

## Epistemic Modals: A Cross-Theoretical Approach

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In recent years, the standard account of epistemic modal discourse has been criticized from two directions. Expressivists and dynamic semanticists argue that simple epistemic modal sentences should be understood as non-truth-conditional. Relativists hold that the truth values of epistemic modal sentences are determined by the features of their contexts of assessment. I argue below that one can integrate the core insights of these critical stances without falling into contradiction.

**Keywords:** epistemic modals, non-truth-conditional frameworks, semantic relativism, meaning, content, integration

### 1. Introduction

The dominant view in semantic theory holds that epistemic modals quantify over a set of possible worlds that are compatible with a relevant body of knowledge or information. Following the terminology introduced by Kratzer (1981, 1991), it is now customary to signify this body of knowledge with the term *modal base*. In standard two-dimensional frameworks, epistemic modal bases are represented as independent variables in the meaning of simple declarative sentences, usually in the following form:

- (1)  $\llbracket \text{might} (B) \phi \rrbracket^{c,i} = 1$  iff  $\exists w' \in \llbracket B \rrbracket^{c,i}$  s.t.  $\llbracket \phi \rrbracket^{c,w'} = 1$
- (2)  $\llbracket \text{must} (B) \phi \rrbracket^{c,i} = 1$  iff  $\forall w' \in \llbracket B \rrbracket^{c,i}$  s.t.  $\llbracket \phi \rrbracket^{c,w'} = 1$

The first definition states that a sentence ‘It might be that  $\phi$ ’ is true in context ‘c’ just in case ‘ $\phi$ ’, the prejacent, is true at some world in the modal base ‘B’. The second states that a sentence ‘It must be that  $\phi$ ’ is true in context ‘c’ just in case the prejacent is true at all worlds in the modal base ‘B’.<sup>1</sup> These definitions require that the value of the modal base – the set of the worlds that are quantified over – be somehow determined.

There are, in principle, three ways to do this. Modal bases can be determined explicitly by attaching restricting clauses to simple modal sentences. Such constructions as ‘Given what s knows, it might be that  $\phi$ ’ or ‘In view of x, it must be that  $\phi$ ’ quantify over a restricted set of possible worlds. In the first case, ‘might’ quantifies over the worlds that are compatible with the body of knowledge possessed by ‘s’; in the second case, ‘must’ quantifies over the worlds that are compatible with the information state ‘x’ represents. Modal bases can also be determined in an implicit way, for example by covert variables in the syntactic structure of

sentences. If the values of such covert variables are contextually determined sets of possible worlds, they can function as restrictors on the quantificational domain of modals. And finally, there is a distinctively pragmatic way to impose restrictions on modal bases. Like the referents of demonstratives, the set of epistemically relevant worlds can be determined by the domain-restricting intentions of the speakers.

The exact nature of these restricting mechanisms is far from clear, and the relationship between them is also poorly understood. Let us suppose that there exist covert variables in the syntax of modals which govern the restriction of modal bases. Then how can the presence of these variables be reconciled with the role of explicit restricting clauses? Or suppose that restrictions are governed systematically by speakers' intentions. If this is so, how can the semantic effectiveness of restricting clauses be explained?

These are vexing questions, but, fortunately, one can understand the theoretical significance of the definitions (1) and (2) without knowing all the details of the determination of modal bases. It is worth to keep in mind that the dominant view is based on a general theory about epistemic modal discourse. The larger picture surrounding (1) and (2) can be described as a mixture of semantic and metaphysical theses:

#### THE TRUTH-CONDITIONAL PICTURE

- (i) Epistemic modals quantify over a suitably restricted set 'B' of possible worlds.
- (ii) Simple epistemic modal sentences – like other declarative sentences – express possible worlds propositions in their context of occurrence 'c'.
- (iii) The propositions expressed in 'c' serve to represent second-order epistemic facts, and are true or false with respect to the index 'i<sup>c</sup>'.

The semantic part of the truth-conditional picture is rather straightforward: epistemic modal sentences express propositions in their contexts of occurrence and these propositions can be assessed for truth and falsity at different indices. Epistemically modalized sentences and the corresponding non-modal sentences appear to be quite similar in this respect. The metaphysical part, however, adds an additional dimension to the customary semantics. It says that simple sentences involving 'might' or 'must' have the role of representing second-order epistemic facts: speakers who use such sentences under normal circumstances can be seen as expressing certain facts pertaining to their own states of mind.<sup>2</sup> On this account, the propositional content of the sentence 'It might be that  $\phi$ ' is best interpreted as representing a certain set of open possibilities which are compatible with the knowledge or information state of the speaker. In uttering that sentence, the speaker directs the hearer's attention to the fact that ' $\phi$ ' is left open by the knowledge or information state she is in. Sentences of the form 'It must be that  $\phi$ ' have to be interpreted in a parallel manner.

In the remainder of this paper, I will take it for granted that something like the picture consisting of the theses (i)-(iii) above is the basic framework lying behind many contemporary accounts of epistemic modals. Such a crude description of THE TRUTH-CONDITIONAL PICTURE would be inappropriate for many purposes, of course, but all I want to do here is to evaluate the prospects for alternative frameworks. In particular, I will consider non-truth-conditional and relativist frameworks which accept (i) but reject either (ii) or (iii), or both of them. These alternative frameworks are often presented in strong opposition to each

other, but I will try to show that most of their fundamental insights can be coherently unified into a single theory. For simplicity's sake, I will focus below only on questions that concern the formal analysis of *might*-sentences.

## 2. Arguments for non-truth-conditional theories

A quick reading of the theses (i)-(iii) might lead one to think that epistemic non-modal discourse is governed by roughly the same semantic principles as epistemic modal discourse. And, indeed, if one disregards the quantificational effects of the modal auxiliary, the meaning of (3) and (4) seems to call for the same kind of analysis:<sup>3</sup>

- (3) The keys are on the table.
- (4) The keys might be on the table.

The first step of the analysis establishes the semantic content of these sentences. This is a contextually supplied proposition in both cases. Then the second step assigns truth values to the contents with respect to the privileged index of the context. There is nothing that could block the second step in either case, so both sentences can be analysed as saying something that is true or false relative to a particular context-index pair.

The standard two-step procedure works even if one thinks that (3) and (4) are not equal in all respects, since, in contrast to (3), the content of (4) has to reflect somehow the speaker's own state of mind. In this case, one should think of the assignment of truth values to the content of (4) as relative to the knowledge or information state of the speaker. Thus the privileged world of the index cannot simply be the world of the context in which (4) occurs. The natural solution is to introduce a knowledge or information-sensitive variable at the level of content, and say that the privileged world varies in accordance with the value of this variable. So all that is essential to the analogy between the meaning analysis of the two sentences is restored, one just sees that (4) has a slightly more complicated relationship to the privileged world of its index than (3).

Many are of the opinion, however, that epistemically modalized sentences cannot so easily be harmonized with their corresponding non-modal sentences. The main target of the criticism is thesis (ii). Simple *might*-sentences do not belong to the category of declaratives – so the criticism goes –, because they do not serve to make genuine assertions about the world or to state facts. This kind of objection seems to be supported by a powerful intuition which has its roots in the discursive practices of ordinary language users. Speakers employ *might*-sentences typically in epistemically incomplete situations. When it is commonly known for every participant of a given conversation that it is actually the case that ' $\phi$ ', then it would be quite improper and unreasonable for someone to say that 'It might be that  $\phi$ '. One can talk properly about  $\phi$ -possibilities only in situations where there is at least one participant in the conversation who is not in a position to know whether or not ' $\phi$ '. Most frequently, of course, the ignorant participant is the speaker herself. This suggests that in using *might*-sentences speakers do not have, and cannot have, the aim of describing how things in the world are.

If this intuitive idea is on the right track, then thesis (ii) can be regarded as false: epistemically modalized sentences do not have fact-stating propositions as their contents, and, as a consequence, their meaning cannot readily be explained in terms of standard truth-conditional semantics.

There are two ways in which this intuitive idea can be made precise. One option is to adopt a dynamic framework for the analysis of epistemic modal discourse. The dynamic framework does not assign a radically new semantic function to modal auxiliaries. ‘*Might*’ should still be interpreted as some sort of quantifier over a contextually relevant body of knowledge or information. Thesis (i) is thus preserved.<sup>4</sup> The significant difference appears in the manner in which the notion of sentential content is defined. In truth-conditional semantics *might*-sentences are supposed to represent (second-order) epistemic facts. Given that facts are usually thought of as true propositions and propositions are, in turn, viewed as contents, one can reasonably conclude that *might*-sentences are endowed with truth-evaluable contents.

Dynamic semantics proposes a different route for constructing sentential contents. The basic idea is that epistemic modal sentences acquire content through the contribution they make to the context in which they occur. Or, as Willer (2013) formulates it, *might*-sentences have content in virtue of their context change potential. In a dynamic setting, however, the conversational contribution of epistemic modal claims should not be equated with something that has a propositional structure, and so it cannot be the kind of thing that can be evaluated for truth and falsity. The two-dimensional analysis of meaning takes therefore the following form:

$$(5) \quad \llbracket \text{might } (B) \phi \rrbracket^{c,w} = \{ \exists w' \in \llbracket (B) \rrbracket^{c,w} \text{ s.t. } w' \uparrow \phi \neq \emptyset \}$$

In (5), ‘*w*’ stands for the set of informational or knowledge states that are compatible with ‘*B*’ in ‘*c*’, and  $\uparrow$  denotes the updating effect of ‘ $\phi$ ’ on ‘*w*’ in ‘*c*’. The definition simply states that ‘*w*’ can be successfully updated with ‘ $\phi$ ’ only in cases where there is at least one informational or knowledge state ‘*w*’ which does not rule out the possibility of ‘ $\phi$ ’. This may sound like old news, but what is noteworthy in (5) is that it establishes a close connection between the meaning of *might*-sentences and the effects of updating processes. More precisely, the notion of sentential meaning is explained here on the basis of these dynamic conversational processes, without any recourse to such truth-evaluable semantic entities as representations or propositions. It is therefore not really surprising that proponents of the dynamic framework reject both thesis (ii) and thesis (iii).

A second option for precisifying the intuitive idea is to apply an expressivist framework in the analysis of epistemic modals. Expressivists agree with the basic statement of the Kratzerian view, and like many others they claim that ‘*might*’ functions semantically as an existential quantifier. Consequently, they regard thesis (i) as adequate.<sup>5</sup>

The agreement ends here, however, because expressivists deny that in real communicative situations epistemically modalized sentences are used for representing some features of external reality. Instead, they think that such sentences are used primarily for signaling the speaker’s own cognitive state. According to Schnieder (2010) and Yalcin (2011), the epistemic modal claim ‘It might be that  $\phi$ ’ signals that the speaker regards the prejacent as an

open possibility. Or, to say the same thing in a slightly different way: it makes manifest that the speaker is interested in ‘ $\phi$ ’, and she does not know that ‘not- $\phi$ ’ is the case.<sup>6</sup>

This imposes at least two criteria on the correct use of epistemic modals: first, the speaker must be in a certain cognitive state with respect to the prejacent, and second, she must have the appropriate intention to express her own cognitive state. If these criteria are satisfied, then the speaker’s speech act can be considered as rationally acceptable. This is an important point. It shows that epistemic modal claims are acceptable even if they do not have truth-conditions in the traditional sense of the term. Expressivists can integrate these insights into their two-dimensional framework in the manner of (6):

$$(6) \quad \llbracket \text{might}(B) \phi \rrbracket^{c,i} = 1 \text{ iff } \exists w' \in \llbracket B \rrbracket^{c,i} \text{ s.t. } \llbracket \phi \rrbracket^{c,w'} = 1, \text{ but } \llbracket \text{might} \phi \rrbracket^{c,w^c} = \{\emptyset\}$$

The essential part in (6) is  $\llbracket \text{might} \phi \rrbracket^{c,w^c} = \{\emptyset\}$ . It indicates that the context of a *might*-sentence must be conceived formally as a non-factual parameter. What is expressed in ‘c’ is therefore something that is not factual. It is a kind of content which cannot be assessed for truth and falsity at the world ‘ $w^c$ ’ of ‘c’. But, as the left-hand side of (6) shows, expressivists acknowledge a second kind of content. The thought is that epistemic modal discourse would be irrational, if *might*-sentences were completely devoid of truth-conditional content. Thus, at least at the discursive level of content, epistemic modal claims are treated by expressivists as truth-apt.<sup>7</sup> This half-hearted rehabilitation of truth-conditional content, however, should not obscure the main point here, which is that thesis (ii) and thesis (iii) are both false in the expressivist framework. The former is false because sentential contents are regarded as non-factual. The latter is false for the same reason, and additionally because *might*-sentences are taken to express first-order cognitive states.

Let us take stock. First, we have introduced THE TRUTH-CONDITIONAL PICTURE as the most popular framework for formalizing the meaning of simple epistemic modal sentences. The theoretical basis of this picture was represented with theses (i) to (iii). Then we have briefly reviewed two alternative frameworks. A common feature of these alternatives was that they accepted thesis (i) but rejected thesis (ii) and thesis (iii). The key intuition behind this theoretical move was that epistemically modalized sentences have a kind of content that cannot be evaluated for truth and falsity.

One obvious problem with non-truth-conditional frameworks is that they are not particularly well-suited for explaining compositional phenomena. Let us consider a few representative examples:

- (7) The keys might be in the car.
- (8) a. Clyde *thinks* that the keys might be in the car.  
b. Bonnie *believes* that the keys might be in the car.  
c. Clyde: The keys might be in the car. Bonnie: That is *false*, they cannot be there.

(8) illustrates that (7) embeds under factive and non-factive attitude verbs and negation quite naturally.<sup>8</sup> But if *might*-sentences have no truth-conditional content, then it is hard to explain why the complex sentences in (8) seem to be truth-conditional. Examples of this type could be easily multiplied.

It is understandable that those who are committed to the denial of thesis (ii) tend to inflate the importance of the standard notion of content. Unfortunately, this manoeuvre results in a difficult position. On the one hand, one has to maintain that *might*-sentences do not describe facts and so they lack propositional content. On the other hand, one must acknowledge that they may be embedded in larger structures which are designed to describe facts.

Dynamic semanticists attempt to resolve this tension by altering the semantics of attitude verbs. According to Willer (2013), attitude verbs do not denote propositional attitudes; rather they denote relations between speakers and context change potentials. If a speaker thinks or believes that the keys might be in the car, the attitude verb eliminates all epistemic possibilities from her current knowledge or information state in which the keys are not in the car. Embedded occurrences of *might*-sentences are thus explained in terms of context change potentials. At first sight, this appears to be a good strategy for evading the questions of truth-conditional content.

There exist a couple of problems with this solution, though. I would like to mention here only one of them. Some attitude verbs are incompatible with false sentences: one can *believe* that  $1 = 2$ , but one cannot *know* that  $1 = 2$ . The context change potential of the embedded (false) sentence is the same in both cases. It narrows down the set of open possibilities of the context by excluding all those worlds in which  $1 \neq 2$ . Now, it might be asked, how can there be a difference between believing and knowing that  $1 = 2$  without there being a difference in the context change potential of the (false) sentence ' $1 = 2$ '. The standard explanation is straightforward: ' $1 = 2$ ' expresses a false proposition; and while there is no in-principle barrier to believe false propositions, one cannot know what is false. This kind of explanation is not available to dynamic semanticists, since they are debarred from applying the notion of propositional content. But it is not entirely clear how an alternative explanation could be provided for the difference between believing and knowing false propositions.

Expressivists are faced with the same sort of problem. They have to explain how *might*-sentences can be embedded in truth-conditional constructions without using the standard notion of content. As we have seen, expressivists try to reserve a place for truth-conditional content at the discursive level of language use.<sup>9</sup> It might be objected, however, that instead of providing a real solution, this move only displaces the original problem to a higher level. What are exactly the *semantic* mechanisms which make *might*-sentences truth-evaluable at the discursive level? And how can these mechanisms be formally represented? Expressivists, like Yalcin or Schnieder, have not yet provided a detailed and definitive answer to these questions.

### 3. The relativist alternative

In contrast to the proponents of dynamic and expressivist theories, semantic relativists do not have principled objections to thesis (ii).<sup>10</sup> Much work of relativists, such as Lasnik (2011) and MacFarlane (2011, 2012), insist that *might*-sentences express truth-evaluable content in their context of occurrence. So they can explain in a straightforward way how and why epistemically modalized sentences interact with other truth-conditional expressions.

However, in spite of the acceptance of thesis (ii) (and thesis (i)), there is a major point of disagreement between semantic relativism and THE TRUTH-CONDITIONAL PICTURE.

MacFarlane (2011) provides an interesting set of linguistic data to show why THE TRUTH-CONDITIONAL PICTURE cannot be correct as it stands.<sup>11</sup> These data concern the use of *might*-sentences in everyday conversational situations. For example, speakers sometimes are forced to retract their prior *might*-claim in a posterior situation, even if they think that the claim was legitimate:

- (9) a. Clyde: The keys might be in the car.  
b. Bonnie: No, they cannot be there. You had left them on the kitchen table.  
c. Clyde: Okay, then I was wrong.

Clyde retracts his claim after he has learned from Bonnie that the keys are on the kitchen table. This does not mean, however, that he should regard his original claim as illegitimate. Quite the contrary, he might think that the prejacent of the asserted sentence was not ruled out by anything he knew at that time.

It may also happen that speakers and hearers take different attitudes to a certain *might*-claim in the same conversational context. Consider the following eavesdropping situation:

- (10) a. Clyde (muttering for himself): The keys might be in the car.  
b. Bonnie (sitting in the neighbor room): No, they cannot be there. They are in my pocket.

Adherents of THE TRUTH-CONDITIONAL PICTURE assume that the truth values of epistemically modalized sentences are fixed in their context of occurrence absolutely. This is why examples like (9) and (10) present difficulties for them. Taken together, (9a) and (9c) are problematic because they assign different truth values to one and the same *might*-claim in different contexts. (10a) and (10b) are similarly puzzling because they assign different truth values to a certain *might*-claim in the same context.

In order to dissolve the problems posed by (9) and (10), semantic relativists propose to assign truth values to epistemically modalized sentences only relative to their contexts of assessment. According to relativists, Clyde may regard his own claim as true, if he assesses it in its original context (9a), but he may reject it as false when he is placed in the epistemically enriched context (9c). The mini-dialogue in (10) can be explained in an analogous fashion. One should only take into account that truth value assignments can vary freely across the cognitive perspectives of speakers: although Clyde and Bonnie disagree about the truth value of the sentence 'The keys might be in the car', both of them are right from their own perspective.

As these examples indicate, the main point of the relativist proposal concerns the question of the assignment of truth values to sentential contents. Truth-conditional frameworks agree that *might*-sentences have to be evaluated for truth and falsity with respect to epistemically relevant worlds. But how are these worlds to be determined?

Thesis (iii) states, as we have seen, that the privileged worlds for truth value evaluation are initialized by the features of the contexts in which *might*-sentences occur. According to MacFarlane and other relativists, contexts of occurrence have no role beyond determining sentential contents. Of course, sentential contents must be determined before any evaluation is

attempted, but it is always the context of assessment which is responsible for truth value assignments. For this reason, the meaning of *might*-sentences is formalized within the relativist framework as follows:

$$(11) \quad \llbracket \text{might}(B) \phi \rrbracket^{c(a,i)} = 1 \text{ iff } \exists w^a \in \llbracket B \rrbracket^{c(a,i)} \text{ s.t. } \llbracket \phi \rrbracket^{a,w^a} = 1,$$

where contexts of assessment are designated by the upper index ‘a’. Note that (11) yields theoretically interesting results only in cases where ‘c ≠ a’. If ‘c = a’, that is, the context of occurrence of a *might*-sentence is identical with its context of assessment, then (11) produces the same result as (1). In such cases, the relativist framework does not differ significantly from other truth-conditional frameworks.

#### 4. A digression on the semantic relevance of dialogic interactions

In his groundbreaking work on the semantics of context-sensitive expressions, David Kaplan has made the following remark: “Logic and semantics are concerned not with the vagaries of actions, but with the verities of meanings.”<sup>12</sup> Actions like uttering or understanding words and sentences are external to the formal dimension of meaning. Actions take time, are idiosyncratic and unrepeatable, and for this reason they cannot be used as input to formal models of logic and semantics. Kaplan argued, rather convincingly, that the proper objects of semantic theories are not utterances, but sentences as they occur in contexts. What applies to actions applies also to contexts: it would be a mistake to treat contexts as concrete situations where dialogic interactions take place. Contexts should instead be interpreted as sequences of parameters which are needed to fix the denotations of various context-sensitive expressions. According to the Kaplanian approach, contexts could be represented by quintuples of the form  $\langle s, t, l, w, g \rangle$ , where ‘s’ is a speaker, ‘t’ is a point of time, ‘l’ is a location, ‘w’ is a possible state of the world, and ‘g’ is a (possibly partial) variable assignment function defined on the salient entities of ‘w’ at ‘t’ and ‘l’.

Many semanticists believe, at least in the formal camp, that such a methodological purism pays off, if the central goal of semantics is to provide truth-conditions for the sentences of a given language. As a corollary of this view, one obtains a familiar division of labor between semantics and pragmatics: while semantics explores verities of meanings, pragmatics investigates what speakers are doing when they make utterances in concrete situations of language use.

Methodological purism relegates dialogic interactions to the realm of pragmatics. The case of epistemic modals shows, however, that this judgement needs certain qualification. Dialogues in which simple epistemic modal sentences are used produce some effects that are not purely pragmatic. One obvious example is when truth value assignments vary across the cognitive perspectives of speakers. If such pragmatic factors as speakers’ perspectives are indeed relevant for the truth-evaluation of *might*-sentences, then one has to choose between two options. One option is to relax the strict standards of methodological purism. Perhaps some kinds of action may yet serve as inputs to formal semantics. Another option is to supplement the Kaplanian notion of context with additional parameters. Perhaps contexts can



be thought of as sextuples of the form  $\langle s, t, l, w, g, p \rangle$ , where ‘p’ denotes the cognitive perspective of ‘s’. Both of these options have their own merits and limitations, but I do not want to pursue the issue further here.

## 5. A strategy of integration

Having made these important side points, let us now turn back to our main theme. It is clear from the foregoing that non-truth-conditional and relativist frameworks are in conflict with each other because of their opposing relation to thesis (ii). This is bad news for those who consider both frameworks as providing a promising alternative to THE TRUTH-CONDITIONAL PICTURE. One may think that non-truth-conditional approaches are correct in claiming that simple *might*-sentences do not have or express truth-evaluable contents. This claim seems to have considerable intuitive support. On the other hand, the relativist framework seems to offer a properly general and plausible solution to the problems posed by compositional and conversational phenomena.

Although the incompatibility between these types of frameworks is pretty obvious, I think that there is a possible strategy for their integration. The core insight is that, with some reservations, one can reject and accept thesis (ii) simultaneously.

First, let us see how to reject it. Recall that according to thesis (ii), a simple epistemic modal sentence expresses a possible worlds proposition in its context of occurrence. If this is taken to mean that the expressed proposition determines automatically its truth conditions, then it strikes me as false. Thesis (ii) does not entail thesis (iii). For the sake of illustration, consider the following sentence as it occurs in ‘c’:

(12) The keys might be on the kitchen table.

Suppose, as many would agree, that (12) expresses the proposition *that the keys might be on the kitchen table*.<sup>13</sup> Then this proposition is the semantic content of (12) in ‘c’. But it does not follow that there is also a privileged world necessarily associated with ‘c’. Rather, it is more plausible to say that ‘c’ is associated with a choice set of worlds  $\{w^c, w^c, w^c, \dots\}$  which does not contain any privileged element. The size of this set can be conceived as dependent on the features of the modal base ‘B’ of ‘c’: it increases or decreases as the body of knowledge or information contained in ‘B’ increases or decreases.

However, the more important observation is that there is no chance in ‘c’ for selecting one particular world from the choice set  $\{w^c, w^c, w^c, \dots\}$  against which the semantic content of (12) could be evaluated for truth and falsity. Given that the standard two-dimensional analysis sees nothing in ‘c’ that could be able to trigger the selection of such a world, the content of (12) may justly be regarded as non-truth-evaluable. Viewed from this perspective, thesis (ii) appears to be false.

Now, let us see why thesis (ii) may nevertheless be considered to be acceptable. The idea is this: (12) has a truth-evaluable content in its context of occurrence ‘c’ only if it is assessed from a context ‘a’ that is able to select a particular world from the choice set of ‘c’. For example, if it is common knowledge in ‘a’ that the keys are on the kitchen table, then the

content of (12) is true in ‘c’ as assessed from ‘a’. On the other hand, if it is common knowledge in ‘a’ that the keys are in the car, then the content of (12) is false in ‘c’ as assessed from ‘a’.

To avoid a misunderstanding, let us emphasize that it is not the truth value of a prior *might*-sentence which is assumed to vary across different contexts of assessment. Instead, the variability has to be located in the selection of truth conditions: *might*-sentences are associated with a choice set of worlds in their context of occurrence and different contexts of assessment select different worlds from this set. The main point of these observations can be represented formally as follows:

$$(13) \quad \llbracket \text{might}(B) \phi \rrbracket^{c(a,i)} = 1 \text{ iff } \exists w^c \in \llbracket B \rrbracket^{c(a,i)} \text{ s.t. } a \rightarrow w^c \text{ and } \llbracket \phi \rrbracket^{c,w^c} = 1, \text{ but } \llbracket \text{might } \phi \rrbracket^{c,w^c} = \{\emptyset\}$$

In (13), ‘ $a \rightarrow w^c$ ’ means that the world ‘ $w^c$ ’ is selected from the choice set of ‘c’ by ‘a’. So ‘ $w^c$ ’ is the world of evaluation of  $\llbracket \phi \rrbracket^c$  when it is assessed from ‘a’, but  $\llbracket \text{might } \phi \rrbracket^{c,w^c}$  yields the empty set, since ‘ $w^c$ ’ has not fixed value in ‘c’.

(13) presupposes that the truth-conditional status of *might*-sentences is determined systematically by the semantic effects of ‘a’, but it also allows for exceptional cases where ‘a’ is semantically inert. One such example is the following:

- (14) a. Bonnie: The keys might be on the kitchen table.  
b. Clyde [to Buck]: Bonnie said that the keys might be on the kitchen table.

The context of assessment of (14a) is (14b), but Clyde seems to remain completely neutral with regard to the truth-value of Bonnie’s claim. He simply reports what Bonnie said. If so, (14b) has no effect on the truth-conditional status of (14a). Then the embedded *might*-sentence in (14b) is to be thought of as neither true nor false. This might be a bit puzzling at first sight, since Clyde’s report is obviously true.

Fortunately, the appearance is deceptive, for there is no essential inconsistency here. One may grant that the *might*-sentence inside the *that*-clause in (14b) does not express a truth-evaluable content, without denying that it expresses a proposition at all. And one can further argue that a *said that* construction requires only that the embedded sentence expresses a proposition. This is sufficient to block the envisaged problem. Clyde’s report is true, because its *that*-clause expresses exactly the same proposition as was expressed by Bonnie’s original claim.

The situation would not be significantly altered if ‘said’ were replaced in (14b) with ‘believes’ or ‘thinks’ or other attitude verbs. I conjecture that all of these cases could be accounted for by the same pattern of explanation. Hence the existence of semantically inert contexts of assessment does not present any special problem for the view outlined in this section.

## 6. Conclusion

Adherents of non-truth-conditional and relativist frameworks have recently offered competing but equally plausible analyses of epistemic modal discourse. I think that a careful integration of these frameworks could provide a further advancement in this domain of research. In order to succeed in integrating non-truth-conditional and relativist views, one must jointly accept both that *might*-sentences do not have truth-evaluable content in their contexts of occurrence, and that it is always the context of assessment that determines whether such sentences are true or false. The present paper attempted to show that such a stance can be articulated without falling into contradiction.

## Notes

1. I am assuming here that the interpretation function  $\llbracket \cdot \rrbracket$  suitable for interpreting the meaning of epistemic modals is singly relative, that is, it comprises a non-empty modal base and an empty ordering source. Cf. the relevant remarks of Kratzer (1991) and Werner (2011).

2. As far as I know, this metatheoretical observation was first made by Yalcin (2011).

3. (3) can be conceived here as an epistemic sentence in the sense that it expresses what the speaker believes (or knows) to be true with respect to the whereabouts of the key.

4. Dynamic semanticists are not always explicit in what they take to be the significance of the effects of the quantifiers. For example, Fintel and Gillies (2007) claim that ‘might’ serves to *comment* that the prejacent is compatible with what is known by a given group of speakers. But it is not entirely clear how to specify precisely such kind of comments at the level of semantic content.

5. It should be noted that thesis (i) does not have a fixed place in the expressivist framework. Sometimes the same author seems to oscillate between different conceptions. For example, while Yalcin (2007) argues explicitly for thesis (i), Yalcin (2011) remains silent on all issues concerning the quantificational nature of epistemic modals.

6. There is a wide consensus in the relevant literature that the cognitive state ‘leaving-open that p’ means that one does not know that ‘not-p’ is the case. I think it is only the half of the truth. ‘Leaving-open that p’ means two things at once: first that one does not know that ‘not-p’ is the case, but also that one leaves-open that ‘not-p’. Without the latter, it would be quite unreasonable to leave-open that ‘p’. There is much more to be said about the real cognitive basis of epistemic modals, but this is a complicated topic which has to be left for another occasion.

7. For more details on this issue, see Yalcin (2011).

8. The case of negation is mentioned here because it poses an additional question. One might object that the demonstrative ‘That’ in (8c) refers only to the prejacent of (7), and so the modal auxiliary does not belong to the scope of negation. I think the plausibility of this objection depends on what one thinks about the semantic of demonstratives. If one holds that the reference of ‘That’ in (8c) is determined by Bonnie’s intention, then there are two possibilities: Bonnie can either deny that the keys are in the car, or she can deny that the keys are possibly in the car. In the latter case, ‘That’ refers to (7), and so the entire sentence falls under the scope of negation.

9. Schroeder (2013) proposes a different strategy for expressivists. According to his view, in order to offer a better explanation or understanding of compositional phenomena, expressivists should make an attempt to

redefine the notion of proposition. This is a proposal which could be further explored, but I think that one can provide a less radical solution to the problem at hand. See Section 4 below.

10. Semantic relativism is a cluster of views according to which the features of the context of assessment play a crucial role in the determination of the truth values of sentences. I will use the label ‘relativism’ here only to refer to theories that relativize truth values to the world parameter of the context of assessment. For other versions of relativism, see Egan (2011).

11. MacFarlane takes these data as direct evidence for his relativist semantic theory. It is worthy of note, however, that the evidential relation between linguistic data and semantic hypotheses is much more complicated than MacFarlane suggests. On this important topic, see Kertész and Rákosi (2012).

12. Kaplan (1989, 584–585).

13. Of course, one can doubt the existence of such propositions for several reasons. But I think it is not at all implausible to *suppose* that there are such propositions.

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