Embedded Epistemic Modals Pragmatically[1]

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Abstract. In Slovenian there is an attitude verb, *dopuščati* ('allow for the possibility'), which is like an existential dual of *believe*. My goal is to explain why it cannot embed epistemic modalities with universal force, like *must* or *cannot*. I will say that it is because of a competition and equivalence with the corresponding belief sentence. I will revise the contribution of epistemic modals and use blind scalar implicatures to achieve this.

Keywords: epistemic modal, embedding, existential belief, exhaustification.

1. Introduction

There is an asymmetry in embedding epistemic modals under attitudes of different strengths:[2]

(1)   Situation: John sees people come in with wet umbrellas. You report:

     a.   Janez misli, da   {utegne, mora} iti dež.   *B◇r, B□r*

         John thinks that   might   must   go rain

         'John thinks that it {might, must} be raining.'

     b.   Janez dopušča, da   {utegne, *mora} iti dež.   *D◇r,*D□r*

         John allows   that might   must   go rain

         'John allows for the possibility that it {might, must} be raining.'

     c.   Janez {misli, *dopušča}, da   ne   more biti sončno.   *B¬◇¬r,*D¬◇¬r*

         John   thinks allows   that not can   be   sunny

         'John {thinks, allows} that it can't be sunny.'

A strong attitude verb like *think* embeds epistemic modal verbs across the board (Stephenson, 2007), while a weak one like *dopuščati* clashes with an embedded universal (epistemic) force: in (1b) with *mora* and in (1c) with *ne more*. Intuitively, these combinations are odd because *dopuščati* is too weak for the choice of epistemic force in the embedded clause.

In this paper I draw a parallel (§4) between the oddness of embedded universal epistemic force above and the oddness of certain sentences involving scalar implicatures, e.g. *Some Italians come from a warm country* (Magri, 2009, 2011)). In order to be able to adopt the mechanism proposed for the latter cases, I will reconsider what epistemic modals (qua evidence-sensitive items) contribute pragmatically. Building on Mandelkern (2019) and Močnik (2019), I will take (§3) epistemic modals to be sensitive to the body of evidence supplied by the attitude verb in two ways: evidence is not unlearned – the epistemic modal base quantifies over subsets of the doxastic state (see Mandelkern (2019)), and evidence is not always partially examined –

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[2] I use * in a theory-neutral sense: it marks unacceptability without making the claim that the observed effect is due to ungrammaticality. Question marks (??, ?) are used to signal lesser degrees of unacceptability.

there is a possible world from which the epistemic modal base and the doxastic state coincide. Section §2 provides a brief overview of the relevant properties of *dopuščati* and embedded epistemic modals (see Močnik (2019) for more details).

2. Patterns of embedding epistemic modals

Following the recent interest in the contribution of embedded epistemic modals (a.o. Stephenson (2007), Hacquard (2006), Yalcin (2007)), Anand and Hacquard (2013) investigate the landscape of epistemic-embedding attitudes (see also Crnič (2014) and Ippolito (2017)). They observe for Romance that doxastic verbs like *fear*, *hope*, or *doubt* (analysed as existential) do not embed modals like *must*.

Slovenian provides an additional data point with *dopuščati*, which does not encode a bias that one could exploit in order to understand why some epistemic embeddings are odd.[3] It simply expresses that something is consistent with the attitude holder's belief state; it lacks the discursive properties of verbs like *concede*, *accept* or *allow* (for the sake of the argument). As illustrated below, *dopuščati* contributes weak quantification, (2), and it can be reinforced into a belief claim, (3).

(2) Situation: John is either inside the house or outside the house. The speaker is asked whether they know where John is.
Dopuščam, da je notri, dopuščam pa   tudi, da je zunaj. $Dp \land D\neg p$
I.allow   that is inside I.allow   though also that is outside
'I allow for the possibility that he's inside but I also allow for the possibility that he's outside.'

(3) Seveda,   dopuščam, da je Zemlja okrogla – trdno verjamem, da je. $Dp \land Bp$
of.course I.allow   that is Earth   round   firmly I.believe   that is
'Of course I allow for the possibility that the Earth is round – I firmly believe that it is.'

Thus, the oddness in (1b) is puzzling because the sentence ($D\square p$) seems to express simply that 'it is consistent with John's beliefs that it is raining in all of the worlds compatible with his (and possibly other's) evidence.' There is nothing inconsistent or inherently conflicting about this thought.

The generalization seems to be that oddness can arise only when the flavour of the embedded modal is epistemic (and not, e.g., deontic) and when the modal is understood to be anchored to the attitude holder, rather than some other body of evidence (e.g. by an 'according to' in the embedded clause). I will limit my study to the anchored cases mentioned in (1).

2.1. Negated attitude verbs

Anand and Hacquard (2013: fn. 27) find that main clause negation makes the embedding of a necessity modal under a doxastic attitude degraded. Here is my example (judgments vary

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[3] Anand and Hacquard (2013) use a diversity presupposition, which needs p as well as non-p worlds to be in the doxastic set. This would lead to problems with our (3). Ippolito (2017), on the other hand, has an account where duality between epistemic modals is not maintained, which is problematic in light of (1c). Her account, however, comes closest in the literature to the view we need for this data.

somewhat between speakers, so I will mark the most charitable interpretation, e.g. '??' should be read as '?? or worse').

(4) Situation: You, me, and John see Bob go home from work early. We sit down on some couches in front of Bob's office. John has his back turned to Bob's door. He puts on some headphones and starts cheating on the latest homework. After a while, Bob, who has a secret entry to his office, which he used to come back, creeps out of his office and comes up behind John's back. John, still immersed in cheating, does not notice this. I nudge you and whisper, with both of us staring at Bob:

  a. John does not think that Bob might be behind his back. $\neg B \Diamond p$

  b. ??John does not think that Bob must be behind his back. $??\neg B \Box p$

  c. It's not the case that John thinks that Bob must be behind his back. $\neg B \Box p$

  d. Janez ne misli, da je Bob mogoče za njegovim hrbtom.
     John not thinks that is Bob maybe behind his back
     'John does not think that Bob might be behind his back.' $\neg B \Diamond p$

  e. ??Janez ne misli, da mora biti Bob za njegovim hrbtom.
     John not thinks that must be Bob behind his back
     'John does not think that Bob must be behind his back.' $??\neg B \Box p$

  f. Janez ne dopušča, da je Bob mogoče za njegovim hrbtom.
     John not allows that is Bob maybe behind his back
     'John does not allow that Bob might be behind his back.' $\neg D \Diamond p$

  g. ??Janez ne dopušča, da mora biti Bob za njegovim hrbtom.
     John not allows that must be Bob behind his back
     'John does not allow that Bob must be behind his back.' $??\neg D \Box p$

Given (4b)/(4e) and (4g), necessity modals seem to be dispreferred under either force.[4] This is in line with the observations in Anand and Hacquard (2013), Homer (2015: ex. (106)), Crnič (2014: ex. (62)), and Ippolito (2017: fn. 9). Interestingly, while oddness is observed above with *misliti*, which does not seem to be a neg-raiser, the effect is absent under *it's not the case that* in (4c). The account I provide has some space for this kind of flexibility.

Further work is needed to investigate the exact conditions under which an embedded necessity modal is odd. Kai von Fintel (p.c.), for example, points out that the context in (4) does not give John any reason for entertaining the thought that Bob must be behind his back, which is why (4b) might be odd. In (5), however, where this has been changed, speakers still resist *must*.[5]

(5) Context: You and I have had the opportunity to work as assistants to Sherlock Holmes, who is investigating a recent murder. Sherlock has taken an interest in the gardener and the butler. You and I are discussing what Sherlock thinks about who the murderer is.
    ?*Sherlock does not think that the gardener must be innocent (since he followed him around this morning).*

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[4]While I did not systematically check this with all the native speakers, *have to* is similarly odd in (4b) and (5) to the ones that I did ask.

[5]Some speakers feel that (5) is as bad as (4b). The difference observed with the others might be related to the fact that *because/since* can suspend implicatures, e.g. *Some students passed the exam because all of them did.*

3. Analysing what epistemic modals express

I will build on earlier work in Močnik (2019), which offers a compositional account of the ideas explored in this section (I refer the reader to that work for certain details).

Recall that what we want to capture is the observation that embedded universal epistemic force is odd under *dopuščati* and negated doxastic attitudes. To do this, we will use two constraints on epistemic modal bases, taking them to be a reflect of how speakers reason with evidence.

The first constraint, **Locality**, is formulated in Mandelkern (2019). He proposes that epistemic modals are inherently local, i.e. the modal base is restricted to the information state it is evaluated against, such as the belief state in (6).

(6) $\forall w' \in \mathscr{B}_a^w : MB(w') \subseteq \mathscr{B}_a^w$ 　　　　　　　　(adapted from Mandelkern (2019))
　　　(for all of the worlds w' in the agent a's belief worlds in w: the worlds compatible with the agent's evidence in w' are part of the agent's doxastic state at w)

I propose to interpret Mandelkern's constraint as follows. Suppose that our individual beliefs ($p, q, \dots$) serve as pieces of evidence, which we use to navigate the world. For example, if I believe that it is raining, the proposition 'it is raining' can serve as evidence for John being at home. When an epistemic modal is embedded under a belief predicate, the modal is restricted by this body of established evidence (the attitude holder's beliefs).

Notice that Locality allows the modal base to form a proper subset of the doxastic state. A way to think about this is that people can also consider whatever they are not sure of, so propositions that are merely consistent with their beliefs. For example, I might act in accordance with the proposition *The weather report is accurate* even if I do not fully trust weather reports. As it turns out, it was a good thing to bring an umbrella. On the other hand, it does not seem rational for me do the same with propositions that blatantly contradict my beliefs, such as the horoscope being correct.

Is this just a mere restatement of having various degrees of credence in a proposition? It seems to be more than that if we think of evidence as something that we can *still* learn. Locality can be conceptualized as a rationality constraint against unlearning: we do not "unlearn" evidence (i.e. give up what constitutes the information state), but we can learn it. Thus, we can check whether the prejacent would be true if we learned more evidence than what we currently have.

This brings us to the second constraint, **Totality**. The intuition behind it is that agents do not work only under the assumption that they will always learn more. It is rational to also consider the evidence as is, in its totality. In terms of the previous analogy, this is a constraint against performing only hypothetical learning updates.

(7) $\exists w' \in f(\mathscr{B}_a^w) : \mathscr{B}_a^w = MB(w')$
　　　(there is a world w' in the chosen part of a's doxastic state at w, such that the worlds compatible with the agent's evidence in w' coincide with his doxastic state)

This constraint uses a function f over the belief state that picks out the salient part of it, if there is one. The main purpose of this is to avoid the Binding Problem (Karttunen and Peters, 1979):

we need to ensure that the existential contribution of *dopuščati* and the existential contribution of Totality talk about the same world. See Močnik (2019) for an alternative.

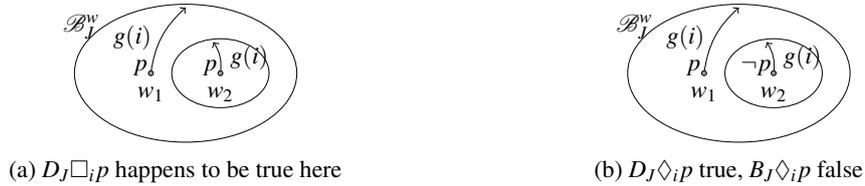To see what the two constraints yield, consider Figure 1.

(a) $D_J\square_i p$ happens to be true here

(b) $D_J\lozenge_i p$ true, $B_J\lozenge_i p$ false

Figure 1: Some situations

The modal base function i (part of the object language) maps w_1 onto the doxastic state, i.e. $\{w_1, w_2\}$, and it maps w_2 onto itself, i.e. $\{w_2\}$. Thus, at both worlds the agent (John) does not unlearn the established evidence (the modal base function remains within the doxastic set). This satisfies Locality. At w_2 it happens to be the case that the agent learns more, which is permitted. Totality can also be satisfied since the evidence considered from w_1 coincides with the established evidence, i.e. the modal base function maps w_1 onto the doxastic state.

It helps to examine Figure 1a to see that embedded universal modal force creates a very strong statement. In particular, it makes $D_J\square_i p$ as strong as $B_J\square_i p$. Totality ensures that there is a chosen world, such as the one on the left, at which the agent's beliefs and evidence coincide. This same world (via f) is such that the prejacent p is true in all the worlds (the $\square_i p$ part) compatible with the agent's evidence from it. Notice that this means then that the prejacent p is true throughout the agent's belief state.[6] By contrast, the interplay of Totality and Locality makes a difference for embedded existential force: $D_J\lozenge_i p$ is strictly weaker than $B_J\lozenge_i p$, as shown in Figure 1b.

I will not go through the cases of negated attitudes, but choosing f in a way that is analogous to the system proposed in Močnik (2019) yields Figure 2 below.
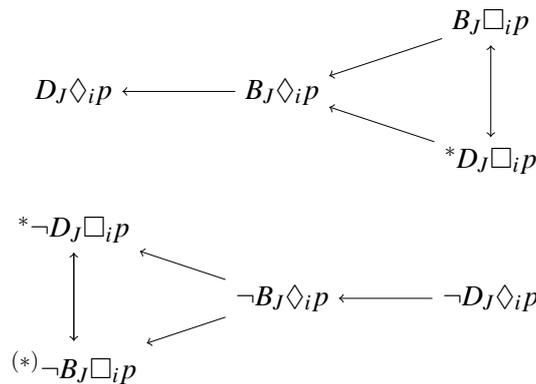

Figure 2: Contextual entailments, oddness annotated

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[6]Notice that if instead of $\square_i p$ we had $\neg\lozenge_i p$, we would still be looking at a universal statement, but about $\neg p$. See Močnik (2019) for a spell-out of this in terms of the truth-conditions.

The goal of §4 is to explain the distribution of stars (oddnesses) in Figure 2, where arrows represent contextual entailments among sentences, abbreviated schematically. The bracketed star on $\neg B_J \square_i p$ marks the fact observed in (4) that oddness is sensitive to how negation is spelled out.

4. Deriving oddnesses using blind scalar implicatures

The main idea of this section is that the source of oddness in sentences with embedded epistemic modals is the same as that observed in sentences like (8), where blind scalar implicatures are said to trigger a contextual contradiction.

(8)   *Some Italians come from a warm country.   (Magri, 2009, 2011)

4.1. Blind scalar implicatures

The sentence in (8) intuitively strikes us as odd because it conveys that not all Italians are from Italy. This intuition is captured by the reasoning, going back to Hawkins (1991), that (8) triggers the scalar implicature *Not all Italians come from a warm country*, which clashes with our world knowledge. Magri (2009, 2011) uses a system of blind exhaustification that creates this inference and makes it obligatory.

LFs contain at every scope site a silent exhaustivity operator (like a covert *only*) that combines with a free variable $\mathscr{R}$ and a prejacent, as in Figure 3. The free variable ranges over the scalar[7] alternatives that are contextually relevant for the prejacent. In particular, the prejacent itself is postulated to be relevant (uncancellable) as well as anything contextually equivalent to it. In Figure 3, for example, the denotation of $\mathscr{R}$ will contain the prejacent (*Some Italians...*) and the alternative *All Italians...*, since they entail each other contextually in this case.

The exhaustivity operator said to be blind (=not see) the contents of free variables, such as $\mathscr{R}$. It only looks at all the scalar alternatives and negates (excludes[8]) the ones that it consistently can. Crucially, thus, the notion of consistency that the operator uses is not contextual but semantic – it is blind to pragmatic information such as Italians being people that come from Italy. So as far as the operator is concerned, so to speak, it is consistent to "say" *Some Italians come from a warm country and not all Italians do*.
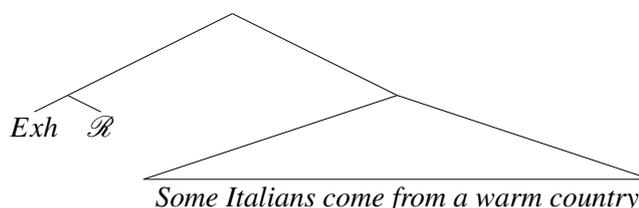

Figure 3: LF of (8), drawn with only the matrix exhaust

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[7] 'The set $Alt(\varphi)$ of *scalar alternatives* of the prejacent LF φ consists of those LFs that can be obtained from the target LF φ by replacing one or more scalar items in φ with their Horn-mates.' (Magri, 2011: p. 7)

[8] 'The set $Excl(\varphi)$ of alternatives *excludable* w.r.t. the prejacent φ consists of those scalar alternatives $\psi \in Alt(\varphi)$ such that ψ can be negated *consistently* with φ.' (Magri, 2011: p. 8)

The way this works more concretely is in (9). The set $Excl(\varphi)$ contains the set of excludable alternatives, i.e. scalar alternatives of φ that can be (semantically) consistently negated with φ. Note, for example, that φ is not an excludable alternative to itself, so even though it is relevant, it will never be negated. In practice, it will be up to $\mathscr{R}$ to have the final say in which semantically-consistent-with-φ scalar-to-φ alternatives are negated. For example, when only the prejacent is relevant, the effect of the exhaustivity operator is not visible.

$$(9) \quad Exh_{\mathscr{R}}(\varphi) = \varphi \wedge \bigwedge_{\psi \in \mathscr{R} \cap Excl(\varphi)} \neg\psi \qquad \text{(Magri, 2011: p. 9)}$$

The background assumption is that when exhaustification produces something trivial (a contradiction or a tautology), this triviality is the source of oddness and unacceptability. We will use this strategy to explain why oddness arises with embedded epistemic modals.

4.2. Blindness with modals and attitudes

Some and *all* are (lexical) scalar alternatives (along with possibly other expressions, such as *most*). Let's assume the same kind of competition between epistemic modals and (separately) between doxastic attitudes (*dopuščati* and *misliti*). I will assume that the exhaustivity operator is sensitive (=not blind) to the requirement that restrictors of natural language quantifiers be non-empty. Thus, for example, $B_J\varphi$ entails $D_J\varphi$. By contrast, the exhaustivity operator is blind to Totality and Locality. Given that modals are context-sensitive expressions in that their flavour (e.g. epistemic) is determined contextually, any restrictions on epistemic modals bases should come in contextually as well. Finally, I will ignore any exhaustivity operators within the embedded clause (i.e. in the complement of the attitude verb) for the sake of simplicity.

Consider first 'John thinks it must be raining' ($B_J\Box_ip$) from (1a). The attitude verb and the modal are stronger than their respective scalar alternatives, so the combination yields the semantically strongest expression in the set of alternatives $\{D_J\Diamond_ip, B_J\Diamond_ip, D_J\Box_ip, B_J\Box_ip\}$. This means that the set of excludable alternatives is empty, see Figure 4, line 1, column 2. Hence, even though $D_J\Box_ip$ is contextually relevant (column 3), it is not excluded (column 4). The enriched meaning (last column) is then simply the prejacent. (The term 'minimal relevance' $\mathscr{R}_{min}$ refers to the relevance that is due to the equivalences in Figure 2.)

By contrast, 'John allows that it must be raining' ($D_J\Box_ip$) from (1b) is semantically weaker than $B_J\Box_ip$, so $B_J\Box_ip$ can be excluded and in fact must be because it is relevant (Figure 4, line 2, column 3). $B_J\Box_ip$ is minimally relevant for $D_J\Box_ip$ because the modal base function i pragmatically strengthens $D_J\Box_ip$ and makes it equivalent to $B_J\Box_ip$. This means that the enriched meaning (last column) is contextually contradictory.

φ	$Excl(\varphi)$	$\mathscr{R}_{min}(\varphi)$	$Excl(\varphi) \cap \mathscr{R}_{min}$	$Exh_{\mathscr{R}_{min}}(\varphi)$
$B\Box p$	$\{\}$	$\{D\Box p, B\Box p\}$	$\{\}$	$B\Box p$
$D\Box p$	$\{B\Diamond p, B\Box p\}$	$\{D\Box p, B\Box p\}$	$\{B\Box p\}$	$D\Box p \wedge \neg B\Box p \Leftrightarrow_c \bot$
$B\Diamond p$	$\{D\Box p, B\Box p\}$	$\{B\Diamond p\}$	$\{\}$	$B\Diamond p$
$D\Diamond p$	$\{B\Diamond p, D\Box p, B\Box p\}$	$\{D\Diamond p\}$	$\{\}$	$D\Diamond p$

Figure 4: Computing the minimally enriched meanings (last column), subscripts omitted

The result we obtain for (1b) in line 2 is thus parallel to Magri's *Some Italians come from a warm country*.

For the sentences with embedded existential force, while the minimally enriched meanings in lines 3 and 4 in Figure 4 are simply the prejacents, this need not be so. Consider the enriched meanings in (10), which convey that John is unopinionated with respect to p.

(10)   a. $Exh_{\mathscr{R}_1}(B_J\Diamond_i p) = B_J\Diamond_i p \wedge \neg D_J\Box_i p \wedge \neg B_J\Box_i p$
         b. $Exh_{\mathscr{R}_1}(D_J\Diamond_i p) = D_J\Diamond_i p \wedge \neg D_J\Box_i p \wedge \neg B_J\Box_i p$
         c. $Exh_{\mathscr{R}_2}(D_J\Diamond_i p) = D_J\Diamond_i p \wedge \neg B_J\Diamond_i p$

Negated attitude verbs are more complex to analyse due to the embedded exhaustivity operator between the negation and the attitude verb. For example, 'John doesn't think that Bob might be behind his back' from (4d) has the LF: $Exh_{\mathscr{R}}(\neg Exh_{\mathscr{R}'}(B_J\Diamond_i p))$. This enriched meaning is analysed in Figure 5, line 3, where χ is the prejacent of the matrix exhaust and $\mathscr{R}'$ is replaced by a subscript spelling out its value from Figure 4, line 3, column 2 (for ease of readability). The result in Figure 5, line 3, column 3 tells us that the effect of the two exhaustivity operators can be vacuous. Similarly to what we discussed for (10), $\mathscr{R}$ can contain for example $\{\neg Exh_{\{B\Diamond p\}}(B\Diamond p), \neg Exh_{\{B\Diamond p\}}(D\Diamond p)\}$ to yield $\neg B\Diamond p \wedge \neg(\neg(D\Diamond p \wedge \neg B\Diamond p))$, which is just $\neg B\Diamond p \wedge D\Diamond p$.

χ	$\mathscr{R}_{\min}$	$Exh_{\mathscr{R}_{\min}}(\chi)$
$\neg Exh_{\{D\Box p, B\Box p\}}(B\Box p)$	$\{\neg Exh_{\{D\Box p, B\Box p\}}(B\Box p)\}$	$\neg B\Box p$
$\neg Exh_{\{D\Box p, B\Box p\}}(D\Box p)$	$\{\neg Exh_{\{D\Box p, B\Box p\}}(D\Box p)\}$	$\neg(D\Box p \wedge \neg B\Box p) \Leftrightarrow_c \top$
$\neg Exh_{\{B\Diamond p\}}(B\Diamond p)$	$\{\neg Exh_{\{B\Diamond p\}}(B\Diamond p)\}$	$\neg B\Diamond p$
$\neg Exh_{\{D\Diamond p\}}(D\Diamond p)$	$\{\neg Exh_{\{D\Diamond p\}}(D\Diamond p)\}$	$\neg D\Diamond p$
cf. $\neg B\Box p$	$\{\neg B\Box p, \neg D\Box p\}$	$\neg B\Box p \wedge D\Box p \Leftrightarrow_c \bot$

Figure 5: Computing the minimally enriched meanings, omitting the subscripts

The main appeal of Magri's system is that it allows us to run pragmatics locally and capture (with the caveat below) the intuition that 'John doesn't allow for the possibility that Bob must be behind his back' in (4g) is odd because it is odd on a local level (cf. *$D\Box p$). The embedded exhaustivity operator yields a contextual contradiction (Figure 4, line 2), while the negation over it creates a contextual tautology. The caveat is that our rich scalar alternatives allow for a potential escape strategy: it should be possible to escape the tautology during the main-clause exhaustification, by conjoining it with something contingent from the excludable alternatives.[9] To my knowledge this has not been discussed with the non-modal examples, so it is an open question for the system whether this option should be generally blocked.

The presence of a local exhaustivity operator (as in Figure 5, Line 2) is the only option within this system to generate the oddness of (4g). The LF $Exh_{\mathscr{R}}(\neg D\Box p)$ does not generate a con-

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[9]There are two maximal ways to extend $\mathscr{R}'_{\min}$. The first option is $\neg Exh_{\{D\Box p, B\Box p\}}(B\Box p)$, which gives $B\Box p$ as the enriched meaning. This is indeed quite impossible intuitively, but the theory allows for it without further constraints. The other option is $\{\neg Exh_{\{D\Box p, B\Box p\}}(D\Diamond p), \neg Exh_{\{D\Box p, B\Box p\}}(B\Diamond p)\}$, which yields $B\Diamond p \wedge \neg D\Box p \wedge \neg B\Box p$ as the final meaning, which is in fact a reasonable candidate.

textual contradiction because $\neg B \Box p$ is semantically weaker than $\neg D \Box p$, and therefore not excludable.

Some flexibility would, however, be useful with negated universal doxastics. While *It's not the case that John thinks that Bob must be behind his back* from (4c) was acceptable, the corresponding sentence with *doesn't think* from (4b) was degraded. To derive this contrast, we can assume that the two have slightly different LFs: (4c) receives the LF in Figure 5, line 1 ($Exh_{\mathscr{R}}(\neg Exh_{\mathscr{R}'}(B_J \Box_i p))$), while (4b) receives the LF in line 5 ($Exh_{\mathscr{R}}(\neg B_J \Box_i p)$).

Are there exceptions to having the exhaustivity operator at every scope site? Magri notes the following contrast and suggests that the difference lies in there being "no space" for an embedded exhaustivity operator within *not all* in (11b).

(11)   Situation: In this department, all professors get together at the end of the semester and decide on a grade to assign to all of their students.

    a. It is false that this year all professors assigned an A.

    b. #This year, not all professors assigned an A.   (Magri, 2011: p. 38)

While this seems less plausible for main clause verbs (especially non-neg-raising ones), other factors such as prosody can shape the LF and could therefore in principle play a role in the conditions on exhaustification as well. Consider for example (12), read with a "B accent" (rise-fall-rise, cf. *All politicians aren't corrupt*), which triggers a wide-scope negation (Büring, 1997). A possible explanation for the oddness of (12) is that it lacks, like (11b), an embedded exhaustivity operator.

(12)   *All Italians don't come from a warm country.*   (rise-fall-rise intonation)

The question that I leave open at this point, though, is why $\neg D \Box p$ should have an obligatory embedded exhaustivity operator (under the matrix negation), while $\neg B \Box p$ seems to show some optionality in this respect, given (4b) vs (4c). The main difference between the two, though, is that an embedded exhaustivity operator with $\neg D \Box p$ yields a contradiction ($D \Box p$ is odd), as in Figure 4, line 2. This could perhaps be exploited when formulating local conditions under which an exhaustivity operator cannot be deleted.

5. Conclusion

In this paper, I have discussed the limited distribution of epistemic modals under the Slovenian verb *dopuščati* ('allow for the possibility'), which I have analysed as an existential doxastic attitude. The goal was to explain the cases of unacceptability of embedded universal epistemic modals under *dopuščati*. Using the ideas in Močnik (2019), I have revised the contribution of epistemic modals. The relevant consequence of this revision was that embedded universal (but not existential) epistemics collapsed the choice of attitude verb.

The core idea explored in this paper was that sentences like *Dopuščam, da mora deževati* ('I allow for the possibility that it must be raining') share their source of oddness with the more well-known *Some Italians come from a warm country* (Magri, 2009, 2011). The oddness arose from a contextual contradiction due to an obligatory scalar implicature.

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