moraš** **moći**  
 that is something that always must.PRES.2SG.∇DEONT may.INF.∃TELEO  
 napraviti.  
 do.INF  
*That's something you must always be allowed to do.*

$\text{morati}_{deont} + \text{moći}_{circum}$

- (15) Context: Ivan is a soldier. He is asked to do 100 push-ups but he fails. His sergeant says:

To je nešto što uvijek **moraš** **moći**  
 that is something that always must.PRES.2SG.∇DEONT can.INF.∃CIRCUM  
 napraviti.  
 do.INF  
*That's something you must always be able to do.*

$\text{morati}_{boul} + \text{morati}_{deont}$

- (16) #Prema majčinim željama on **mora** **morati**  
 according to mother's wishes he must.PRES.3SG.∇BOUL must.INF.∇DEONT

pospremiti sobu prema zakonu.  
 clean.INF room to according to law  
*According to his mother's wishes, he must have to clean the room according to the law.*

---

morati<sub>boul</sub> + morati<sub>boul</sub>

- (17) #Prema majčinim željama on **mora** **morati**  
 according to mother's wishes he must.PRES.3SG.√BOUL must.INF.√BOUL  
 pospremiti sobu prema očevim željama.  
 clean.INF room according to father's wishes  
*According to his mother's wishes, he must have to clean the room according to his father's wishes.*

---

morati<sub>boul</sub> + morati<sub>teleo</sub>

- (18) #Prema majčinim željama on **mora** **morati**  
 according to mother's wishes he must.PRES.3SG.√BOUL must.INF.√TELEO  
 pospremiti sobu da bi dobio čokoladu.  
 clean.INF room that be.COND get.PTCP chocolate  
*According to his mother's wishes, he must have to clean the room to get a chocolate.*

---

morati<sub>boul</sub> + morati<sub>circum</sub>

- (19) Context: Ivan is an actor. The director wants him to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.
- On **mora** **morati** kihnuti u tom  
 he must.PRES.3SG.√BOUL must.INF.√CIRCUM sneeze.INF in that  
 trenutku.  
 moment  
*He must have to sneeze at that moment.*

---

morati<sub>boul</sub> + trebati<sub>deont</sub>

- (20) #Prema majčinim željama on **mora** **trebati**  
 according to mother's wishes he must.PRES.3SG.√BOUL ought.INF.√DEONT  
 pospremiti sobu prema zakonu.  
 clean.INF room according to law  
*According to his mother's wishes, he must need to clean the room according to the law.*

---

morati<sub>boul</sub> + trebati<sub>boul</sub>

- (21) #Prema majčinim željama on **mora** **trebati**  
 according to mother's wishes he must.PRES.3SG.√BOUL ought.INF.√BOUL

pospremiti sobu prema očevim željama.  
 clean.INF room according to father's wishes  
*According to his mother's wishes, he must need to clean the room according to his father's wishes.*

morati<sub>boul</sub> + trebati<sub>teleo</sub>

- (22) #Prema majčinih željama on **mora** **trebati**  
 according to mother's wishes he must.PRES.3SG.√BOUL ought.INF.√TELEO  
 pospremiti sobu da bi dobio čokoladu.  
 clean.INF room that be.COND get.PTCP chocolate  
*According to his mother's wishes, he must need to clean the room to get a chocolate.*

morati<sub>boul</sub> + trebati<sub>circum</sub>

- (23) Context: Ivan is an actor. The director wants him to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.
- On **mora** **trebati** kihnuti u tom  
 he must.PRES.3SG.√BOUL ought.INF.√CIRCUM sneeze.INF in that  
 trenutku.  
 moment  
*He must need to sneeze at that moment.*

morati<sub>boul</sub> + smjeti<sub>deont</sub>

- (24) Context: Ivan's mother is quite conservative and wishes Ivan would not divorce. He is not happily married any more and wants to get a divorce, and he is afraid what his mother will say. One of his friends says:
- To **moraš** **smjeti** napraviti bez obzira na  
 it must.PRES.2SG.√BOUL may.INF.∃DEONT do.INF no matter on  
 majčin pritisak.  
 mother's pressure  
*You must be allowed to do that in spite of pressure from your mother.*

morati<sub>boul</sub> + smjeti<sub>boul</sub>

- (25) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that based on the wishes of the president, it has to be allowed by the wishes of your voters for you to say this:
- To **moraš** **smjeti** reći.  
 it must.PRES.2SG.√BOUL may.INF.∃BOUL say.INF  
*You must be allowed to say that.*

---

morati<sub>boul</sub> + smjeti<sub>teleo</sub>

- (26) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that based on the wishes of the president, it has to be allowed for him to say this so he can focus on his work:

To **moraš**                      **smjeti**                      reći.  
 it must.PRES.2SG.∇BOUL may.INF.∃TELEO say.INF  
*You must be allowed to say that.*

---

morati<sub>boul</sub> + moći<sub>deont</sub>

- (27) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the wishes of the principal peeing is something that needs to be allowed by the school rules:

To je nešto            što uvijek **moraš**                      **moći**  
 that is something that always must.PRES.2SG.∇BOUL may.INF.∃DEONT  
 napraviti.  
 do.INF  
*That's something you must always be allowed to do.*

---

morati<sub>boul</sub> + moći<sub>boul</sub>

- (28) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the wishes of the principal peeing is something that needs to be allowed by the teacher's wishes:

To je nešto            što uvijek **moraš**                      **moći**  
 that is something that always must.PRES.2SG.∇BOUL may.INF.∃BOUL  
 napraviti.  
 do.INF  
*That's something you must always be allowed to do.*

---

morati<sub>boul</sub> + moći<sub>teleo</sub>

- (29) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the wishes of the principal peeing is something that needs to be allowed with the aim of student being focused on the class:

To je nešto            što uvijek **moraš**                      **moći**  
 that is something that always must.PRES.2SG.∇BOUL may.INF.∃TELEO

napraviti.

do.INF

*That's something you must always be allowed to do.*

morati<sub>boul</sub> + moći<sub>circum</sub>

- (30) Context: Ivan is a soldier. He is asked to do 100 push-ups but he fails. His sergeant says:

Prema mojim željama to je nešto što uvijek  
 according to my wishes that is something that always  
**moraš** **moći** napraviti.  
 must.PRES.2SG.∇BOUL can.INF.∃CIRCUM do.INF

*According to my wishes, that is something you must always be able to do.*

morati<sub>teleo</sub> + morati<sub>deont</sub>

- (31) #Da bi dobio čokoladu, on **mora**  
 that be.COND get.PTCP chocolate he must.PRES.3SG.∇TELEO  
**morati** pospremiti sobu prema zakonu.  
 must.INF.∇DEONT clean.INF room according to law  
*To get a chocolate, he must have to clean the room according to the law.*

morati<sub>teleo</sub> + morati<sub>boul</sub>

- (32) #Da bi dobio čokoladu, on **mora** **morati**  
 that be.COND get.PTCP chocolate he must.PRES.3SG.∇TELEO must.INF.∇BOUL  
 pospremiti sobu prema majčinim željama.  
 clean.INF room according to mother's wishes  
*To get a chocolate, he must have to clean the room according to his mother's wishes.*

morati<sub>teleo</sub> + morati<sub>teleo</sub>

- (33) #Da bi dobio čokoladu, on **mora**  
 that be.COND get.PTCP chocolate he must.PRES.3SG.∇TELEO  
**morati** pospremiti sobu da bi dobio nagradu.  
 must.INF.∇TELEO clean.INF room that be.COND get.PTCP price  
*To get a chocolate, he must have to clean the room to get a prize.*

morati<sub>teleo</sub> + morati<sub>circum</sub>

- (34) Context: Ivan is an actor. To get the scene right he has to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.



the public will say when he announces he and his wife are splitting up. One of his friends says:

Da bi bio sretan, to **moraš**  
 that be.COND be.PTCP happy it must.PRES.2SG.∀TELEO  
**smjeti** reći bez obzira na masovni pritisak.  
 may.INF.∃DEONT say.INF no matter on mass pressure

*In order to be happy, you must be allowed to say that in spite of public pressure.*

$\text{morati}_{\text{teleo}} + \text{smjeti}_{\text{boul}}$

- (40) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that with the aim of keeping the society transparent and fair, it has to be allowed by the wishes of his voters for him to say this:

To **moraš** **smjeti** reći.  
 it must.PRES.2SG.∀TELEO may.INF.∃BOUL say.INF

*You must be allowed to say that.*

$\text{morati}_{\text{teleo}} + \text{smjeti}_{\text{teleo}}$

- (41) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that with the aim of keeping the society transparent and fair, it has to be allowed for him to say this so he can focus on his work:

To **moraš** **smjeti** reći.  
 it must.PRES.2SG.∀TELEO may.INF.∃TELEO say.INF

*You must be allowed to say that.*

$\text{morati}_{\text{teleo}} + \text{moći}_{\text{deont}}$

- (42) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that with the aim to create a healthy environment in the classroom peeing is something that must be allowed by the school rules:

To je nešto što uvijek **moraš** **moći**  
 that is something that always must.PRES.2SG.∀TELEO may.INF.∃DEONT  
 napraviti.  
 do.INF

*That's something you must always be allowed to do.*

$\text{morati}_{\text{teleo}} + \text{moći}_{\text{boul}}$

- (43) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that with the aim to create a healthy environment in the classroom peeing is something that must be allowed by the teacher's wishes:

To je nešto što uvijek **moraš** **moći**  
 that is something that always must.PRES.2SG.√TELEO may.INF.∃BOUL  
 napraviti.  
 do.INF  
*That's something you must always be allowed to do.*

morati<sub>teleo</sub> + moći<sub>teleo</sub>

- (44) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that with the aim to create a healthy environment in the classroom peeing is something that must be allowed with the aim of the student being focused on the class:

To je nešto što uvijek **moraš** **moći**  
 that is something that always must.PRES.2SG.√TELEO may.INF.∃TELEO  
 napraviti.  
 do.INF  
*That's something you must always be allowed to do.*

morati<sub>teleo</sub> + moći<sub>circum</sub>

- (45) Context: Ivan is a soldier. He is asked to do 100 push-ups but he fails. His sergeant says:

Da bi postao zapovjednik, to je nešto što  
 that be.COND become.PTCP commander that is something that  
**moraš** **moći** napraviti.  
 must.PRES.2SG.√TELEO can.INF.∃CIRCUM do.INF  
*To become a commander, that is something you must be able to do.*

morati<sub>circum</sub> + morati<sub>deont</sub>

- (46) #Zbog okolnosti alergičari **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.√CIRCUM  
**morati** kihnuti prema zakonu.  
 must.INF.√DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers must have to sneeze according to the law.*

morati<sub>circum</sub> + morati<sub>boul</sub>

- (47) #Zbog okolnosti alergičari **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.√CIRCUM

**morati**            kihnuti    prema        nečijim    željama.  
 must.INF.∇BOUL sneeze.INF according to someone's wishes  
*Due to circumstances, allergy sufferers must have to sneeze according to someone's wishes.*

$\text{morati}_{\text{circum}} + \text{morati}_{\text{teleo}}$

- (48) #Zbog okolnosti    alergičari        **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∇CIRCUM  
**morati**            kihnuti    da    bi        ispraznili    nos.  
 must.INF.∇TELEO sneeze.INF that be.COND empty.PTCP nose  
*Due to circumstances, allergy sufferers must have to sneeze to empty out their nose.*

$\text{morati}_{\text{circum}} + \text{morati}_{\text{circum}}$

- (49) #Zbog okolnosti    alergičari        **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∇CIRCUM  
**morati**            kihnuti    zbog    okolnosti.  
 must.INF.∇DEONT sneeze.INF due to circumstances  
*Due to circumstances, allergy sufferers must have to sneeze due to circumstances.*

$\text{morati}_{\text{circum}} + \text{trebati}_{\text{deont}}$

- (50) #Zbog okolnosti    alergičari        **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∇CIRCUM  
**trebati**            kihnuti    prema        zakonu.  
 ought.INF.∇DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers have to need to sneeze according to the law.*

$\text{morati}_{\text{circum}} + \text{trebati}_{\text{boul}}$

- (51) #Zbog okolnosti    alergičari        **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∇CIRCUM  
**trebati**            kihnuti    prema        nečijim    željama.  
 ought.INF.∇BOUL sneeze.INF according to someone's wishes  
*Due to circumstances, allergy sufferers have to need to sneeze according to someone's wishes.*

$\text{morati}_{\text{circum}} + \text{trebati}_{\text{teleo}}$

- (52) #Zbog okolnosti    alergičari        **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∇CIRCUM  
**trebati**            kihnuti    da    bi        ispraznili    nos.  
 ought.INF.∇TELEO sneeze.INF that be.COND empty.PTCP nose

*Due to circumstances, allergy sufferers have to need to sneeze to empty out their nose.*

---

morati<sub>circum</sub> + trebati<sub>circum</sub>

- (53) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**trebati**                      kihnuti      zbog okolnosti.  
 ought.INF.∀CIRCUM sneeze.INF due to circumstances  
*Due to circumstances, allergy sufferers have to need to sneeze due to circum-  
 stances.*

---

morati<sub>circum</sub> + smjeti<sub>deont</sub>

- (54) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**smjeti**                      kihnuti      prema      zakonu.  
 may.INF.∃DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers have to be allowed to sneeze according to  
 the law.*

---

morati<sub>circum</sub> + smjeti<sub>boul</sub>

- (55) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**smjeti**                      kihnuti      prema      nečijim      željama.  
 may.INF.∃BOUL sneeze.INF according to someone's wishes  
*Due to circumstances, allergy sufferers have to be allowed to sneeze according to  
 someone's wishes.*

---

morati<sub>circum</sub> + smjeti<sub>teleo</sub>

- (56) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**smjeti**                      kihnuti      da bi      ispraznili      nos.  
 may.INF.∃TELEO sneeze.INF that be.COND empty.PTCP nose  
*Due to circumstances, allergy sufferers have to be allowed to sneeze to empty out  
 their nose.*

---

morati<sub>circum</sub> + moći<sub>deont</sub>

- (57) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**moći**                      kihnuti      prema      zakonu.  
 may.INF.∃DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers have to be allowed to sneeze according to*

*the law.*

---

morati<sub>circum</sub> + moći<sub>boul</sub>

- (58) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**moći**              kihnuti      prema      nečijim      željama.  
 may.INF.∃BOUL sneeze.INF according to someone's wishes  
*Due to circumstances, allergy sufferers have to be allowed to sneeze according to someone's wishes.*

---

morati<sub>circum</sub> + moći<sub>teleo</sub>

- (59) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**moći**              kihnuti      da bi      ispraznili      nos.  
 may.INF.∃TELEO sneeze.INF that be.COND empty.PTCP nose  
*Due to circumstances, allergy sufferers have to be allowed to sneeze to empty out their nose.*

---

morati<sub>circum</sub> + moći<sub>circum</sub>

- (60) #Zbog okolnosti      alergičari      **moraju**  
 due to circumstances allergy-sufferers must.PRES.3PL.∀CIRCUM  
**moći**              kihnuti.  
 can.INF.∃CIRCUM sneeze.INF  
*Due to circumstances, allergy sufferers have to be able to sneeze.*

## A.2 *Trebati* as the first modal

**Table A.2:** Summary of restrictions for DMCs where *trebati* is in the initial position (repeated from Chapter 3)

M2	M1			
	trebati <sub>deont</sub>	trebati <sub>boul</sub>	trebati <sub>teleo</sub>	trebati <sub>circum</sub>
morati <sub>deont</sub>	-	-	-	-
morati <sub>boul</sub>	-	-	-	-
morati <sub>teleo</sub>	-	-	-	-
morati <sub>circum</sub>	+	+	+	-
trebati <sub>deont</sub>	-	-	-	-
trebati <sub>boul</sub>	-	-	-	-
trebati <sub>teleo</sub>	-	-	-	-
trebati <sub>circum</sub>	+	+	+	-
smjeti <sub>deont</sub>	+	+	+	-
smjeti <sub>boul</sub>	+	+	+	-
smjeti <sub>teleo</sub>	+	+	+	-
moći <sub>deont</sub>	+	+	+	-
moći <sub>boul</sub>	+	+	+	-
moći <sub>teleo</sub>	+	+	+	-
moći <sub>circum</sub>	+	+	+	-

trebati<sub>deont</sub> + morati<sub>deont</sub>

- (61) #Prema zakonu on **treba** **morati** pospremiti  
 according to law he ought.PRES.3SG.√DEONT must.INF.√DEONT clean.INF  
 sobu prema pravilima posla.  
 room according to rules job  
*According to the law, he ought to have to clean the room according to the rules of the job.*

---

trebati<sub>deont</sub> + morati<sub>boul</sub>

- (62) #Prema zakonu on **treba** **morati** pospremiti  
 according to law he ought.PRES.3SG.√DEONT must.INF.√BOUL clean.INF  
 sobu prema majčinim željama.  
 room according to mother's wishes  
*According to the law, he ought to have to clean the room according to his mother's wishes.*

---

trebati<sub>deont</sub> + morati<sub>teleo</sub>

- (63) #Prema zakonu on **treba** **morati** pospremiti  
 according to law he ought.PRES.3SG.√DEONT must.INF.√TELEO clean.INF

sobu da bi dobio čokoladu.  
 room that be.COND get.PTCP chocolate  
*According to the law, he ought to have to clean the room to get a chocolate.*

trebati<sub>deont</sub> + morati<sub>circum</sub>

- (64) Context: Ivan is an actor. The rules of the set and the movie industry are that actors are to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.

On **treba** **morati** kihnuti u tom  
 he ought.PRES.3SG.∇DEONT must.INF.∇CIRCUM sneeze.INF in that  
 trenutku.  
 moment  
*He ought to have to sneeze at that moment.*

trebati<sub>deont</sub> + trebati<sub>deont</sub>

- (65) #Prema zakonu on **treba** **trebati**  
 according to law he ought.PRES.3SG.∇DEONT ought.INF.∇DEONT  
 pospremiti sobu prema pravilima posla.  
 clean.INF room according to rules job  
*According to the law, he ought to need to clean the room according to the rules of the job.*

trebati<sub>deont</sub> + trebati<sub>boul</sub>

- (66) #Prema zakonu on **treba** **trebati** pospremiti  
 according to law he ought.PRES.3SG.∇DEONT ought.INF.∇BOUL clean.INF  
 sobu prema majčinim željama.  
 room according to mother's wishes  
*According to the law, he ought to need to clean the room according to his mother's wishes.*

trebati<sub>deont</sub> + trebati<sub>teleo</sub>

- (67) #Prema zakonu on **treba** **trebati** pospremiti  
 according to law he ought.PRES.3SG.∇DEONT ought.INF.∇TELEO clean.INF  
 sobu da bi dobio čokoladu.  
 room that be.COND get.PTCP chocolate  
*According to the law, he ought to need to clean the room to get a chocolate.*

trebati<sub>deont</sub> + trebati<sub>circum</sub>

- (68) Context: Ivan is an actor. The rules of the set and the movie industry are that actors are to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.



- (72) Context: Ivan is the CEO of the company and he is late for a meeting. The person he is supposed to meet complains. Ivan's assistant says:

On **treba** **moći** doći bilo kada.  
 he ought.PRES.3SG.∀DEONT may.INF.∃DEONT come.INF any when  
*He ought to be allowed to come anytime.*

trebati<sub>deont</sub> + moći<sub>boul</sub>

- (73) Context: Ivan is the CEO of the company and he is late for a meeting. The person he is supposed to meet complains. Ivan's assistant says:

On **treba** **moći** doći kad on  
 he ought.PRES.3SG.∀DEONT may.INF.∃BOUL come.INF when he  
 želi.  
 wish.PRES.3SG  
*He ought to be allowed to come when he wishes.*

trebati<sub>deont</sub> + moći<sub>teleo</sub>

- (74) Context: Ivan is the CEO of the company and he is late for a meeting. The person he is supposed to meet complains. Ivan's assistant says:

On **treba** **moći** doći bilo kada da  
 he ought.PRES.3SG.∀DEONT may.INF.∃TELEO come.INF any when that  
 bi bio sretan.  
 be.COND be.PTCP happy  
*He ought to be allowed to come anytime to be happy.*

trebati<sub>deont</sub> + moći<sub>circum</sub>

- (75) Context: Ivan is training to be a firefighter. They are learning about how to emotionally deal with difficult situations. The lecturer says:

To je užas koji **trebaš** **moći**  
 that is horror which ought.PRES.2SG.∀DEONT can.INF.∃CIRCUM  
 preživjeti.  
 survive.INF  
*That is a horror that you ought to be able to survive.*

trebati<sub>boul</sub> + morati<sub>deont</sub>

- (76) #Prema majčinim željama on **treba** **morati**  
 according to mother's wishes he ought.PRES.3SG.∀BOUL must.INF.∀DEONT  
 pospremiti sobu prema zakonu.  
 clean.INF room according to law  
*According to his mother's wishes, he ought to have to clean the room according to the law.*

---

trebati<sub>boul</sub> + morati<sub>boul</sub>

- (77) #Prema majčnim željama on **treba** **morati**  
 according to mother's wishes he ought.PRES.3SG.∇BOUL must.INF.∇BOUL  
 pospremiti sobu prema očevim željama.  
 clean.INF room according to father's wishes  
*According to his mother's wishes, he ought to have to clean the room according to his father's wishes.*

---

trebati<sub>boul</sub> + morati<sub>teleo</sub>

- (78) #Prema majčnim željama on **treba** **morati**  
 according to mother's wishes he ought.PRES.3SG.∇BOUL must.INF.∇TELEO  
 pospremiti sobu da bi dobio čokoladu.  
 clean.INF room that be.COND get.PTCP chocolate  
*According to his mother's wishes, he ought to have to clean the room to get a chocolate.*

---

trebati<sub>boul</sub> + morati<sub>circum</sub>

- (79) Context: Ivan is an actor. The director needs him to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.
- On **treba** **morati** kihnuti u tom  
 he ought.PRES.3SG.∇BOUL must.INF.∇CIRCUM sneeze.INF in that  
 trenutku.  
 moment  
*He ought to have to sneeze at that moment.*

---

trebati<sub>boul</sub> + trebati<sub>deont</sub>

- (80) #Prema majčnim željama on **treba** **trebati**  
 according to mother's wishes he ought.PRES.3SG.∇BOUL ought.INF.∇DEONT  
 pospremiti sobu prema zakonu.  
 clean.INF room according to law  
*According to his mother's wishes, he ought to need to clean the room according to the law.*

---

trebati<sub>boul</sub> + trebati<sub>boul</sub>

- (81) #Prema majčnim željama on **treba** **trebati**  
 according to mother's wishes he ought.PRES.3SG.∇BOUL ought.INF.∇BOUL  
 pospremiti sobu prema očevim željama .  
 clean.INF room according to father's wishes  
*According to his mother's wishes, he ought to need to clean the room according to his father's wishes.*

---

 trebati<sub>boul</sub> + trebati<sub>teleo</sub>

- (82) #Prema majčinim željama on **treba** **trebati**  
 according to mother's wishes he ought.PRES.3SG.∇BOUL ought.INF.∇TELEO  
 pospremiti sobu da bi dobio čokoladu.  
 clean.INF room that be.COND get.PTCP chocolate  
*According to his mother's wishes, he ought to need to clean the room to get a chocolate.*

---

 trebati<sub>boul</sub> + trebati<sub>circum</sub>

- (83) Context: Ivan is an actor. The director needs him to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.
- On **treba** **trebati** kihnuti u tom  
 he ought.PRES.3SG.∇BOUL ought.INF.∇CIRCUM sneeze.INF in that  
 trenutku.  
 moment  
*He ought to need to sneeze at that moment.*

---

 trebati<sub>boul</sub> + smjeti<sub>deont</sub>

- (84) Context: Ivan is the son of a very wealthy man who donates a lot of money to the police force. He broke the law but was let go early due to his father's influence. One of the more outspoken police officers says that based on the wishes of the president he needs to be allowed to be kept there according to the rules of this particular police station:
- Ivan **treba** **smjeti** biti zadržan u zatvoru.  
 Ivan ought.PRES.3SG.∇BOUL may.INF.∃DEONT be.INF kept in prison  
*It ought to be allowed that Ivan is kept in prison.*

---

 trebati<sub>boul</sub> + smjeti<sub>boul</sub>

- (85) Context: Ivan is the son of a very wealthy man who donates a lot of money to the police force. He broke the law but was let go early due to his father's influence. One of the more outspoken police officers says that based on the wishes of the president he needs to be allowed to be kept there if the police officers wish so:
- Ivan **treba** **smjeti** biti zadržan u zatvoru.  
 Ivan ought.PRES.3SG.∇BOUL may.INF.∃BOUL be.INF kept in prison  
*It ought to be allowed that Ivan is kept in prison.*

---

 trebati<sub>boul</sub> + smjeti<sub>teleo</sub>

- (86) Context: Ivan is the son of a very wealthy man who donates a lot of money to the police force. He broke the law but was let go early due to his father's influence.

One of the more outspoken police officers says that based on the wishes of the president he needs to be allowed to be kept there to give the police officers time to finish the investigation properly:

Ivan **treba** **smjeti** biti zadržan u zatvoru.  
 Ivan ought.PRES.3SG.∇BOUL may.INF.∃TELEO be.INF kept in prison  
*It ought to be allowed that Ivan is kept in prison.*

trebati<sub>boul</sub> + moći<sub>deont</sub>

- (87) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the wishes of the principal peeing is something that needs to be allowed by the school rules:

To je nešto što uvijek **trebaš** **moći**  
 that is something that always ought.PRES.2SG.∇BOUL may.INF.∃DEONT  
 napraviti.  
 do.INF  
*That's something you ought to always be allowed to do.*

trebati<sub>boul</sub> + moći<sub>boul</sub>

- (88) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the wishes of the principal peeing is something that needs to be allowed by the teacher's wishes:

To je nešto što uvijek **trebaš** **moći**  
 that is something that always ought.PRES.2SG.∇BOUL may.INF.∃BOUL  
 napraviti.  
 do.INF  
*That's something you ought to always be allowed to do.*

trebati<sub>boul</sub> + moći<sub>teleo</sub>

- (89) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that based on the wishes of the principal peeing is something that needs to be allowed with the aim of the student being focused on the class:

To je nešto što uvijek **trebaš** **moći**  
 that is something that always ought.PRES.2SG.∇BOUL may.INF.∃TELEO  
 napraviti.  
 do.INF  
*That's something you ought to always be allowed to do.*

trebati<sub>boul</sub> + moći<sub>circum</sub>

- (90) Context: Ivan is a soldier. He is asked to do 100 push-ups but he fails. His sergeant says:

Prema mojim željama, to je nešto što uvijek  
 according to my wishes that is something that always  
**trebaš** **moći** napraviti.  
 ought.PRES.2SG.∇BOUL can.INF.∃CIRCUM do.INF

*According to my wishes, that is something you ought to always be able to do.*

trebati<sub>teleo</sub> + morati<sub>deont</sub>

- (91) #Da bi dobio čokoladu, on **treba**  
 that be.COND get.PTCP chocolate he ought.PRES.3SG.∇TELEO  
**morati** pospremiti sobu prema zakonu.  
 must.INF.∇DEONT clean.INF room according to law  
*To get a chocolate, he ought to have to clean the room according to the law.*

trebati<sub>teleo</sub> + morati<sub>boul</sub>

- (92) #Da bi dobio čokoladu, on **treba** **morati**  
 that be.COND get.PTCP chocolate he ought.PRES.3SG.∇TELEO must.INF.∇BOUL  
 pospremiti sobu prema majčinih željama.  
 clean.INF room according to mother's wishes  
*To get a chocolate, he ought to have to clean the room according to his mother's wishes.*

trebati<sub>teleo</sub> + morati<sub>teleo</sub>

- (93) #Da bi dobio čokoladu, on **treba**  
 that be.COND get.PTCP chocolate he ought.PRES.3SG.∇TELEO  
**morati** pospremiti sobu da bi dobio nagradu.  
 must.INF.∇TELEO clean.INF room that be.COND get.PTCP prize  
*To get a chocolate, he ought to have to clean the room to get a prize.*

trebati<sub>teleo</sub> + morati<sub>circum</sub>

- (94) Context: Ivan is an actor. To get the scene right he has to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.

On **treba** **morati** kihnuti u tom  
 he ought.PRES.3SG.∇TELEO must.INF.∇CIRCUM sneeze.INF in that  
 trenutku.  
 moment

*He ought to have to sneeze at that moment.*

trebati<sub>teleo</sub> + trebati<sub>deont</sub>

- (95) #Da bi dobio čokoladu, on **treba**  
 that be.COND get.PTCP chocolate he ought.PRES.3SG.√TELEO  
**trebati** pospremiti sobu prema zakonu.  
 ought.INF.√DEONT clean.INF room according to law  
*To get a chocolate, he ought to need to clean the room according to the law.*

trebati<sub>teleo</sub> + trebati<sub>boul</sub>

- (96) #Da bi dobio čokoladu, on **treba**  
 that be.COND get.PTCP chocolate he ought.PRES.3SG.√TELEO  
**trebati** pospremiti sobu prema majčinim željama.  
 ought.INF.√BOUL clean.INF room according to mother's wishes  
*To get a chocolate, he ought to need to clean the room according to his mother's wishes.*

trebati<sub>teleo</sub> + trebati<sub>teleo</sub>

- (97) #Da bi dobio čokoladu, on **treba**  
 that be.COND get.PTCP chocolate he ought.PRES.3SG.√TELEO  
**trebati** pospremiti sobu da bi dobio nagradu.  
 ought.INF.√TELEO clean.INF room that be.COND get.PTCP prize  
*To get a chocolate, he ought to have to clean the room to get a prize.*

trebati<sub>teleo</sub> + trebati<sub>circum</sub>

- (98) Context: Ivan is an actor. To get the scene right he has to sneeze at an exact moment, but he also wants the sneeze to be very realistic, so they will cause the sneezing by putting a flower under his nose.
- On **treba** **trebati** kihnuti u tom  
 he ought.PRES.3SG.√TELEO ought.INF.√CIRCUM sneeze.INF in that  
 trenutku.  
 moment  
*He ought to need to sneeze at that moment.*

trebati<sub>teleo</sub> + smjeti<sub>deont</sub>

- (99) Context: In order to be happy, Ivan cannot keep any secrets to himself. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says:
- Da bi bio sretan, to **trebaš**  
 that be.COND be.PTCP happy it ought.PRES.2SG.√TELEO  
**smjeti** reći.  
 may.INF.√DEONT say.INF  
*In order to be happy, you need to be allowed to say that.*

---

trebati<sub>teleo</sub> + smjeti<sub>boul</sub>

- (100) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that with the aim of keeping the society transparent and fair, it has to be allowed by the wishes of your voters for you to say this:

To **trebaš** **smjeti** reći bez obzira na  
 it ought.PRES.2SG.∀TELEO may.INF.∃BOUL say.INF no matter on  
 masovni pritisak.  
 mass pressure  
*You need to be allowed to say that in spite of public pressure.*

---

trebati<sub>teleo</sub> + smjeti<sub>teleo</sub>

- (101) Context: Ivan is the mayor of a very conservative small town. He is not happily married any more and wants to get a divorce, and he is afraid of what the public will say when he announces he and his wife are splitting up. One of his friends says that with the aim of keeping the society transparent and fair, it has to be allowed for him to say this so he can focus on his work:

To **trebaš** **smjeti** reći.  
 it ought.PRES.2SG.∀TELEO may.INF.∃TELEO say.INF  
*You need to be allowed to say that.*

---

trebati<sub>teleo</sub> + moći<sub>deont</sub>

- (102) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that with the aim to create a healthy environment in the classroom peeing is something that needs to be allowed by the school rules:

To je nešto što uvijek **trebaš**  
 that is something that always ought.PRES.2SG.∀TELEO  
**moći** napraviti.  
 may.INF.∃DEONT do.INF  
*That's something you need to always be allowed to do.*

---

trebati<sub>teleo</sub> + moći<sub>boul</sub>

- (103) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that with the aim to create a healthy environment in the classroom peeing is something that needs to be allowed by the teacher's wishes:

To je nešto što uvijek **trebaš** **moći**  
 that is something that always ought.PRES.2SG.∀TELEO may.INF.∃BOUL  
 napraviti.  
 do.INF  
*That's something you need to always be allowed to do.*

trebati<sub>teleo</sub> + moći<sub>teleo</sub>

- (104) Context: Ivan is a high school student. He complains to his mother that he needed to go to the toilet but his teacher did not let him leave the classroom during the exam. His mother says that with the aim to create a healthy environment in the classroom peeing is something that needs to be allowed with the aim of the student being focused on the class:

To je nešto što uvijek **trebaš** **moći**  
 that is something that always ought.PRES.2SG.∀TELEO may.INF.∃TELEO  
 napraviti.  
 do.INF  
*That's something you need to always be allowed to do.*

trebati<sub>teleo</sub> + moći<sub>circum</sub>

- (105) Context: Ivan is a soldier. He is asked to do 100 push-ups but he fails. His sergeant says:

Da bi postao zapovjednik, to je nešto što  
 that be.COND become.PTCP commander is something that always  
 uvijek **trebaš** **moći** napraviti.  
 ought.PRES.2SG.∀TELEO can.INF.∃CIRCUM do.INF  
*To become a commander, that is something you need to always be able to do.*

trebati<sub>circum</sub> + morati<sub>deont</sub>

- (106) #Zbog okolnosti alergičari **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**morati** kihnuti prema zakonu.  
 must.INF.∀DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers need to have to sneeze according to the law.*

trebati<sub>circum</sub> + morati<sub>boul</sub>

- (107) #Zbog okolnosti alergičari **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**morati** kihnuti prema nečijim željama.  
 must.INF.∀BOUL sneeze.INF according to someone's wishes

*Due to circumstances, allergy sufferers need to have to sneeze according to someone's wishes.*

---

trebati<sub>circum</sub> + morati<sub>teleo</sub>

- (108) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**morati**              kihnuti      da      bi              ispraznili      nos.  
 must.INF.∀TELEO sneeze.INF that be.COND empty.PTCP nose  
*Due to circumstances, allergy sufferers need to have to sneeze to empty out their nose.*

---

trebati<sub>circum</sub> + morati<sub>circum</sub>

- (109) #Zbog okolnosti      alergičari      **trebati**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**morati**              kihnuti      zbog      okolnosti.  
 must.INF.∀CIRCUM sneeze.INF due to circumstances  
*Due to circumstances, allergy sufferers need to have to sneeze due to circumstances.*

---

trebati<sub>circum</sub> + trebati<sub>deont</sub>

- (110) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**trebati**              kihnuti      prema      zakonu.  
 ought.INF.∀DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers ought to need to sneeze according to the law.*

---

trebati<sub>circum</sub> + trebati<sub>boul</sub>

- (111) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**trebati**              kihnuti      prema      nečijim      željama.  
 ought.INF.∀BOUL sneeze.INF according to someone's wishes  
*Due to circumstances, allergy sufferers ought to need to sneeze according to someone's wishes.*

---

trebati<sub>circum</sub> + trebati<sub>teleo</sub>

- (112) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**trebati**              kihnuti      da      bi              ispraznili      nos.  
 ought.INF.∀TELEO sneeze.INF that be.COND empty.PTCP nose  
*Due to circumstances, allergy sufferers ought to need to sneeze to empty out*

*their nose.*

---

trebati<sub>circum</sub> + trebati<sub>circum</sub>

- (113) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**trebati**              kihnuti      zbog okolnosti.  
 ought.INF.∀CIRCUM sneeze.INF due to circumstances  
*Due to circumstances, allergy sufferers ought to need to sneeze due to circum-*  
*stances.*

---

trebati<sub>circum</sub> + smjeti<sub>deont</sub>

- (114) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**smjeti**              kihnuti      prema      zakonu.  
 may.INF.∃DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers need to be allowed to sneeze according to*  
*the law.*

---

trebati<sub>circum</sub> + smjeti<sub>boul</sub>

- (115) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**smjeti**              kihnuti      prema      nečijim      željama.  
 may.INF.∃BOUL sneeze.INF according to someone's wishes  
*Due to circumstances, allergy sufferers need to be allowed to sneeze according to*  
*someone's wishes.*

---

trebati<sub>circum</sub> + smjeti<sub>teleo</sub>

- (116) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**smjeti**              kihnuti      da bi      ispraznili      nos.  
 may.INF.∃BOUL sneeze.INF that be.COND empty.PTCP nose  
*Due to circumstances, allergy sufferers need to be allowed to sneeze to empty*  
*out their nose.*

---

trebati<sub>circum</sub> + moći<sub>deont</sub>

- (117) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**moći**              kihnuti      prema      zakonu.  
 may.INF.∃DEONT sneeze.INF according to law  
*Due to circumstances, allergy sufferers need to be allowed to sneeze according to*  
*the law.*

---

trebati<sub>circum</sub> + moći<sub>boul</sub>

- (118) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**moći**              kihnuti      prema      nečijim      željama.  
 may.INF.∃BOUL sneeze.INF according to someone's wishes  
*Due to circumstances, allergy sufferers need to be allowed to sneeze according to someone's wishes.*

---

trebati<sub>circum</sub> + moći<sub>teleo</sub>

- (119) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**moći**              kihnuti      da      bi      ispraznili      nos.  
 may.INF.∃TELEO sneeze.INF that be.COND empty.PTCP nose  
*Due to circumstances, allergy sufferers need to be allowed to sneeze to empty out their nose.*

---

trebati<sub>circum</sub> + moći<sub>circum</sub>

- (120) #Zbog okolnosti      alergičari      **trebaju**  
 due to circumstances allergy-sufferers ought.PRES.3PL.∀CIRCUM  
**moći**              kihnuti.  
 can.INF.∃CIRCUM sneeze.INF  
*Due to circumstances, allergy sufferers need to be able to sneeze.*

### A.3 *Smjeti* as the first modal

**Table A.3:** Summary of restrictions for DMCs where *smjeti* is in the initial position (repeated from Chapter 3)

M2	M1		
	<i>smjeti<sub>deont</sub></i>	<i>smjeti<sub>boul</sub></i>	<i>smjeti<sub>teleo</sub></i>
<i>morati<sub>deont</sub></i>	-	-	-
<i>morati<sub>boul</sub></i>	-	-	-
<i>morati<sub>teleo</sub></i>	-	-	-
<i>morati<sub>circum</sub></i>	+	+	+
<i>trebati<sub>deont</sub></i>	-	-	-
<i>trebati<sub>boul</sub></i>	-	-	-
<i>trebati<sub>teleo</sub></i>	-	-	-
<i>trebati<sub>circum</sub></i>	+	+	+
<i>smjeti<sub>deont</sub></i>	-	-	-
<i>smjeti<sub>boul</sub></i>	-	-	-
<i>smjeti<sub>teleo</sub></i>	-	-	-
<i>moći<sub>deont</sub></i>	-	-	-
<i>moći<sub>boul</sub></i>	-	-	-
<i>moći<sub>teleo</sub></i>	-	-	-
<i>moći<sub>circum</sub></i>	+	+	+

*smjeti<sub>deont</sub>* + *morati<sub>deont</sub>*

- (121) #Prema zakonu on **smije** **morati** izreći  
 according to law he may.PRES.3SG.∃DEONT must.INF.∇DEONT express.INF  
 mišljenje prema pravilima posla.  
 opinion according to rules job  
*According to the law, he is allowed to have to express his opinion according to the rules of the job.*

---

*smjeti<sub>deont</sub>* + *morati<sub>boul</sub>*

- (122) #Prema zakonu on **smije** **morati** izreći  
 according to law he may.PRES.3SG.∃DEONT must.INF.∇BOUL express.INF  
 mišljenje prema predsjednikovim željama.  
 opinion according to president's wishes  
*According to the law, he is allowed to have to express his opinion according to the president's wishes.*

---

*smjeti<sub>deont</sub>* + *morati<sub>teleo</sub>*

- (123) #Prema zakonu on **smije** **morati** izreći  
 according to law he may.PRES.3SG.∃DEONT must.INF.∇TELEO express.INF

mišljenje da bi bio sretan.  
 opinion that be.COND be.PTCP happy  
*According to the law, he is allowed to have to express his opinion to be happy.*

smjeti<sub>deont</sub> + morati<sub>circum</sub>

- (124) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam. Among others, he says:

**Smijete morati piškiti.**  
 may.PRES.2PL.∃DEONT must.INF.∀CIRCUM pee.INF  
*You are allowed to have to pee.*

smjeti<sub>deont</sub> + trebati<sub>deont</sub>

- (125) #Prema zakonu on **smije trebati** izreći  
 according to law he may.PRES.3SG∃DEONT ought.INF.∀DEONT express.INF  
 mišljenje prema pravilima posla.  
 opinion according to rules job  
*According to the law, he is allowed to need to express his opinion according to the rules of the job.*

smjeti<sub>deont</sub> + trebati<sub>boul</sub>

- (126) #Prema zakonu on **smije trebati** izreći  
 according to law he may.PRES.3SG∃DEONT ought.INF.∀BOUL express.INF  
 mišljenje prema predsjednikovim željama.  
 opinion according to president's wishes  
*According to the law, he is allowed to need to express his opinion according to the president's wishes.*

smjeti<sub>deont</sub> + trebati<sub>teleo</sub>

- (127) #Prema zakonu on **smije trebati** izreći  
 according to law he may.PRES.3SG∃DEONT ought.INF.∀TELEO express.INF  
 mišljenje da bi bio sretan.  
 opinion that be.COND be.PTCP happy  
*According to the law, he is allowed to have to express his opinion to be happy.*

smjeti<sub>deont</sub> + trebati<sub>circum</sub>

- (128) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam. Among others, he says:

**Smijete trebati piškiti.**  
 may.PRES.2PL.∃DEONT ought.INF.∀CIRCUM pee.INF  
*You are allowed to need to pee.*

---

 smjeti<sub>deont</sub> + smjeti<sub>deont</sub>

- (129) #Prema zakonu on **smije** **smjeti** izreći  
 according to law he may.PRES.3SG.∃DEONT may.INF.∃DEONT express.INF  
 mišljenje prema pravilima posla.  
 opinion according to rules job  
*According to the law, he may be allowed to express his opinion according to the rules of the job.*

---

 smjeti<sub>deont</sub> + smjeti<sub>boul</sub>

- (130) #Prema zakonu on **smije** **smjeti** izreći  
 according to law he may.PRES.3SG.∃DEONT may.INF.∃BOUL express.INF  
 mišljenje prema predsjednikovim željama.  
 opinion according to president's wishes  
*According to the law, he may be allowed to express his opinion according to the president's wishes.*

---

 smjeti<sub>deont</sub> + smjeti<sub>teleo</sub>

- (131) #Prema zakonu on **smije** **smjeti** izreći  
 according to law he may.PRES.3SG.∃DEONT may.INF.∃TELEO express.INF  
 mišljenje da bi bio sretan.  
 opinion that be.COND be.PTCP happy  
*According to the law, he may be allowed to express his opinion to be happy.*

---

 smjeti<sub>deont</sub> + moći<sub>deont</sub>

- (132) #Prema zakonu kaciga se **smije** **moći**  
 according to law helmet self may.PRES.3SG.∃DEONT may.INF.∃DEONT  
 vrtjeti oko glave prema pravilima posla.  
 revolve.INF around head according to rules job  
*According to the law, it is allowed for the helmet to may swivel around on the head according to the rules of the job.*

---

 smjeti<sub>deont</sub> + moći<sub>boul</sub>

- (133) #Prema zakonu kaciga se **smije** **moći**  
 according to law helmet self may.PRES.3SG.∃DEONT may.INF.∃BOUL  
 vrtjeti oko glave prema predsjednikovim željama.  
 revolve.INF around head according to president's wishes  
*According to the law, it is allowed for the helmet to may swivel around on the head according to the president's wishes.*

---

 smjeti<sub>deont</sub> + moći<sub>teleo</sub>

- (134) #Prema zakonu kaciga se **smije** **moći**  
 according to law helmet self may.PRES.3SG.∃DEONT may.INF.∃TELEO  
 vrtjeti oko glave da bi vožnja bila ugodna.  
 revolve.INF around head that be.COND ride be.PTCP comfortable  
*Prema zakonu it is allowed for the helmet to may swivel around on the head to  
 make the ride comfortable.*

smjeti<sub>deont</sub> + moći<sub>circum</sub>

- (135) Context: Among the laws and rules of riding a motorcycle, there are rules on  
 the type and the position of the helmet.  
 Kaciga se **smije** **moći** vrtjeti  
 helmet self may.PRES.3SG.∃DEONT may.INF.∃CIRCUM revolve.INF  
 oko glave.  
 around head  
*It is allowed for the helmet to be able to swivel around on the head.*

smjeti<sub>boul</sub> + morati<sub>deont</sub>

- (136) #Prema predsjednikovim željama on **smije**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**morati** izreći mišljenje prema pravilima posla.  
 must.INF.∃DEONT express.INF opinion according to rules job  
*According to the president's wishes, he is allowed to have express his opinion  
 according to the rules of the job.*

smjeti<sub>boul</sub> + morati<sub>boul</sub>

- (137) #Prema predsjednikovim željama on **smije**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**morati** izreći mišljenje prema željama premijera.  
 must.INF.∃BOUL express.INF opinion according to wishes prime minister  
*According to the president's wishes, he is allowed to have to express his opinion  
 according to the prime minister's wishes.*

smjeti<sub>boul</sub> + morati<sub>teleo</sub>

- (138) #Prema predsjednikovim željama on **smije**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**morati** izreći mišljenje da bi bio sretan.  
 must.INF.∃TELEO express.INF opinion that be.COND be.PTCP happy  
*According to the president's wishes, he is allowed to have to express his opinion  
 to be happy.*

smjeti<sub>boul</sub> + morati<sub>circum</sub>

- (139) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam according to his wishes. Among others, he says:

**Smijete**                      **morati**                      piškiti.  
 may.PRES.2PL.∃BOUL must.INF.∇CIRCUM pee.INF  
*You are allowed to have to pee.*

smjeti<sub>boul</sub> + trebati<sub>deont</sub>

- (140) #Prema            željama predsjednika on **smije**  
 according to wishes president he may.PRES.3SG.∃BOUL  
**trebati**            izreći            mišljenje prema            pravilima posla.  
 ought.INF.∇DEONT express.INF opinion according to rules job  
*According to the wishes of the president, he is allowed to need to express his opinion according to the rules of the job.*

smjeti<sub>boul</sub> + trebati<sub>boul</sub>

- (141) #Prema            željama predsjednika on **smije**                      **trebati**  
 according to wishes president he may.PRES.3SG.∃BOUL ought.INF.∇BOUL  
 izreći            mišljenje prema            željama premijera.  
 express.INF opinion according to wishes prime minister  
*According to the wishes of the president, he is allowed to need to express his opinion according to the prime minister's wishes.*

smjeti<sub>boul</sub> + trebati<sub>teleo</sub>

- (142) #Prema            željama predsjednika on **smije**  
 according to wishes president he may.PRES.3SG.∃BOUL  
**trebati**            izreći            mišljenje da bi            bio            sretan.  
 ought.INF.∇TELEO express.INF opinion that be.COND be.PTCP happy  
*According to the wishes of the president, he is allowed to need to express his opinion to be happy.*

smjeti<sub>boul</sub> + trebati<sub>circum</sub>

- (143) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam according to his wishes. Among others, he says:

**Smijete**                      **trebati**                      piškiti.  
 may.PRES.2PL.∃BOUL ought.INF.∇CIRCUM pee.INF  
*You are allowed to need to pee.*

smjeti<sub>boul</sub> + smjeti<sub>deont</sub>

- (144) #Prema željama predsjednika on **smije** **smjeti**  
 according to wishes president he may.PRES.3SG.∃BOUL may.INF.∃DEONT  
 izreći mišljenje prema zakonu.  
 express.INF opinion according to law  
*According to the president's wishes, he may be allowed to express his opinion  
 according to the law.*

smjeti<sub>boul</sub> + smjeti<sub>boul</sub>

- (145) #Prema željama predsjednika on **smije** **smjeti**  
 according to wishes president he may.PRES.3SG.∃BOUL may.INF.∃BOUL  
 izreći mišljenje prema željama premijera.  
 express.INF opinion according to wishes prime minister  
*According to the president's wishes, he may be allowed to express his opinion  
 according to the prime minister's wishes.*

smjeti<sub>boul</sub> + smjeti<sub>teleo</sub>

- (146) #Prema željama predsjednika on **smije** **smjeti**  
 according to wishes president he may.PRES.3SG.∃BOUL may.INF.∃TELEO  
 izreći mišljenje da bi bio sretan.  
 express.INF opinion that be.COND be.PTCP happy  
*According to the president's wishes, he may be allowed to express his opinion to  
 be happy.*

smjeti<sub>boul</sub> + moći<sub>deont</sub>

- (147) #Prema željama predsjednika on **smije** **moći**  
 according to wishes president he may.PRES.3SG.∃BOUL may.INF.∃DEONT  
 izreći mišljenje prema pravilima.  
 express.INF opinion according to rules  
*According to the president's wishes, he may be allowed to express his opinion  
 according to the rules.*

smjeti<sub>boul</sub> + moći<sub>boul</sub>

- (148) #Prema željama predsjednika on **smije** **moći**  
 according to wishes president he may.PRES.3SG.∃BOUL may.INF.∃BOUL  
 izreći mišljenje prema željama premijera.  
 express.INF opinion according to wishes prime minister  
*According to the president's wishes, he may be allowed to express his opinion  
 according to the prime minister's wishes.*

smjeti<sub>boul</sub> + moći<sub>teleo</sub>

- (149) #Prema željama predsjednika on **smije** **moći**  
 according to wishes president he may.PRES.3SG.∃BOUL may.INF.∃TELEO  
 izreći mišljenje da bi bio sretan.  
 express.INF opinion that be.COND be.PTCP happy  
*According to the president's wishes, he may be allowed to express his opinion to be happy.*

smjeti<sub>boul</sub> + moći<sub>circum</sub>

- (150) Context: When Ivan rides his motorbike in his backyard, he follows his mother's wishes. Among her wishes there are some on the type and position of the helmet.
- Kaciga se **smije** **moći** vrtjeti oko  
 helmet self may.PRES.3SG.∃BOUL can.INF.∃CIRCUM revolve.INF around  
 glave.  
 head  
*It is allowed for the helmet to be able to swivel around on the head.*

smjeti<sub>teleo</sub> + morati<sub>deont</sub>

- (151) #Da bi bio sretan on **smije** **morati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO must.INF.∇DEONT  
 izreći mišljenje prema pravilima.  
 express.INF opinion according to rules  
*To be happy he is allowed to have to express his opinion according to the rules.*

smjeti<sub>teleo</sub> + morati<sub>boul</sub>

- (152) #Da bi bio sretan on **smije** **morati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO must.INF.∇BOUL  
 izreći mišljenje prema željama predsjednika.  
 express.INF opinion according to wishes president  
*To be happy he is allowed to have to express his opinion according to the president's wishes.*

smjeti<sub>teleo</sub> + morati<sub>teleo</sub>

- (153) #Da bi postigao svoj cilj on **smije**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO  
**morati** izreći mišljenje da bi bio sretan.  
 must.INF.∇TELEO express.INF opinion that be.COND be.PTCP happy  
*To achieve his goal he is allowed to have to express his opinion to be happy.*

smjeti<sub>teleo</sub> + morati<sub>circum</sub>

- (154) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam with the aim to get the best

grades. Among others, he says:

**Smijete**                      **morati**                      piškiti.  
 may.PRES.2PL.∃TELEO must.INF.∇CIRCUM pee.INF  
*You are allowed to have to pee.*

smjeti<sub>teleo</sub> + trebati<sub>deont</sub>

- (155) #Da bi                      bio                      sretan on **smije**                      **trebati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO ought.INF.∇DEONT  
 izreći                      mišljenje prema                      pravilima.  
 express.INF opinion according to rules  
*To be happy he is allowed to need to express his opinion according to the rules.*

smjeti<sub>teleo</sub> + trebati<sub>boul</sub>

- (156) #Da bi                      bio                      sretan on **smije**                      **trebati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO ought.INF.∇BOUL  
 izreći                      mišljenje prema                      željama predsjednika.  
 express.INF opinion according to wishes president  
*To be happy he is allowed to need to express his opinion according to the president's wishes.*

smjeti<sub>teleo</sub> + trebati<sub>teleo</sub>

- (157) #Da bi                      postigao                      svoj cilj on **smije**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO  
**trebati**                      izreći                      mišljenje da bi                      bio                      sretan.  
 ought.INF.∇TELEO express.INF opinion that be.COND be.PTCP happy  
*To achieve his goal he is allowed to have to express his opinion to be happy.*

smjeti<sub>teleo</sub> + trebati<sub>circum</sub>

- (158) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam with the aim to get the best grades. Among others, he says:

**Smijete**                      **trebati**                      piškiti.  
 may.PRES.2PL.∃TELEO ought.INF.∇CIRCUM pee.INF  
*You are allowed to need to pee.*

smjeti<sub>teleo</sub> + smjeti<sub>deont</sub>

- (159) #Da bi                      bio                      sretan on **smije**                      **smjeti**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃DEONT  
 izreći                      mišljenje prema                      pravilima.  
 express.INF opinion according to rules  
*To be happy he may be allowed to express his opinion according to the rules.*

---

 smjeti<sub>teleo</sub> + smjeti<sub>boul</sub>

- (160) #Da bi bio sretan on **smije** **smjeti**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃BOUL  
 izreći mišljenje prema željama predsjednika.  
 express.INF opinion according to wishes president  
*To be happy he may be allowed to express his opinion according to the president's wishes.*

---

 smjeti<sub>teleo</sub> + smjeti<sub>teleo</sub>

- (161) #Da bi postigao svoj cilj on **smije**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO  
**smjeti** izreći mišljenje da bi bio sretan.  
 may.INF.∃TELEO express.INF opinion that be.COND be.PTCP happy  
*To achieve his goal he may be allowed to express his opinion to be happy.*

---

 smjeti<sub>teleo</sub> + moći<sub>deont</sub>

- (162) #Da bi bio sretan on **smije** **moći**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃DEONT  
 izreći mišljenje prema pravilima.  
 express.INF opinion according to rules  
*To be happy he may be allowed to express his opinion according to the rules.*

---

 smjeti<sub>teleo</sub> + moći<sub>boul</sub>

- (163) #Da bi bio sretan on **smije** **moći**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃BOUL  
 izreći mišljenje prema željama predsjednika.  
 express.INF opinion according to wishes president  
*To be happy he may be allowed to express his opinion according to the president's wishes.*

---

 smjeti<sub>teleo</sub> + moći<sub>teleo</sub>

- (164) #Da bi postigao svoj cilj on **smije**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO  
**moći** izreći mišljenje da bi bio sretan.  
 may.INF.∃TELEO express.INF opinion that be.COND be.PTCP happy  
*To achieve his goal he may be allowed to express his opinion to be happy.*

---

 smjeti<sub>teleo</sub> + moći<sub>circum</sub>

- (165) Context: Since helmets are so tight and the air outside is fresh, with the aim to get the air in, one of the rules of riding the motorcycle is:

Kaciga se **smije** **moći** vrtjeti oko  
 helmet self may.PRES.3SG.∃TELEO can.INF.∃CIRCUM revolve.INF around  
 glave.  
 head

*It is allowed for the helmet to be able to swivel around on the head.*

## A.4 *Moći* as the first modal

**Table A.4:** Summary of restrictions for DMCs where *moći* is in the initial position (repeated from Chapter 3)

M2	M1			
	moći <sub>deont</sub>	moći <sub>boul</sub>	moći <sub>teleo</sub>	moći <sub>circum</sub>
morati <sub>deont</sub>	-	-	-	-
morati <sub>boul</sub>	-	-	-	-
morati <sub>teleo</sub>	-	-	-	-
morati <sub>circum</sub>	+	+	+	+
trebati <sub>deont</sub>	-	-	-	-
trebati <sub>boul</sub>	-	-	-	-
trebati <sub>teleo</sub>	-	-	-	-
trebati <sub>circum</sub>	+	+	+	+
smjeti <sub>deont</sub>	-	-	-	-
smjeti <sub>boul</sub>	-	-	-	-
smjeti <sub>teleo</sub>	-	-	-	-
moći <sub>deont</sub>	-	-	-	-
moći <sub>boul</sub>	-	-	-	-
moći <sub>teleo</sub>	-	-	-	-
moći <sub>circum</sub>	+	+	+	+

moći<sub>deont</sub> + morati<sub>deont</sub>

- (166) #Prema zakonu on **može** **morati** izreći  
 according to law he may.PRES.3SG.∃DEONT must.INF.∇DEONT express.INF  
 mišljenje prema pravilima.  
 opinion according to rules  
*According to the law, he is allowed to have to express his opinion according to the rules.*

moći<sub>deont</sub> + morati<sub>boul</sub>

- (167) #Prema zakonu on **može** **morati** izreći  
 according to law he may.PRES.3SG.∃DEONT must.INF.∇BOUL express.INF  
 mišljenje prema predsjednikovim željama.  
 opinion according to president's wishes

*According to the law, he is allowed to have to express his opinion according to the president's wishes.*

---

moći<sub>deont</sub> + morati<sub>teleo</sub>

- (168) #Prema zakonu on **može** **morati** izreći  
 according to law he may.PRES.3SG.∃DEONT must.INF.∇TELEO express.INF  
 mišljenje da bi bio sretan.  
 opinion that be.COND be.PTCP happy  
*According to the law, he is allowed to have to express his opinion to be happy.*

---

moći<sub>deont</sub> + morati<sub>circum</sub>

- (169) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam. Among others, he says:  
**Možete morati** piškiti.  
 may.PRES.2PL.∃DEONT must.INF.∇CIRCUM pee.INF  
*You are allowed to have to pee.*

---

moći<sub>deont</sub> + trebati<sub>deont</sub>

- (170) #Prema zakonu on **može** **trebati** izreći  
 according to law he may.PRES.3SG.∃DEONT ought.INF.∇DEONT express.INF  
 mišljenje prema pravilima posla.  
 opinion according to rules job  
*According to the law, he is allowed to need to express his opinion according to the rules of the job.*

---

moći<sub>deont</sub> + trebati<sub>boul</sub>

- (171) #Prema zakonu on **može** **trebati** izreći  
 according to law he may.PRES.3SG.∃DEONT ought.INF.∇BOUL express.INF  
 mišljenje prema predsjednikovim željama.  
 opinion according to president's wishes  
*According to the law, he is allowed to need to express his opinion according to the president's wishes.*

---

moći<sub>deont</sub> + trebati<sub>teleo</sub>

- (172) #Prema zakonu on **može** **trebati** izreći  
 according to law he may.PRES.3SG.∃DEONT ought.INF.∇TELEO express.INF  
 mišljenje da bi bio sretan.  
 opinion that be.COND be.PTCP happy  
*According to the law, he is allowed to have to express his opinion to be happy.*
-

moći<sub>deont</sub> + trebati<sub>circum</sub>

- (173) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam. Among others, he says:

**Možete**                      **trebati**                      piškiti.  
 may.PRES.2PL.∃DEONT ought.INF.∀CIRCUM pee.INF  
*You are allowed to need to pee.*

moći<sub>deont</sub> + smjeti<sub>deont</sub>

- (174) #Prema              zakonu on **može**                      **smjeti**                      izreći  
 according to law      he may.PRES.3SG.∃DEONT may.INF.∃DEONT express.INF  
 mišljenje prema              pravilima posla.  
 opinion according to rules      job  
*According to the law, he may be allowed to express his opinion according to the rules of the job.*

moći<sub>deont</sub> + smjeti<sub>boul</sub>

- (175) #Prema              zakonu on **može**                      **smjeti**                      izreći  
 according to law      he may.PRES.3SG.∃DEONT may.INF.∃BOUL express.INF  
 mišljenje prema              predsjednikovim željama.  
 opinion according to president's      wishes  
*According to the law, he may be allowed to express his opinion according to the president's wishes.*

moći<sub>deont</sub> + smjeti<sub>teleo</sub>

- (176) #Prema              zakonu on **može**                      **smjeti**                      izreći  
 according to law      he may.PRES.3SG.∃DEONT may.INF.∃TELEO express.INF  
 mišljenje da bi              bio              sretan.  
 opinion that be.COND be.PTCP happy  
*According to the law, he may be allowed to express his opinion to be happy.*

moći<sub>deont</sub> + moći<sub>deont</sub>

- (177) #Prema              zakonu kaciga se **može**                      **moći**  
 according to law      helmet self may.PRES.3SG.∃DEONT may.INF.∃DEONT  
 vrtjeti oko glave prema              pravilima posla.  
 revolve.INF around head according to rules      job  
*According to the law, it is allowed for the helmet to may swivel around on the head according to the rules of the job.*

moći<sub>deont</sub> + moći<sub>boul</sub>

- (178) #Prema zakonu kaciga se **može** **moći**  
 according to law helmet self may.PRES.3SG.∃DEONT may.INF.∃BOUL  
 vrtjeti oko glave prema predsjednikovim željama.  
 revolve.INF around head according to president's wishes  
*According to the law, it is allowed for the helmet to may swivel around on the head according to the president's wishes.*

---

moći<sub>deont</sub> + moći<sub>teleo</sub>

- (179) #Prema zakonu kaciga se **može** **moći**  
 according to law helmet self may.PRES.3SG.∃DEONT may.INF.∃TELEO  
 vrtjeti oko glave da bi vožnja bila ugodna.  
 revolve.INF around head that be.COND ride be.PTCP comfortable  
*According to the law, it is allowed for the helmet to may swivel around on the head to make the ride comfortable.*

---

moći<sub>deont</sub> + moći<sub>circum</sub>

- (180) Context: The online student system is set up in such a way that the student is the only one who is able to see their grades. It says on the university website:  
 Samo student **može** **moći** vidjeti svoje  
 only student may.PRES.3SG.∃DEONT can.INF.∃CIRCUM see.INF their  
 ocjene na temelju pravila fakulteta.  
 grades on basis rules faculty  
*It is permitted only for the student to be able to see their grades on the basis of the faculty rules.*

---

moći<sub>boul</sub> + morati<sub>deont</sub>

- (181) #Prema predsjednikovim željama on **može**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**morati** izreći mišljenje prema pravilima.  
 must.INF.∇DEONT express.INF opinion according to rules  
*According to the president's wishes, he is allowed to have to express his opinion according to the rules.*

---

moći<sub>boul</sub> + morati<sub>boul</sub>

- (182) #Prema predsjednikovim željama on **može**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**morati** izreći mišljenje prema željama premijera.  
 must.INF.∇BOUL express.INF opinion according to wishes prime minister  
*According to the president's wishes, he is allowed to have to express his opinion according to the prime minister's wishes.*

---

moći<sub>boul</sub> + morati<sub>teleo</sub>

- (183) #Prema predsjednikovim željama on **može**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**morati** izreći mišljenje da bi bio sretan.  
 must.INF.∇TELEO express.INF opinion that be.COND be.PTCP happy  
*According to the president's wishes, he is allowed to have to express his opinion to be happy.*

moći<sub>boul</sub> + morati<sub>circum</sub>

- (184) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam according to his wishes. Among others, he says:

**Možete morati piškiti.**  
 may.PRES.2PL.∃BOUL must.INF.∇CIRCUM pee.INF  
*You are allowed to have to pee.*

moći<sub>boul</sub> + trebati<sub>deont</sub>

- (185) #Prema predsjednikovim željama on **može**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**trebati** izreći mišljenje prema pravilima.  
 ought.INF.∇DEONT express.INF opinion according to rules  
*According to the president's wishes, he is allowed to need to express his opinion according to the rules.*

moći<sub>boul</sub> + trebati<sub>boul</sub>

- (186) #Prema predsjednikovim željama on **može**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**trebati** izreći mišljenje prema željama premijera.  
 ought.INF.∇BOUL express.INF opinion according to wishes prime minister  
*According to the president's wishes, he is allowed to need to express his opinion according to the prime minister's wishes.*

moći<sub>boul</sub> + trebati<sub>teleo</sub>

- (187) #Prema predsjednikovim željama on **može**  
 according to president's wishes he may.PRES.3SG.∃BOUL  
**trebati** izreći mišljenje da bi bio sretan.  
 ought.INF.∇TELEO express.INF opinion that be.COND be.PTCP happy  
*According to the president's wishes, he is allowed to need to express his opinion to be happy.*

moći<sub>boul</sub> + trebati<sub>circum</sub>

- (188) Context: Just before the exam, the teacher is naming all the things the students

are and are not allowed to do during the exam according to his wishes. Among others, he says:

**Možete**                      **trebati**                      piškiti.  
 may.PRES.2PL.∃BOUL ought.INF.∀CIRCUM pee.INF  
*You are allowed to need to pee.*

moći<sub>boul</sub> + smjeti<sub>deont</sub>

- (189) #Prema            predsjednikovim željama on **može**  
 according to president's            wishes he may.PRES.3SG.∃BOUL  
**smjeti**                      izreći            mišljenje prema            pravilima.  
 may.INF.∃DEONT express.INF opinion according to rules  
*According to the president's wishes, he may be allowed to express his opinion according to the rules.*

moći<sub>boul</sub> + smjeti<sub>boul</sub>

- (190) #Prema            predsjednikovim željama on **može**  
 according to president's            wishes he may.PRES.3SG.∃BOUL  
**smjeti**                      izreći            mišljenje prema            željama premijera.  
 may.INF.∃BOUL express.INF opinion according to wishes prime minister  
*According to the president's wishes, he may be allowed to express his opinion according to the prime minister's wishes.*

moći<sub>boul</sub> + smjeti<sub>teleo</sub>

- (191) #Prema            predsjednikovim željama on **može**  
 according to president's            wishes he may.PRES.3SG.∃BOUL  
**smjeti**                      izreći            mišljenje da bi            bio            sretan.  
 may.INF.∃TELEO express.INF opinion that be.COND be.PTCP happy  
*According to the president's wishes, he may be allowed to express his opinion to be happy.*

moći<sub>boul</sub> + moći<sub>deont</sub>

- (192) #Prema            predsjednikovim željama on **može**  
 according to president's            wishes he may.PRES.3SG.∃BOUL  
**moći**                      izreći            mišljenje prema            pravilima.  
 must.INF.∃DEONT express.INF opinion according to rules  
*According to the president's wishes, he may be allowed to express his opinion according to the rules.*

moći<sub>boul</sub> + moći<sub>boul</sub>

- (193) #Prema            predsjednikovim željama on **smije**  
 according to president's            wishes he may.PRES.3SG.∃BOUL

**moći**            izreći            mišljenje prema            željama premijera.  
 must.INF.∃BOUL express.INF opinion according to wishes prime minister  
*According to the president's wishes, he may be allowed to express his opinion  
 according to the prime minister's wishes.*

$moći_{boul} + moći_{teleo}$

- (194) #Prema            predsjednikovim željama on **može**  
 according to president's            wishes he may.PRES.3SG.∃BOUL  
**moći**            izreći            mišljenje da bi            bio            sretan.  
 must.INF.∃TELEO express.INF opinion that be.COND be.PTCP happy  
*According to the president's wishes, he may be allowed to express his opinion to  
 be happy.*

$moći_{boul} + moći_{circum}$

- (195) Context: The online student system is set up in such a way that it is possible  
 for the student, parent and the teacher to see students grades. The teacher  
 decides whether they will allow for the parents to see the grades.  
 Samo student **može**            **moći**            vidjeti svoje  
 only student may.PRES.3SG.∃BOUL can.INF.∃CIRCUM see.INF their  
 ocjene.  
 grades  
*It is permitted only for the student to be able to see their grades.*

$moći_{teleo} + morati_{deont}$

- (196) #Da bi            bio            sretan on **može**            **morati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO must.INF.∇DEONT  
 izreći            mišljenje prema            pravilima.  
 express.INF opinion according to rules  
*To be happy he is allowed to have to express his opinion according to the rules.*

$moći_{teleo} + morati_{boul}$

- (197) #Da bi            bio            sretan on **može**            **morati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO must.INF.∇BOUL  
 izreći            mišljenje prema            željama predsjednika.  
 express.INF opinion according to wishes president  
*To be happy he is allowed to have to express his opinion according to the  
 president's wishes.*

$moći_{teleo} + morati_{teleo}$

- (198) #Da bi            postigao            svoj cilj on **može**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO

**morati**            izreći            mišljenje da    bi            bio            sretan.  
 must.INF.∇TELEO express.INF opinion    that be.COND be.PTCP happy  
*To achieve his goal he is allowed to have to express his opinion to be happy.*

moći<sub>teleo</sub> + morati<sub>circum</sub>

- (199) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam with the aim to get the best grades. Among others, he says:

**Možete**                            **morati**                            piškiti.  
 may.PRES.2PL.∃TELEO must.INF.∇CIRCUM pee.INF  
*You are allowed to have to pee.*

moći<sub>teleo</sub> + trebati<sub>deont</sub>

- (200) #Da bi            bio            sretan on **smije**                            **trebati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO ought.INF.∇DEONT  
 izreći            mišljenje prema            pravilima.  
 express.INF opinion according to rules  
*To be happy he is allowed to need to express his opinion according to the rules.*

moći<sub>teleo</sub> + trebati<sub>boul</sub>

- (201) #Da bi            bio            sretan on **može**                            **trebati**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO ought.INF.∇BOUL  
 izreći            mišljenje prema            predsjednikovim željama.  
 express.INF opinion according to president's wishes  
*To be happy he is allowed to need to express his opinion according to the president's wishes.*

moći<sub>teleo</sub> + trebati<sub>teleo</sub>

- (202) #Da bi            postigao            svoj cilj on **može**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO  
**trebati**            izreći            mišljenje da    bi            bio            sretan.  
 ought.INF.∇TELEO express.INF opinion    that be.COND be.PTCP happy  
*To achieve his goal he is allowed to need to express his opinion to be happy.*

moći<sub>teleo</sub> + trebati<sub>circum</sub>

- (203) Context: Just before the exam, the teacher is naming all the things the students are and are not allowed to do during the exam with the aim to get the best grades. Among others, he says:

**Možete**                            **trebati**                            piškiti.  
 may.PRES.2PL.∃TELEO ought.INF.∇CIRCUM pee.INF  
*You are allowed to need to pee.*

---

moći<sub>teleo</sub> + smjeti<sub>deont</sub>

- (204) #Da bi bio sretan on **može** **smjeti**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃DEONT  
 izreći mišljenje prema pravilima.  
 express.INF opinion according to rules  
*To be happy he may be allowed to express his opinion according to the rules.*

---

moći<sub>teleo</sub> + smjeti<sub>boul</sub>

- (205) #Da bi bio sretan on **može** **smjeti**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃BOUL  
 izreći mišljenje prema željama predsjednika.  
 express.INF opinion according to wishes president  
*To be happy he may be allowed to express his opinion according to the president's wishes.*

---

moći<sub>teleo</sub> + smjeti<sub>teleo</sub>

- (206) #Da bi postigao svoj cilj on **može**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO  
**smjeti** izreći mišljenje da bi bio sretan.  
 may.INF.∃TELEO express.INF opinion to be.COND be.PTCP happy  
*To achieve his goal he may be allowed to express his opinion to be happy.*

---

moći<sub>teleo</sub> + moći<sub>deont</sub>

- (207) #Da bi bio sretan on **može** **moći**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃DEONT  
 izreći mišljenje prema pravilima.  
 express.INF opinion according to rules  
*To be happy he may be allowed to express his opinion according to the rules.*

---

moći<sub>teleo</sub> + moći<sub>boul</sub>

- (208) #Da bi bio sretan on **može** **moći**  
 that be.COND be.PTCP happy he may.PRES.3SG.∃TELEO may.INF.∃BOUL  
 izreći mišljenje prema željama predsjednika.  
 express.INF opinion according to wishes president  
*To be happy he may be allowed to express his opinion according to the president's wishes.*

---

moći<sub>teleo</sub> + moći<sub>teleo</sub>

- (209) #Da bi postigao svoj cilj on **može**  
 that be.COND achieve.PTCP self goal he may.PRES.3SG.∃TELEO



Djeca **mogu** **morati** piškiti.  
 children can.PRES.3SG.∃CIRCUM must.INF.∀CIRCUM pee.INF  
*It is possible for the kids to have to pee.*

moći<sub>circum</sub> + trebati<sub>deont</sub>

- (215) #Ivan **može** **trebati** pospremiti sobu  
 Ivan can.PRES.3SG.∃CIRCUM ought.INF.∀DEONT clean.INF room  
 prema pravilima.  
 according to rules  
*It is possible for Ivan to need to clean the room according to the rules./ Ivan is able to need to clean the room according to the rules.*

moći<sub>circum</sub> + trebati<sub>boul</sub>

- (216) #Ivan **može** **trebati** pospremiti sobu prema  
 Ivan can.PRES.3SG.∃CIRCUM ought.INF.∀BOUL clean.INF room according to  
 željama majke.  
 wishes mother  
*It is possible for Ivan to need to clean the room according to his mother's wishes./ Ivan is able to need to clean the room according to his mother's wishes.*

moći<sub>circum</sub> + trebati<sub>teleo</sub>

- (217) #Ivan **može** **trebati** pospremiti sobu da  
 Ivan can.PRES.3SG.∃CIRCUM ought.INF.∀TELEO clean.INF room that  
 bi dobio čokoladu.  
 be.COND get.PTCP chocolate  
*It is possible for Ivan to need to clean the room to get a chocolate./ Ivan is able to need to clean the room to get a chocolate.*

moći<sub>circum</sub> + trebati<sub>circum</sub>

- (218) Context: A group is going bird watching. Their leader tells everyone not to make a sound when they get close to a bird. Someone says:  
 Alergičari **mogu** **trebati** kihnuti.  
 allergy-sufferers can.PRES.3PL.∃CIRCUM ought.INF.∀CIRCUM sneeze.INF  
*It is possible that the allergy sufferers will need to sneeze.*

moći<sub>circum</sub> + smjeti<sub>deont</sub>

- (219) #Ivan **može** **smjeti** otvoriti vrata prema  
 Ivan can.PRES.3SG.∃CIRCUM may.INF.∃DEONT open.INF door according to  
 pravilima.  
 rules

*It is possible for Ivan to be allowed to clean the room according to the rules./  
Ivan is able to be allowed to clean the room according to the rules.*

moći<sub>circum</sub> + smjeti<sub>boul</sub>

- (220) #Ivan **može** **smjeti** otvoriti vrata prema  
 Ivan can.PRES.3SG.∃CIRCUM may.INF.∃BOUL open.INF door according to  
 željama majke.  
 wishes mother  
*It is possible for Ivan to be allowed to clean the room according to his mother's  
 wishes./ Ivan is able to be allowed to clean the room according to his mother's  
 wishes.*

moći<sub>circum</sub> + smjeti<sub>teleo</sub>

- (221) #Ivan **može** **smjeti** otvoriti vrata da bi  
 Ivan can.PRES.3SG.∃CIRCUM may.INF.∃TELEO open.INF door that be.COND  
 dobio čokoladu.  
 get.PTCP chocolate  
*It is possible for Ivan to be allowed to clean the room to get a chocolate./ Ivan  
 is able to be allowed to clean the room to get a chocolate.*

moći<sub>circum</sub> + moći<sub>deont</sub>

- (222) #Ivan **može** **moći** otvoriti vrata prema  
 Ivan can.PRES.3SG.∃CIRCUM may.INF.∃DEONT open.INF door according to  
 pravilima.  
 rules  
*It is possible for Ivan to be allowed to clean the room to get a chocolate./ Ivan  
 is able to be allowed to clean the room to get a chocolate.*

moći<sub>circum</sub> + moći<sub>boul</sub>

- (223) #Ivan **može** **moći** otvoriti vrata prema  
 Ivan can.PRES.3SG.∃CIRCUM may.INF.∃BOUL open.INF door according to  
 željama majke.  
 wishes mother  
*It is possible for Ivan to be allowed to clean the room according to his mother's  
 wishes./ Ivan is able to be allowed to clean the room according to his mother's  
 wishes.*

moći<sub>circum</sub> + moći<sub>teleo</sub>

- (224) #Ivan **može** **moći** otvoriti vrata da bi  
 Ivan can.PRES.3SG.∃CIRCUM may.INF.∃TELEO open.INF door that be.COND

dobio čokoladu.

get.PTCP chocolate

*It is possible for Ivan to be allowed to clean the room to get a chocolate./ Ivan is able to be allowed to clean the room to get a chocolate.*

$\text{moći}_{\text{circum}} + \text{moći}_{\text{circum}}$

- (225) Context: There is a hole in the wall. Ana says no human can pass through it because it is too small, and Ivan replies:

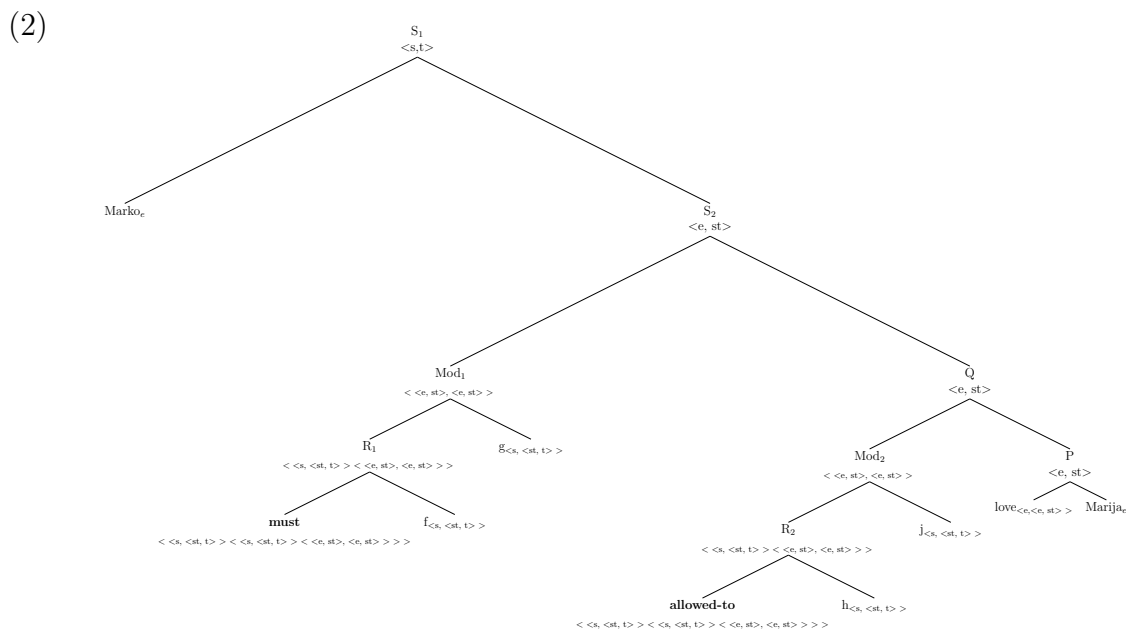
Djeca **moгу** **moći** proći kroz  
 children can.PRES.3PL.∃CIRCUM can.INF.∃CIRCUM pass.INF through  
 tu rupu.  
 that hole

*It is possible for children to be able to pass through that hole.*

# B

## A sample derivation of a non-epistemic DMC example

- (1) Marko **mora** **smjeti** voljeti Mariju.  
 student must.PRES.3SG.∀PRIO may.INF.∃PRIO love Marija  
*Marko must be allowed to love Marija.*



- (3)  $[[\mathbf{must}_{priority}]]^w = \lambda f_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}_{g(w)}(\cap f(w)): Q(x)(w')=1.$
- (4)  $[[\mathbf{allowed-to}_{priority}]]^w = \lambda h_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda j_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda P_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \exists w' \in \text{Best}_{g(w)}(\cap f(w)): P(x)(w')=1.$
- (5)  $[[f]] = \lambda w_s \cdot \lambda w'_s \cdot \lambda p_t \cdot p$  is one of the circumstances in  $w$  compatible with circumstances in  $w'$

- (6)  $[[\mathbf{h}]] = \lambda w_s. \lambda w'_s. \lambda r_t. r$  is one of the circumstances in  $w$  compatible with circumstances in  $w'$
- (7)  $[[\mathbf{g}]] = \lambda w_s. \lambda w'_s. \lambda q_t. q$  is one of the regulations in  $w$  followed in  $w'$
- (8)  $[[\mathbf{j}]] = \lambda w_s. \lambda w'_s. \lambda v_t. v$  is one of the regulations in  $w$  followed in  $w'$
- (9) Ordering source: For all worlds  $w$  and  $z \in W$ :  $w \leq_A z$  iff  $\{ p: p \in A \text{ and } z \in p \} \subseteq \{ p: p \in A \text{ and } w \in p \}$
- (10) Modal base:  $\cap f(w@) = f_1 \cap f_2 \cap f_3 \cap f_4 \cap f_5 = \{w@, w_1, w_2, w_3, w_7, w_{15}, w_{20}\}$
- (11)  $[[\mathbf{love}]] = \lambda y_e. \lambda x_e. \lambda w_s. x$  loves  $y$  in  $w$
- (12)  $[[\mathbf{Marija}]] = \text{Marija}$
- (13)  $[[\mathbf{Marko}]] = \text{Marko}$
- (14)  $[[\mathbf{P}]] = [[\mathbf{love}]] [[\mathbf{Marija}]]$   
 $= [\lambda y_e. \lambda x_e. \lambda w_s. x \text{ loves } y \text{ in } w] (\text{Marija})$   
 $= \lambda x_e. \lambda w_s. x \text{ loves Marija in } w$
- (15)  $[[\mathbf{R}_2]] = [[\mathbf{allowed-to}]] [[\mathbf{h}]]$   
 $= [\lambda h_{\langle s, \langle st, t \rangle \rangle}. \lambda j_{\langle s, \langle st, t \rangle \rangle}. \lambda P_{\langle e, st \rangle}. \lambda x_e. \lambda w_s. \exists w' \in \text{Best}_{j(w)}(\cap h(w)):$   
 $P(x)(w')=1] (\lambda w_s. \lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w')$   
 $= \lambda j_{\langle s, \langle st, t \rangle \rangle}. \lambda P_{\langle e, st \rangle}. \lambda x_e. \lambda w_s. \exists w' \in \text{Best}_{j(w)}([\lambda w_s. \lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w'](w)):$   
 $P(x)(w')=1$   
 $= \lambda j_{\langle s, \langle st, t \rangle \rangle}. \lambda P_{\langle e, st \rangle}. \lambda x_e. \lambda w_s. \exists w' \in \text{Best}_{j(w)}(\lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w') \text{ such that } P(x)(w')=1$
- (16)  $[[\mathbf{Mod}_2]] = [[\mathbf{R}_2]] [[\mathbf{j}]]$   
 $= [\lambda j_{\langle s, \langle st, t \rangle \rangle}. \lambda P_{\langle e, st \rangle}. \lambda x_e. \lambda w_s. \exists w' \in \text{Best}_{j(w)}(\lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w'): P(x)(w')=1]$   
 $(\lambda w_s. \lambda w'_s. \lambda v_t. v \text{ is one of the regulations in } w \text{ followed in } w')$   
 $= \lambda P_{\langle e, st \rangle}. \lambda x_e. \lambda w_s. \exists w' \in \text{Best}[\lambda w_s. \lambda w'_s. \lambda v_t. v \text{ is one of the regulations in } w \text{ followed in } w'](w)(\lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w'): P(x)(w')=1$   
 $= \lambda P_{\langle e, st \rangle}. \lambda x_e. \lambda w_s. \exists w' \in \text{Best}[\lambda w'_s. \lambda v_t. v \text{ is one of the regulations in } w \text{ followed in } w'](w)(\lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w') \text{ such that } P(x)(w')=1$
- (17)  $[[\mathbf{Q}]] = [[\mathbf{Mod}_2]] [[\mathbf{P}]]$   
 $= [\lambda P_{\langle e, st \rangle}. \lambda x_e. \lambda w_s. \exists w' \in \text{Best}[\lambda w'_s. \lambda v_t. v \text{ is one of the regulations in } w \text{ followed in } w'](w)(\lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w'): P(x)(w')=1] (\lambda x_e. \lambda w_s. x \text{ loves Marija in } w)$   
 $= \lambda x_e. \lambda w_s. \exists w' \in \text{Best}[\lambda w'_s. \lambda v_t. v \text{ is one of the regulations in } w \text{ followed in } w'](w)(\lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with circumstances in } w'): [\lambda x_e. \lambda w_s. x \text{ loves Marija in } w](x)(w')=1$   
 $= \lambda x_e. \lambda w_s. \exists w' \in \text{Best}[\lambda w'_s. \lambda v_t. v \text{ is one of the regulations in } w \text{ followed in } w'](w)(\lambda w'_s. \lambda r_t. r \text{ is one of the circumstances in } w \text{ compatible with$

circumstances in  $w'$ ) such that  $x$  loves Marija in  $w'$

$$\begin{aligned}
 (18) \quad & \llbracket \mathbf{R}_1 \rrbracket = \llbracket \mathbf{must} \rrbracket \llbracket \mathbf{f} \rrbracket \\
 & = [\lambda f_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}_{g(w)}(\cap f(w)) : \\
 & \quad Q(x)(w')=1] (\lambda w_s \cdot \lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of the circumstances in } w \text{ compatible} \\
 & \quad \text{with circumstances in } w') \\
 & = \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}_{g(w)}([\lambda w_s \cdot \lambda w'_s \cdot \lambda p_t \cdot p \text{ is} \\
 & \quad \text{one of the circumstances in } w \text{ compatible with circumstances in } w'](w)) : \\
 & \quad Q(x)(w')=1 \\
 & = \lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}_{g(w)}(\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of} \\
 & \quad \text{the circumstances in } w \text{ compatible with circumstances in } w') \text{ such that} \\
 & \quad Q(x)(w')=1
 \end{aligned}$$

$$\begin{aligned}
 (19) \quad & \llbracket \mathbf{Mod}_1 \rrbracket = \llbracket \mathbf{R}_1 \rrbracket \llbracket \mathbf{g} \rrbracket \\
 & = [\lambda g_{\langle s, \langle st, t \rangle \rangle} \cdot \lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}_{g(w)}(\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of} \\
 & \quad \text{the circumstances in } w \text{ compatible with circumstances in } w') : Q(x)(w')=1] \\
 & \quad (\lambda w_s \cdot \lambda w'_s \cdot \lambda q_t \cdot q \text{ is one of the regulations in } w \text{ followed in } w') \\
 & = \lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}[\lambda w_s \cdot \lambda w'_s \cdot \lambda q_t \cdot q \text{ is one of the regulations} \\
 & \quad \text{in } w \text{ followed in } w'](w) (\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of the circumstances in } w \\
 & \quad \text{compatible with circumstances in } w') : Q(x)(w')=1] \\
 & = \lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}[\lambda w'_s \cdot \lambda q_t \cdot q \text{ is one of the regulations} \\
 & \quad \text{followed in } w'](\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of the circumstances in } w \text{ compatible} \\
 & \quad \text{with circumstances in } w') \text{ such that } Q(x)(w')=1
 \end{aligned}$$

$$\begin{aligned}
 (20) \quad & \llbracket \mathbf{S}_2 \rrbracket = \llbracket \mathbf{Mod}_1 \rrbracket \llbracket \mathbf{Q} \rrbracket \\
 & = [\lambda Q_{\langle e, st \rangle} \cdot \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}[\lambda w'_s \cdot \lambda q_t \cdot q \text{ is one of the regulations} \\
 & \quad \text{followed in } w'](\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of the circumstances in } w \text{ compatible with} \\
 & \quad \text{circumstances in } w') \text{ such that } Q(x)(w')=1] (\lambda x_e \cdot \lambda w_s \cdot \exists w' \in \text{Best}[\lambda w'_s \cdot \lambda v_t \cdot v \\
 & \quad \text{is one of the regulations in } w \text{ followed in } w'](\lambda w'_s \cdot \lambda r_t \cdot r \text{ is one of the} \\
 & \quad \text{circumstances in } w \text{ compatible with circumstances in } w') \text{ such that } x \text{ loves} \\
 & \quad \text{Marija in } w') \\
 & = \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}[\lambda w'_s \cdot \lambda q_t \cdot q \text{ is one of the regulations in } w \text{ followed} \\
 & \quad \text{in } w'](\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of the circumstances in } w \text{ compatible with} \\
 & \quad \text{circumstances in } w') \text{ such that } [\lambda x_e \cdot \lambda w_s \cdot \exists w' \in \text{Best}[\lambda w'_s \cdot \lambda v_t \cdot v \text{ is one of the} \\
 & \quad \text{regulations in } w \text{ followed in } w'](\lambda w'_s \cdot \lambda r_t \cdot r \text{ is one of the circumstances} \\
 & \quad \text{in } w \text{ compatible with circumstances in } w') \text{ such that } x \text{ loves Marija in} \\
 & \quad w'](x)(w')=1 \\
 & = \lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}[\lambda w'_s \cdot \lambda q_t \cdot q \text{ is one of the regulations in } w \text{ followed} \\
 & \quad \text{in } w'](\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of the circumstances in } w \text{ compatible with} \\
 & \quad \text{circumstances in } w') \text{ such that } x \text{ loves Marija in some } w' \in \text{Best}[\lambda w'_s \cdot \lambda v_t \cdot v \\
 & \quad \text{is one of the regulations in } w \text{ followed in } w'](\lambda w'_s \cdot \lambda r_t \cdot r \text{ is one of the} \\
 & \quad \text{circumstances in } w \text{ compatible with circumstances in } w')
 \end{aligned}$$

$$\begin{aligned}
 (21) \quad & \llbracket \mathbf{S}_1 \rrbracket = \llbracket \mathbf{S}_2 \rrbracket \llbracket \mathbf{Marko} \rrbracket \\
 & = [\lambda x_e \cdot \lambda w_s \cdot \forall w' \in \text{Best}[\lambda w'_s \cdot \lambda q_t \cdot q \text{ is one of the regulations in } w \text{ followed} \\
 & \quad \text{in } w'](\lambda w'_s \cdot \lambda p_t \cdot p \text{ is one of the circumstances in } w \text{ compatible with} \\
 & \quad \text{circumstances in } w') \text{ such that } x \text{ loves Marija in some } w' \in \text{Best}[\lambda w'_s \cdot \lambda v_t \cdot v \\
 & \quad \text{is one of the regulations in } w \text{ followed in } w'](\lambda w'_s \cdot \lambda r_t \cdot r \text{ is one of the}
 \end{aligned}$$

circumstances in  $w$  compatible with circumstances in  $w'$ ] (Marko)  
=  $\lambda_{w_s}$ .  $\forall w' \in \text{Best}[\lambda_{w'_s}$ .  $\lambda_{q_t}$ .  $q$  is one of the regulations in  $w$  followed in  $w'$ ]( $\lambda_{w'_s}$ .  $\lambda_{p_t}$ .  $p$  is one of the circumstances in  $w$  compatible with circumstances in  $w'$ ) such that Marko loves Marija in some  $w' \in \text{Best}[\lambda_{w'_s}$ .  $\lambda_{v_t}$ .  $v$  is one of the regulations in  $w$  followed in  $w'$ ]( $\lambda_{w'_s}$ .  $\lambda_{r_t}$ .  $r$  is one of the circumstances in  $w$  compatible with circumstances in  $w'$ )

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