Modal objects or modal quantifiers?

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1 Overview of Moltmann's proposal

A useful way to engage with Friederike Moltmann's interesting paper is to focus on the differences she sees between the truthmaker approach and previous theories in their understanding of how modals interact with situations. She treats modals as predicates of MODAL OBJECTS ("entities like obligations, permissions, and needs") and she argues against the view that they are quantificational operators which map propositions to propositions. This analysis of modals goes along with a treatment of modal or propositional attitude constructions wherein the clause (the prejacent of the modal or the syntactic complement of the attitude verb) functions as a predicate of a modal or attitudinal object. In this way, her analysis departs from those previous treatments that adopt the RELATIONAL ANALYSIS of attitudes, according to which the complement *that S* of an attitude predicate is an argument of the predicate.

In Moltmann's paper, we have logical forms like the following:

(1)   Performative modal: *Modal ϕ $\lambda d \Rightarrow Modal(d) \wedge \phi(d)$*

   - *Mary should leave $\Rightarrow \lambda d[should(d) \wedge Mary\text{-}leaves(d)]$*

(2)   Harmonic modal: *X Att that Modal $\phi \Rightarrow ATT(e,x) \wedge Modal(MOD\text{-}PROD(e)) \wedge that\text{-}\phi(MOD\text{-}PROD(e))$*

   - *John insists that Mary should leave $\Rightarrow \exists e[insist(e,j) \wedge should(MOD\text{-}PROD(e)) \wedge Mary\text{-}leaves(MOD\text{-}PROD(e))]$*

In (1), *should* is unembedded. It can be seen as performative because an utterance of the sentence creates an obligation for Mary to leave. The sentence expresses a property of modal objects, and its function is to characterize the "should" modal object produced by the utterance of the sentence itself.[1] In

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[1] An interesting feature of Moltmann's analysis is the way it treats the distinction between performative and descriptive modals. As illustrated above, the performative modal sentence expresses a property of modal objects; in contrast, the descriptive use of the same sentence experesses the proposition that there exists such an object. Thanks to Friederike Moltmann for discussion of this point. This way of looking at the difference raises the question of whether the syntax-semantics interface produces distinct logical forms for the performative and non-performative uses of a given modal sentence. It is reminiscent of theories of imperatives which are based on semantic type, such as Hausser (1980) and Portner (2004), and it implies that

(2), *should* is embedded under an attitude predicate and intuitively does not contribute an independent layer of modality; it is a harmonic modal. Moltmann's analysis relates the attitude event e to its modal product, in this case the obligation created by John's insisting. The embedded clause is again not an argument of the verb but a predicate of modal objects.

Moltmann's paper raises important and fundamental issues. In this commentary, we will discuss Moltmann's treatment of one specific case that we feel to be especially revealing, namely harmonic modals, in relation to other recent work in modal semantics. Specifically, we will for the most part limit our attention to theories that agree with Moltmann that we should reject the relational theory, but which differ from her in that they do not enrich the ontology with modal and attitudinal objects; this includes the work of Kratzer (2006, 2016) and Moulton (2009, 2015), as well as our own work (Portner and Rubinstein, to appear). In our view, the argument for the truthmaker-based non-relational theory over the other non-relational theories is not convincing, though there is no doubt it helps to clarify the debate and move it forward.

2   Harmonic modals

Moltmann introduces the topic of harmonic modals in an intuitive manner, but she does not establish clear criteria for determining which cases of an embedded modal are harmonic and which are not. She gives examples (3a-b).[2]

(3)   a.   John insisted that Mary **should** leave. (harmonic)

   b.   John reported that Mary **should** leave. (not harmonic)

In Moltmann's words, the reason for calling *should* in (3a) 'harmonic' is that it "appears to resume the modal force associated with the reported attitude, rather than contributing to a modal content of that attitude." The criterion appears to be that a modal is harmonic iff it can be dropped from the sentence, without changing the meaning (this criterion has been applied rigorously by Cui 2015). But then when we look at examples later in the paper, it's not always clear why they are assumed to be harmonic. Consider the following:

(4)   John suggested that Bill might leave.

(5)   The document indicates that Bill might be guilty.

(6)   John thought the package might have been for him.

With the modal, (4) means something different from *John suggested that Bill leave*.[3] Even more clearly, (5) is weaker than, i.e., entailed by, *The document*

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substantive semantics-pragmatics interface principles are at work in identifying precisely the right conversational update for a given utterance.

[2]Example (3a) is her (8); (3b) is her (9b) except we've replaced *must* with *should* to create a minimal pair.

[3]This one is hard to judge, because *suggest* has an epistemic reading which is prominent when *might* is present, but has a deontic advice-giving meaning when the embedded modal is absent.

indicates that Bill is guilty. (At least, the version without the modal has a reading which is stronger than the one with the modal, but it is possible that the former has another reading where the two are synonymous.) Similarly, (6) is weaker than *John thought that the package was for him.* Cui (2015) examines the semantic effects of using various particular harmonic modals in Mandarin sentences similar to these.

In what follows, we'll focus on Moltmann's primary example of modal harmony, (3a). She notes that when *should* is dropped, the complement clause can be subjunctive, as in (7).

(7) John insisted that Mary leave.

We believe that the switch in mood is significant, and in fact Portner (1997) uses the term 'mood-indicating modals' for certain cases that would commonly be called harmonic. Still, the significance of the alternation between harmonic modal and subjunctive is not clear. In English, the main verbs of (5)-(6) do not take subjunctive, although in other languages they allow it in certain cases; in Italian, for example, *pensare* 'think' famously takes subjunctive in well-defined circumstances. Nevertheless, *indicare* 'indicate' generally takes indicative, so mood choice in this language does not help us identify the set of verbs which, according to Moltmann, give rise to a harmonic meaning either.

A different criterion for identifying so-called harmonic modals might be to determine whether the entire sentence contains one or two modal operators. In examples (3a) and (4)-(6) the meaning seems to involve a single modal. For example, (6) means 'It is compatible with John's thoughts that the package is for him', not 'It is entailed by John's thoughts that there is some accessible world in which the package is for him.' (In contrast, the modal in (3b) comes out as non-harmonic because it is doubly modalized; it means that 'It is entailed by John's report that in all deontically accessible worlds Mary leaves.') According to this way of characterizing the examples, we would agree that they involve modal harmony, but it's important to note that such a definition does not imply that sentences with and without the modal are synonymous or even that the modal matches the force of the attitude.[4]

Harmonic modals were also a main focus of Kratzer's work mentioned above. According to Kratzer (2006, 2016), the complement of a propositional attitude functions as a modifier of the event associated with the verb (see also Moulton 2009), and it introduces the quantificational force traditionally associated with the predicate. Harmonic modals are among the elements that can represent this force. In relevant respects, according to this approach the logical form of an example like (2) is as follows:

(8) *John insists that Mary should leave* $\Rightarrow \exists e[insist(e, j) \land (should(Mary\text{-}leaves))(e)]$

(9) $[\![\, should(\phi) \,]\!] = \lambda e[NEC(content(e))([\![\, \phi \,]\!])]$

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[4]Besides those we focus on in the text, various semantic theories have been given for the fact that some 'attitude+modal' combinations are interpreted as if there is a single layer of modality (e.g., Yalcin 2007, Anand and Hacquard 2013, and Cui 2015).

Moltmann criticizes Kratzer's analysis with the argument that it cannot handle possibility harmonic modals, such as (4)-(6). It would lead to a meaning that is too weak (i.e., (4) would mean 'it is compatible with what John suggested that Bill leaves', and would be true even if John's suggestion was about an orthogonal matter, such as what to have for breakfast). This is a valid criticism, if the only mechanism for generating harmonic modality in the theory is the one instantiated by (8).

Moltmann's analysis of harmonic modals handles the problem because *might* does not have a quantificational possibility semantics, but rather implies that the modal product d of the event of indicating is a "might" object. On the assumption that $might(d)$ entails that d is an epistemic possibility object, this means that d has satisfiers but no falsifiers. Based on this, a sentence like (5) is predicted to entail, in part, that the act of indicating created a possibility which is satisfied by Bill being guilty. Within truthmaker semantics, the relation of satisfaction is "exact", so the problem of John's indication being on an orthogonal matter does not arise.

Applying the same approach to an example with deontic *should*, namely (3a), we get the following. This example means that the modal product d of some insisting event is a "should" object, and we know that d has both satisfiers and falsifiers because a "should" object is a kind of necessity object. The clause *Mary leave* tells us, then, that d is satisfied by Mary leaving and falsified by Mary not leaving.

It is less clear what happens when no harmonic modal is present. If we can assume (as seems natural) that the modal products of insisting events are always necessity objects, and that the modal products of indicating events are always possibility objects, we might infer that the embedded modals in these cases are semantically vacuous, as suggested by the term 'harmonic modal'. In that case, we seem to get the right prediction for (3a), but the fact that the possibility modals in (4)-(6) seem to change the meaning is unaccounted for. Of course, it counts as a success to explain the harmonic uses of necessity modals, but by itself that does not show the analysis to be an improvement over Kratzer's, since Moltmann argues the treatment of possibility modals is what differentiates the two theories.

One issue that remains open in Moltmann's account of embedded modals is the semantics of mood. In our own work (Portner and Rubinstein, to appear) on desire verbs in Romance languages, we develop the idea (which originated with Kratzer's analysis of the reportative subjunctive in German) that verbal mood can introduce the modal force of attitude sentences. This works well in Spanish, for example, since the complement clause is always inflected for mood; we proposed that indicative marks strong necessity while subjunctive marks something slightly weaker (human necessity or local necessity to be precise). The theory then aims to explain mood selection in terms of which modal force is compatible with the contents of different kinds of attitude situations — wanting situations, believing situations, hoping situations, and so forth.

This is not the venue to extend the approach to English, since it would require that the forces represented by subjunctive and indicative in Spanish are

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not overtly differentiated in English, implying some covert structure or morphology. Still, it does seem that there could be advantages to taking the contribution of mood seriously. We would be inclined to build on the idea that modal verbs in this language sometimes have a mood-like function. In particular, the harmonic *should* in (3a) would naturally be assigned the same modal force as the Romance subjunctive. Hypothetically, this would explain the harmonic interpretation of *should* in the example. But we would also predict that *could* in examples like the following is mood-like:

(10)   They suggested that we could leave.

This example is mood-like, in the sense of contributing the one and only modal force in the sentence, but not harmonic in the sense of being semantically vacuous, since by dropping a harmonic modal, one would get the default force associated with subjunctive, necessity by hypothesis, and this is stronger.

In this version of the quantificational non-relational theory, the key question about (10) is what its modal force should be. It appears to be stronger than basic possibility, but weaker than the what we would get with the modally unmarked, or possibly subjunctive, complement. Perhaps the right approach is to assign *could* in this subjunctive-like context a force stronger than simple possibility but weaker than the force of *should*.[5] However, another possibility is that we are seeing an effect of the performative nature of suggesting events. Suppose that the sentence is true in situation s iff there was a suggesting event e in s that was intended to result in situation s' such that 'we leave' is a possibility with respect to the content of s'. Asserting this ought to implicate that the suggestion was non-orthogonal to 'they leave', since otherwise *They could leave* would be simpler and true. In other words, if we build on Cui's and Moltmann's proposal that that priority/deontic harmonic modals involve performativity (relative to a reported context), the problem of harmonic possibility modals may evaporate for the modal theories as well as the truthmaker theory.

3   Conclusion

Moltmann presents harmonic modality as a strong argument in favor of her two main hypotheses: (i) that the relational theory is wrong, and (ii) that the semantics of modality should be given in terms of truthmaker objects rather than using standard tools of modal semantics (like quantification over accessible worlds). The closest competitor theory she considers is that of Kratzer (2006, 2016), which also rejects the relational logical form but retains a standard modal semantics. Though she points out a problem for Kratzer's theory in the case of possibility harmonic modals, we have argued that the non-relational modal

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[5]It is not easy to diagnose which *could* we are seeing here. It might be the past tense of *can* in a sequence of tense context, but it also might be the slightly stronger modal *could* of root sentences like *You could leave*. In English, the contributions of tense and mood in clauses with modal auxiliaries are non-transparent, and so it would be better to build our theories on data from other languages.

analysis can handle the problematic cases. Indeed, we have suggested that the modal theory does better at explaining the subtle differences between sentences with and without a harmonic modal. One reason for this is that it incorporates an explicit semantics for mood, which is a crucial part of the empirical picture. We have sketched a way that the treatment of mood might explain the subtle differences between sentences with and without a harmonic modal. Moltmann herself did not consider these differences, and it remains possible that an explicit semantics of mood within the truthmaker approach would be viable.

Moltmann's paper is important because it raises another theoretical option for explaining harmonic modality specifically, and properties of modal embedding more generally. We have focused on two non-relational theories (Moltmann's and the Kratzer/Moulton/Portner & Rubinstein approach), and in addition the family of theories inspired by Yalcin (2007) has much in common with them. (While it is a relational theory, in certain well-defined circumstances a matrix attitude predicate becomes vacuous except for contributing the modal backgrounds to its embedded clause.) We look forward to further exploration of the empirical differences between the quantificational and truthmaker approaches.

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