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Semantic restrictions on modal auxiliary combinations: Evidence from Croatian double modal constructions*

Even though single modal auxiliaries have often been the main and only focus of literature on modality, Croatian data shows that modal auxiliaries show interesting restrictions when they occur in layered constructions. This paper examines double modal constructions in Croatian and their semantic restrictions. The result of the study is a hierarchical analysis, which regards modal force and flavour as the crucial factors behind semantic restrictions under which modal auxiliaries combine. Croatian data shows that epistemics can embed non-epistemics, but not vice versa. Within the non-epistemic group, the priority flavour scopes over the circumstantial group, within which pure possibility scopes over ability and disposition. On the other hand, regarding the modal force, data shows that necessity scopes over possibility, but only in combinations of modals conveying the same flavour. This analysis also challenges some of the traditional assumptions on modal flavours.

Key words: layered modality; modal flavour; modal force; Croatian.

1. Introduction

Modal meaning can be conveyed by different types of modal expressions, such as *must*, *might*, *have to*, *be able to*, *possibly*, *necessarily*. These can differ in modal force and flavour. As for the former, modal expressions can express either necessi-

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ty or possibility. For instance, *must* expresses necessity, while *might* expresses possibility.¹ The latter refers to a variety of interpretations of modal expressions, such as epistemic (based on evidence), deontic (based on rules), circumstantial (based on circumstances) (Von Fintel 2006).² In English, one modal element can express a variety of modal flavours, depending on the context. For instance:

- (1) a. epistemic: *This **must** be your wife.* (given what is known)
 - b. deontic: *You **must** eat everything.* (given a body of rules)
- (adapted from Von Fintel (2006: 2))

These different types of modal expressions can be stacked on top of each other, like in examples (2) and (3):

- (2) *John **might possibly** be studying.*
- (3) *John **might be able to** be studying.*³

Example (2) combines a modal auxiliary and a modal adverb. These combinations are generally acceptable. They often result in a modal concord reading (Geurts & Huitink 2006; Zeijlstra 2007; Huitink 2012), where only one modal operator is interpreted if both modal elements have the same force and flavour. This is the case with (2), where both *might* and *possibly* convey epistemicity and possibility.⁴ On the other hand, example (3) shows that one type of verbal modality can embed another type of verbal modality. These structures cannot have a modal concord reading. For example, in (3) *might* is epistemic, and *to be able to* is circumstantial.

¹ Crucially, English modal elements can express only one modal force. 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; unlike in some other languages analysed in Rullmann et al. (2008) and Deal (2011), i.e. *St'aimcets* and *Nez Perce*.

² 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. 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 source can be deontic, teleological, bouletic, or epistemic. For example, a deontic ordering source contains rules according to which the possible worlds from the modal base are ordered (Kratzer 2012).

³ These examples are my own but the assumptions are based on the literature on modal concord (Geurts & Huitink 2006; Zeijlstra 2007; Huitink 2012), as well as on the literature on English double modals (Battistella 1995; Close 2004; Elsmann & Dubinsky 2009; Hasty 2012).

⁴ Alternatively, if they are not of the same force and flavour, their interpretation has to be cumulative/compositional, as in *Maybe Mary has to leave*, where *maybe* is a possibility epistemic modal adverb and *to have to* is a deontic necessity modal auxiliary (Zeijlstra 2007: 317).



Furthermore, the verbal-verbal combination seems to be possible only with a modal auxiliary embedding a semi-modal verb.⁵ If the semi-modal *be able to* is replaced with its modal auxiliary equivalent *can*, the structure is no longer grammatical in standard English:

(4) **John might can be studying.*

While it is generally claimed (ever since Chomsky (1957) and Akmajian (1979)) that two modal auxiliaries cannot combine in standard English and that a modal auxiliary can only embed a non-modal verb, it has been shown that double modal constructions (DMCs) are possible in some non-standard dialects of Southern American English (Di Paolo 1989; Battistella 1995; Hasty 2012). Compare (5), where *might* expresses the epistemic flavour, and *can* the circumstantial flavour:

(5) *We might can go up there next Saturday.* (Di Paolo 1989: 195)

Cross-linguistically, however, English is an outlier, and yet the main body of research remains on DMCs in English. Oddly, other languages seem to be fairly under-researched even though DMCs are neither rare, nor stigmatised, but rather quite standard. For instance, Croatian DMCs occur often, without any dialectal markedness, and in many different combinations. In (6), the first modal is an epistemic modal, while the second modal is a non-epistemic modal. The opposite order is not acceptable, as shown in example (7).⁶

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

Mora *biti* *da* *psi* *moгу* *plivati.*
 must.PRS.3SG. \forall EPI be.INF that dogs can.PRS.3PL. \exists NON-EPI swim.INF
 ‘It must be that dogs are able to swim.’

(7) **Psi moraju* *može* *biti*
 dogs must.PRS.3PL. \forall NON-EPI may.PRS.3SG. \exists EPI be.INF
da *plivaju.*
 that swim.PRS.3PL
 ‘It is necessary that dogs may be swimming (according to what I know).’

⁵ The term *semi-modal* is used by many, including Von Stechow (2006) and Hacquard (2006). Semi-modality is defined in comparison to modal auxiliaries, which are often taken as *true* modal verbs.

⁶ Note that the opposite order, as shown in (7), is tricky to show since there is a structural ban.



On the other hand, in (8), a non-epistemic modal embeds another non-epistemic modal. While in structures like (6) there are apparent structural reasons why epistemic + non-epistemic is the required ordering,⁷ in non-epistemic + non-epistemic combinations the structural differences between different flavours are not as transparent, but the ordering exists. For example, the order in (8) is acceptable but the opposite order is not (9), even though there are no apparent structural differences.

- (8) *U* *demokraciji* *se* *sve*
 in democracy self everything
mora *smjeti* *privatizirati.*
 must.PRS.3SG. \forall DEONT may.INF. \exists DEONT privatise.INF
 ‘In a democracy it must be allowed to privatise everything.’⁸

- (9) #*U* *demokraciji* *se* *sve*
 in democracy self everything
smije *morati* *privatizirati.*
 may.PRS.3SG. \exists DEONT must.INF. \forall DEONT privatise.INF
 ‘In a democracy it is allowed to have to privatise everything.’

This paper aims to show that even though non-epistemic + non-epistemic combinations are, in general, judged to be acceptable, modal auxiliaries do not combine freely, but rather under systematic and predictable semantic restrictions.⁹ To explore them, I focus on the influence of modal force and modal flavour on these restrictions. I also discuss the possible implications of double modal data on the way we traditionally define modal flavours within the non-epistemic group.

2. The anti-concord constraint

One of the early influential studies on the double modality phenomenon is Di Paolo (1989). The author looked at English DMCs and concluded that DM combinations are unpredictable and simply a matter of stipulation. Most of the later studies found this position unconvincing, showing that at least some combinations are predicta-

⁷ Croatian epistemics always scope higher than subjects, which is reflected in the linear order. The modal verb combines with an entire CP.

⁸ Example adapted from <http://arhiva.nacional.hr/clanak/104727/sprjecimo-da-bolnice-postanu-uboznice>, simplified for ease of presentation, accessed in October 2017.

⁹ This paper focuses on restrictions in non-epistemic combinations. Restrictions exist in other possible groups too; combinations of epistemics and non-epistemics, and epistemics and epistemics are acceptable, those of non-epistemics and epistemics are not. For more see Werkmann Horvat (2017).



ble. It was also generally claimed that they were subject to syntactic restrictions (Battistella 1995; Thráinsson & Vikner 1995; Close 2004; Elsmann & Dubinsky 2009; Hasty 2012). Most of these proposals explore combinations of modal auxiliaries in which epistemics embed non-epistemics, deal with syntactic restrictions, and mostly say little or nothing about the possibility that these restrictions are being driven by the semantic nature of modal auxiliaries.

On the other hand, there are studies, such as Cinque (1999) and Nauze (2008), which focus on various modal flavours – not just on the two big groups of modal flavours. Both these studies approach the issue from a typological perspective, providing modal hierarchies as a result.

Cinque (1999) explores a possible hierarchy of modal heads using modal adverbs to identify restrictions on where different modal heads can appear in syntax. In his seminal work, Cinque devotes a section to the hierarchical relations in multiple modal constructions. First, Cinque points out that modal elements can be divided into two groups, epistemic and non-epistemic. Secondly, he notices that the non-epistemic group of modals is not uniform since there are modal elements within this group that can assume different interpretations, i.e. 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: 78). Based mainly on Italian adverb data, Cinque (1999) suggests the following strict hierarchical ordering for modal elements:

- (10) $\text{Mod}_{\text{epistemic}} > \text{Mod}_{\text{necessity}} > \text{Mod}_{\text{possibility}} > \text{Mod}_{\text{volition}} > \text{Mod}_{\text{obligation}} > \text{Mod}_{\text{ability}}$
(Cinque 1999: 78)

Another extensive study of various modal systems comes from Nauze (2008), who focuses on the cross-linguistic typological reality of modality and deals with modal elements from six different languages: Dutch, a cluster of Fon dialects, Korean, Lillooet, Turkish, and Tuvaluan. Nauze presents some of the various ways in which languages express modality, exploring both single and double modal constructions. The main focus is on combinations of modal adjectives/adverbs and modal auxiliaries.

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

- (11) $\text{epistemic} > \text{participant-external} > \text{participant-internal}$ (Nauze 2008: 20)

While existing research in this area deals with a variety of research questions, Thráinsson & Vikner (1995), Nauze (2008), and Jędrzejowski & van de Vate



(2013) raise the question of semantic restrictions. Data from various languages shows that semantic restrictions must also be at play, since syntactic restrictions cannot explain why some combinations are unacceptable. Therefore, further research must address the issue of semantic restrictions.

Furthermore, both Cinque (1999) and Nauze (2008) suggest that there is a hierarchy of modal flavours; however, modal force is not given as prominent a role as modal flavour. This raises the question: is modal flavour the factor that influences these restrictions in DMCs, or is modal force important too?

The overarching restriction that seems to be guiding most non-epistemic DMC combinations in Croatian relies on both modal force and flavour. Much of the modal concord literature notes that while combinations of modal adverbs and modal auxiliaries result in modal concord, combinations of modal verbs do not, i.e. they result in a cumulative compositional reading (Geurts & Huitink 2006; Zeijlstra 2007; Huitink 2012). Additionally, to yield a modal concord reading, the modal adverb and auxiliary must be of the same force and flavour, i.e. if the modal auxiliary is *might* (epistemic flavour and possibility force), then the adverb must be of epistemic flavour and possibility force. DMCs behave differently, for example, two modals of the same force are acceptable together if they are of different flavours.

- (12) Context: An experienced parent advises a new parent on how to know if the seatbelt is tight enough.

<i>Jedan</i>	<i>prst</i>	<i>smiješ</i>		<i>moći</i>
one	finger	may.PRS.2SG. ∃ DEONT		can.INF. ∃ CIRCUM
<i>ugurati</i>		<i>između</i>	<i>pojasa</i>	<i>i prsa.</i>
Push in.INF		between	seatbelt	and chest

‘You may be able to insert one finger between the seatbelt and the chest.’¹⁰

- (13) 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.

<i>On</i>	<i>mora</i>		<i>trebati</i>		<i>kihnuti</i>
he	must.PRS.3SG. ∇ DEONT		ought.INF. ∇ CIRCUM		sneeze.INF
<i>u tom trenutku.</i>					
in that moment					

‘He must need to sneeze at that moment.’

¹⁰ Example from: <http://forum.roda.hr/threads/61053-Creatis-12-mj-pitanje>, simplified for ease of presentation, accessed in August 2018.



However, two modals with the same force are not acceptable if their flavour is also the same. This can be seen in the following examples, where two modals of the same force and flavour combine.¹¹

- (14) #*Jedan prst smiješ moći*
 one finger may.PRS.2SG. ∃ DEONT can.INF. ∃ DEONT
ugurati između pojasa i prsa.
 push in.INF between seatbelt and chest
 ‘You may be allowed to insert one finger between the seatbelt and the chest.’

- (15) #*On mora trebati kihnuti*
 he must.PRS.3SG. √ DEONT ought.INF. √ DEONT sneeze.INF
u tom trenutku.
 in that moment
 ‘He must ought to sneeze at that moment.’

Therefore, I suggest the following grammatical constraint on DMCs:

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

The data from (12) to (15) is not the only thing that motivates the ACC. In what follows, I will show how the ACC motivates a categorisation of modal flavours in which modal flavours have important grammatical roles. For instance, combinations of deontic, bouletic, and teleological flavour where force is the same are not possible in DMCs. 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 the grammatical level. Apart from these, there are other crucial restrictions that stem from the anti-concord constraint, i.e. the restrictions within the circumstantial modal group. In the sections to come, I will also discuss restrictions between deontic, bouletic, and teleological modals, and restrictions between circumstantials and deontic, bouletic, and teleological modals, which do not stem directly from the ACC.

¹¹ Note that these examples are minimal pairs with examples (12) and (13), since modal auxiliaries are polysemous and, therefore, it is possible to use the same auxiliaries. However, when interpreting these, one must be careful to pay attention to glosses and translations, where the difference in readings is visible.



3. Variety within the group

In what follows, I propose that the deontic, bouletic, and teleological flavour ought to be treated as one grammatical modal flavour, i.e. the priority flavour, since they do not show grammatical differences in layered modal structures. I also show that, the circumstantial group, in turn, should be treated as three grammatically distinct flavours, i.e. pure possibility, ability, and disposition, and give suggestions on what the crucial differences among them might be and how they might be defined.

3.1. *Priority modals*

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 (Lyons 1977; Kratzer 1981; Bybee 1994; van der Auwera & Plungian 1998; Palmer 2001; Portner 2009, etc.) 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 (Palmer 1979; Kratzer 1981; Coates 1983; Portner 2009, etc.), the terminology and opinions on other non-epistemic flavours are more diverse.

For example, within the Kratzerian tradition (Kratzer 1981; Kratzer 1991; Kratzer 2012), the most common view is that deontic, bouletic, and teleological modal flavours are different since they are based on different contextual information. Most of the literature (Von Stechow 2006; Hacquard 2006; Rubinstein 2012, etc.) following this tradition does not specify whether there is an overarching commonality uniting these three flavours, and therefore they are taken as separate flavours. An exception to this is Portner (2009), who groups them together into the priority group of 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 flavour or the more specific deontic, bouletic, and teleological flavours?

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 are, therefore, not grammatically distinct. For example, a possibility deontic modal embedding a necessity deontic



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.

3.2. *Three types of circumstantials*

While priority modals tend to be separated into 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 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, i.e. are they grammatical flavours causing different restrictions or are they just subflavours without grammatical significance? 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 the distinctions within this group are grammatically significant.

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 aim to fill the gap in the previous analyses by trying to determine whether different subcategories of modal meanings actually influence semantic restrictions and the grammatical acceptability of DM structures. 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 grammatically distinct groups of circumstantials in Croatian that share some inherent characteristics.

3.2.1. *Pure possibility*

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

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



Coates (1983) says that the *pure possibility* 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. The modal *can* in (19) can be paraphrased as *it is possible for*, or *there is nothing to prevent us from finding the solutions* (Coates 1983: 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 Portner's quantificational existential reading, as in:

(20) *A spider can be dangerous.* (Portner 2009: 134)

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

Croatian *moći* has a meaning similar to this English reading of *can*. In Croatian, this flavour of *moći* appears both in single modal constructions and DMCs. In example (21) the first modal is of this flavour. However, the second modal shows that there is more to circumstantial meaning than just the expression of possibility.

(21) Context: In a world where the industry does not work with the academia, there is no possibility that the companies have the ability of advancing. The newspapers report:

<i>Firme</i>	<i>moгу</i>	<i>moći</i>	<i>razviti</i>
firms	may.PRS.3PL. \exists CIRCUM	can.INF. \exists CIRCUM	develop.INF

samo standardnu tehnologiju.

only standard technology

'It is possible for the firms to only be able to develop standard technology.'¹³

If both modals were indeed circumstantial, they would not be able to combine due to ACC, and yet 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 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

¹³ Example adapted from <http://portal.connect.znanost.org/2009/03/renesansa-nuklearne-energije>, simplified for ease of presentation, accessed in October 2017.



already discussed in the previous example: *It is possible for the firms to ...*, while the second modal can be paraphrased as *be able to*.¹⁴

Like in example (21), in (22) the first modal has a similar possibility interpretation as the modal in (19).¹⁵ 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.¹⁶

(22) 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.PRS.3PL. \exists CIRCUM ought.INF. \forall CIRCUM sneeze.INF
 ‘It is possible that the allergy sufferers will need to sneeze.’

The modal flavour *possibility* can most simply be paraphrased as *there is nothing to prevent x* (Coates 1983). Coates (1983) says that it certainly 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 approaches in the literature, such as Coates (1983), I call this the *pure possibility* flavour and define it as in (23). This lexical entry relies heavily on assumptions from Kratzer's work.

(23) $\llbracket \text{moći} \rrbracket^{c,f,g} = \lambda P_{e, st}. \lambda x_e. \lambda w_s. \exists w' \text{ compatible with external conditions} \in \max_{g(w)} (\cap f(w)): P(x)(w')=1$

The modal quantifies existentially over the set of all the possible worlds from the modal base (*f*) compatible with external conditions, which is an intersection of the possible 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 (*g*) 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. For Kratzer, the semantics of modals specifies the quantificational force and structure, while the flavour is filled in from the context.¹⁷ In (23), I propose the introduction of a new grammatical flavour de-

¹⁴ This meaning will be discussed shortly in Section 3.2.2.

¹⁵ Note, however, that this type of example would not be a problem for ACC even if one was to call these two same flavours.

¹⁶ This meaning will be discussed shortly in Section 3.2.3.

¹⁷ For a slightly different view on whether modal force and flavour are contextual parameters or arguments of the modal, see Werkmann Horvat (2017), where the latter view is assumed.



terminated by *external conditions*, which are defined as the relevant circumstances in one's environment.

3.2.2. Ability

In the previous section I briefly acknowledged the existence of another circumstantial flavour of the modal *moći*, which can be paraphrased as 'to be able to'. That interpretation of the modal *moći* is often used as the representative of the circumstantial flavour. It includes examples such as (24a and b) (from Coates 1983). This has probably been the most prominent and most thoroughly researched type of circumstantial modal meaning in the linguistic and the philosophical literature.

(24) a. *I can walk far.*

b. *I can only type very slowly as I am quite a beginner.*

Much previous literature (Palmer 1979; Palmer 1983; Palmer 2001; Coates 1983) discusses the ability interpretation of *can*. 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, that the verb denotes an action, and that the possibility of the action is determined by inherent properties of the subject (Coates 1983: 89). Note that, like Coates, most of the literature agrees that this flavour only comes in combination with existential quantification.

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*. 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.

For Portner (2009), ability is a subtype of volitional modality. This is slightly different from what Palmer (2001) suggests, viz. that ability is a subcategory of dynamic modality, while volitive modality is another category of dynamic modality. This may be merely a difference in terminology but it 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, he talks about ability and opportunity together. Still, he acknowledges issues in identifying certain instances of ability *can* by citing (25) as an example for which, in Portner's view, it is difficult to identify whether this is a quantificational



reading or an ability reading.

(25) *A student can fear his teachers.* (Portner 2009: 194)

In Croatian, ability is a very common modal flavour, and it can only be expressed by *moći*. In DMCs, ability *moći* behaves differently from pure possibility *moći*. For example, while (21), in which ability *moći* comes in the second position, is acceptable, the reverse order in (26) is not acceptable.

(26) #*Firme mogu moći razviti*
 firms may.PRS.3PL. ∃ ABIL can.INF. ∃ PPOSS develop.INF
samo standardnu tehnologiju.
 only standard technology
 ‘The firms are able to have the possibility to develop standard technology.’

The data in (26) further underscore the need to distinguish between different flavours of circumstantials: if all of them were grouped under the same flavour, it would be 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:

(27) $\llbracket \text{moći} \rrbracket^{c,f,g} = \lambda P_{e, st.} \lambda x_e. \lambda w_s. \exists w' \text{ compatible with } x\text{'s skills or means}$
 $\in \max_{g(w)} (\cap f(w)): P(x)(w')=1$

In (27), the ordering source $\max_{g(w)}$ relies on *skills*, here defined as one’s competence to do something well, or *means*, here defined as one’s available resources.

3.2.3. Disposition

In example (22) in Section 3.2.1, here repeated as (28), I showed that there seems to be a third flavour within the circumstantial group, here exemplified in the second modal of the DMC (*trebati*):

(28) *Alergičari mogu trebati kihnuti.*
 allergy-sufferers can.PRS.3PL. ∃ CIRCUM ought.INF. ∨ CIRCUM sneeze.INF
 ‘It is possible that the allergy sufferers will need to sneeze.’

Trebati in (28) 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: 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". On the other hand, Portner (2009) groups dispositional modality with volitional dispositional modals, but does not say anything more about them, apart from providing the following example:

(29) *Mary will laugh if you tell her that.* (Portner 2009: 215)

This type of disposition follows a different intuition from the one Kratzer talks about. This is an important difference in terminology that stems from two different views on what it means to be disposed to do something. On the Kratzerian view, disposition refers to something you need to do because of some set of internal circumstances, while the second perspective is more concerned with tendencies that do not need to be fulfilled (Vetter 2015). On the first perspective, there is a certain sense of immediacy, while that is not necessarily true of the second sense of disposition. I am here concerned with the former sense of disposition and will use the term *dispositional* for the type of modality as understood by Kratzer (2012: 5).

In Croatian, dispositional modality is expressed by *morati* and *trebati*. The necessity modals in (30) have a similar interpretation, the difference is in modal strength:

(30) *Maja mora/treba piškiti.*
 Maja must/ought.PRS.3SG. \forall CIRCUM pee.INF
 'Maja needs to pee.'

Therefore, the third, dispositional flavour of the circumstantial group of modals is defined as:

(31) $\llbracket \text{morati} \rrbracket^{c,f,g} = \lambda P_{e, st}. \lambda x_{e.} \lambda w_{s.} \forall w' \text{ compatible with internal conditions} \in \max_{g(w)} (\cap f(w)): P(x)(w')=1$

Note that, unlike with the two circumstantial meanings above, this meaning is defined as a universal quantifier, i.e. a disposition must be true in all possible worlds. Also, unlike with *external conditions*, *internal conditions* are defined as those conditions or tendencies pertaining to one's body, rather than the environment.

3.3. The 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 (32) and (33), which can tell us more about why this new division of circumstantials is important for a DMC analysis.



(32) *Firme mogu moći razviti*
 firms may.PRS.3PL. ∃ PPOSS can.INF. ∃ ABIL develop.INF
samo standardnu tehnologiju.
 only standard technology
 ‘It is possible for the firms to only be able to develop standard technology.’

(33) #*Firme mogu moći razviti*
 firms may.PRS.3PL. ∃ ABIL can.INF. ∃ PPOSS develop.INF
samo standardnu tehnologiju.
 only standard technology
 ‘The firms are able to have the possibility to develop standard technology.’

The former is acceptable, while the latter is not. In (32) the order is pure possibility in initial position, followed by ability, and vice versa in (33). If these two were considered to represent the same flavour, or just non-grammatically distinct subflavours, it would be impossible to explain why one structure is acceptable and the other is not. Crucially, if these were considered the same flavour, the acceptability of (32) would not be compatible with the ACC. Examples (32) and (33) also imply that these two flavours enter into a certain ordering relationship, which will be discussed shortly. Therefore, it seems that not only are these indeed different grammatical 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 behaves differently from those in (32) and (33). According to earlier findings, necessity would be expected to scope over possibility (Cormack & Smith 2002; Butler 2003). However, the DMC in (34), composed of a necessity disposition modal embedding an ability modal, is unacceptable.

(34) #*Ti moraš moći otvoriti vrata.*
 you must.PRS.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 can embed disposition, even if it is necessity disposition, and the initial modal expresses possibility:¹⁸

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

¹⁸ This is often assumed to be an unacceptable ordering.



Therefore, if the circumstantial group is split into three separate flavours, the following ordering can describe the data above (examples 32 to 35):

(36) pure possibility > ability > disposition

The hierarchy in (36) assumes, first, that pure possibility modal auxiliaries scope above ability and disposition modals. Second, an ability modal will scope under pure possibility and over disposition, while disposition remains lowest.

Finally, it is important to emphasise that the aim here was not to cover the full variety of possible circumstantial flavours or to provide an exhaustive list of possible flavours, but rather only those that seem to play a distinct role in DM combinatorics. As shown, the literature has identified many different meanings that fall under the circumstantial/dynamic umbrella. These present several kinds of problems. One is inconsistent terminology. Sometimes the issues are relatively small, e.g. when essentially the same group is variously called circumstantial or dynamic. At other times, the same term is found to be used for different flavours of modality, as in the case of dispositional modality. Another problem is that some authors refer to flavours, some to categories, and some to meanings, which is particularly problematic since these terms are not all equal, some are subordinate or superordinate to others. The aim of the above discussion was to deal with at least one of these issues, namely – the question of whether there are some flavours that seem to be more prominent than others, and how this prominence manifest itself. My aim was to show that some of the modal flavours identified are grammatically distinct (such as pure possibility, ability, and disposition), while others are not (such as deontic, bouletic, and teleological as subflavours of the priority flavour), which by no means implies that the other meanings should not be recognised.

4. The final ordering

In the following section I summarize the findings from the previous sections by discussing the final ordering and taking into account the relationship between the epistemic and non-epistemic group, as well as the already discussed circumstantial ordering. I also discuss data that serves as evidence for the necessary ordering between priority and circumstantials modals, and modals that differ in modal force.

4.1. *Epistemics and non-epistemics*

While the previous section focused on the lower part of the hierarchy, I now briefly turn to some more widely discussed assumptions in modal ordering. The assump-



Therefore, even though the order of the epistemics was not specified, the order of quantification for priority modals must be specified as necessity > possibility, and it has to be specified within a modal flavour group. Since Croatian has both necessity and possibility deontic modals, the force order matters, unlike in the case of Croatian circumstantials. Pure possibility, ability, and disposition are separate flavour groups, and thus the possibility > necessity order is acceptable when priority, pure possibility, and ability embed disposition.

The necessity > possibility ordering follows existing claims in the literature (Cinque 1999; Cormack & Smith 2002; Butler 2003). Cinque's hierarchy suggests the order $\text{Mod}_{\text{necessity}} > \text{Mod}_{\text{possibility}}$, but this ordering is mixed together with modal flavours. In other words, Cinque does not make any assumptions on whether this ordering is respected within a flavour or when flavours are mixed, i.e. when two modals of the same flavour or of different flavours combine. Examples such as (22) speak 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 dispositional meaning. However, one should be very careful when defining the relationship between the modal force and flavour in this hierarchy. For instance, Cinque takes them as equal elements of the hierarchy that are positioned together on a scale. I claim that they have a different relationship with the modal flavour, that is, they do not behave as equal elements of the same hierarchy. As pointed out above, both modal flavour and force influence the modal ordering but cannot be positioned on a scale together since they are separate modal properties. Nevertheless, they are connected since the necessity > possibility holds within a flavour, as shown by (38) and (39).

Finally, Cormack & Smith (2002) and Butler (2003) suggest that the necessity > possibility order is the preferred one but within a modal group, that is, within the epistemic and within the non-epistemic group.

4.3. Priority and circumstantial modals

The last thing left to explain is the relationship between priority modals and circumstantial modals, 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 (40) and (41). In (41) a circumstantial modal scopes over a priority modal, resulting in an unacceptable structure, while in (40)



the opposite ordering creates an acceptable structure.

(40) *Što dijete mora moći napraviti*
 what child must.PRS.3SG. ∇ Prio can.INF. ∃ ABIL do.INF
za upis u školu?
 for enrolment in school
 ‘What must a child be able to do to enrol in school?’¹⁹

(41) #*Što dijete može morati napraviti*
 what child can.PRS.3SG. ∃ ABIL must.INF. ∇ Prio do.INF
za upis u školu?
 for enrolment in school
 ‘What is a child able to have to do to enrol in school?’

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

(42) $\text{epistemic}_{(\text{necessity} \mid \text{possibility})} > \text{priority}_{(\text{necessity} > \text{possibility})} > \text{pure possibility}_{(\text{possibility})} > \text{ability}_{(\text{possibility})} > \text{disposition}_{(\text{necessity})}$

The ordering in (42) shows that epistemic modals can embed epistemic modals, and it does not matter whether they express necessity or possibility since they are different clauses.²⁰ Furthermore, epistemics embed non-epistemics, and the opposite order is not possible. Within the non-epistemic group, priority modals can express necessity and possibility, and when they combine, the order must be necessity > possibility. Both necessity and possibility priority modals can embed all three of the circumstantial flavours. Finally, pure possibility and ability only come in possibility force, while disposition only comes in necessity. Out of the three, pure possibility scopes the highest, followed by ability and disposition.

5. Conclusion

This paper looked at how different layers of modality combine in Croatian. The two main findings were, first, that there is an anti-concord constraint within double modal constructions, and second, that there is a hierarchical relationship between different flavours and forces of modality.

¹⁹ Example adapted from <https://www.skolskiportal.hr/clanak/6822-sto-dijete-mora-moci-za-upis-u-skolu>, simplified for ease of presentation, accessed in October 2017.

²⁰ See Werkmann Horvat (2017) for more on epistemics embedding epistemics.



The former finding was set up as a constraint that blocks modal auxiliaries from combining if they are of the same force and flavour. This constraint motivated other interesting findings. For instance, it was shown that some circumstantial modals, which combine in acceptable structures, seemingly do not respect the constraint. However, this proved not to be correct. In fact, all double modal constructions respect the anti-concord constraint, but the issue stems from the way modal auxiliaries are sometimes classified into flavours that might not be grammatically relevant categories. My analysis explored some of the new grammatical flavours within the circumstantial group, i.e. pure possibility, ability, and disposition. 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, deontic, bouletic, and teleological flavours do not seem to influence double modal 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.

The second finding concerns the hierarchical relationship among the modal flavours. The data showed that pure possibility scopes over ability, and ability scopes over disposition, which scopes the lowest. In addition, it was also shown that priority scopes above the circumstantial group, and that modals can indeed combine within the priority group, if 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 within the final ordering in (42).

Some of the important implications of this paper 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. Second, the DMC data shows that while modal force and flavour seem to be independent from one another, they both influence the semantic relationships that a modal auxiliary has with other modal auxiliaries.

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List of abbreviations

∀: universal quantifier/necessity modal; ∃: existential quantifier/possibility modal; **ABIL**: ability; **CIRCUM**: circumstantial, **DMC**: double modal construction; **DEONT**: deontic; **NON-EPI**: non-epistemic; **EPI**: epistemic; **BOUL**: bouletic; **PPOSS**: pure possibility; **PRIO**: priority; **DISPO**: disposition.

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SEMANTIČKA OGRANIČENJA U KOMBINACIJAMA MODALNIH GLAGOLA: DOKAZI IZ HRVATSKIH MODALNIH KONSTRUKCIJA

Iako su pojedinačni modalni glagoli često jedini u središtu zanimanja literature koja se bavi modalnošću, podaci iz hrvatskog pokazuju da modalni glagoli imaju zanimljiva ograničenja kada se pojavljuju u slojevitim strukturama. Ovaj rad istražuje dvostruke modalne strukture u hrvatskom te njihova semantička ograničenja. Rezultat je istraživanja hijerarhijska analiza u kojoj su modalna snaga i značenje presudni čimbenici u semantičkim ograničenjima pod kojima se modalni glagoli udružuju. Podaci iz hrvatskog pokazuju da epistemički glagoli mogu upravljati neepistemičkim, ali da obratan poredak nije moguć. U neepistemičkoj grupi prioritetni glagoli upravljaju okolnosnom grupom u kojoj čista mogućnost dolazi iznad sposobnosti i dispozicije. U drugu ruku, što se tiče snage, pokazano je da nužnost dolazi iznad mogućnosti, ali samo u kombinacijama modalnih glagola istog značenja. Ova analiza također preispituje i neke od tradicionalnih pretpostavki o modalnim značenjima.

Ključne riječi: slojevita modalnost; modalno značenje; modalna snaga; hrvatski jezik.