



# Epistemic modality and truth conditions

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Received 1 February 2005; received in revised form 18 May 2005; accepted 19 May 2005

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## Abstract

Within the linguistics literature it is often claimed that epistemic modality, unlike other kinds of modality, does not contribute to truth-conditional content. In this paper I challenge this view. I reanalyze a variety of arguments which have been used in support of the non-truth-conditional view and show that they can be handled on an alternative analysis of epistemic modality.

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*Keywords:* Epistemic modality; Truth conditions; Subjective; Objective; Possible-world semantics; Evidentiality

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## 1. Introduction

It is often claimed in the linguistics literature that epistemic modality, unlike other kinds of modality, does not contribute to the truth conditions of the utterance. Relatedly, several commentators argue that epistemic modality expresses a comment on the proposition expressed by the rest of the utterance:

[Epistemic modality] . . . is the speaker's assessment of probability and predictability. It is external to the content, being a part of the attitude taken up by the speaker: his attitude, in this case, towards his own speech role as 'declarer'. (Halliday, 1970:349)

[Epistemic modality indicates] . . . the status of the proposition in terms of the speaker's commitment to it. (Palmer, 1986:54–55)

Epistemics are clausal-scope indicators of a speaker's commitment to the truth of a proposition. (Bybee and Fleischman, 1995:6)

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[E]pistemic modals must be analyzed as evidential markers. As such they are part of the extrapositional layer of clause structure and take scope over all propositional operators ... (Drubig, 2001:44)

The intuition underlying this view is that epistemic modality in natural language marks the degree and/or source of the speaker's commitment to the embedded proposition. According to this view, the proposition expressed by the utterance in (1) can be paraphrased by (2), and the modal force of the utterance indicates that the speaker entertains the embedded proposition with a low degree of commitment:

- (1) John may be at home.
- (2) John is at home.

This position on epistemic modality is at odds with standard semantic treatments of modality, in which epistemic modality (alongside other types of modality) is seen as regularly contributing to truth conditions. On these accounts, modal operators in natural language encode modal force (necessity or possibility) that gets relativized with respect to different types of contextual assumptions (Kratzer, 1981, 1991; cf. Lewis, 1986; Brennan, 1993; Papafragou, 2000). According to Kratzer (1991), the semantics of *may* and *must* is as follows (cf. von Stechow and Gillies, 2004):

$$[[\textit{may } \varphi]]^{c, i} = 1 \text{ iff } \exists w' \in f_c(i): [[\varphi]]^{c, \langle w', t_i \rangle} = 1.$$

$$[[\textit{must } \varphi]]^{c, i} = 1 \text{ iff } \forall w' \in f_c(i): [[\varphi]]^{c, \langle w', t_i \rangle} = 1.$$

(where  $c$  is the context of utterance and  $i$  is an index of evaluation consisting of a pair of an evaluation world  $w'$  and an evaluation time  $t_i$ .  $f_c$  is a function supplied from the context assigning to the evaluation world and the evaluation time a set of accessible worlds).

The context-supplied function  $f_c$ , or *conversational background*, determines for every index, the set of worlds which are accessible from the evaluation world at  $t_i$ ; for instance, an *epistemic* conversational background determines the set of worlds which are compatible with what is known in the evaluation world at  $t_i$ . Depending on the specific conversational background selected (paraphrased by “in view of” phrases), modal expressions receive different kinds of interpretation, as shown in the examples below:

- (3) The children must be leaving.
- (4)
  - a. In view of what is known, the children must be leaving.
  - b. In view of what their obligations are, the children must be leaving.
- (5) John may go.
- (6)
  - a. In view of what is known, John may go.
  - b. In view of what the circumstances are, John may go.

The interpretations in (4a), (6a) involve epistemic conversational backgrounds, while those in (4b) or (6b) involve deontic (or root) conversational backgrounds. In this kind of theory, deontic and epistemic modality are treated symmetrically, and both are seen as contributing to the proposition expressed by the utterance.

Given that this general semantic approach has a strong independent motivation, the claim that epistemic modality does not participate in the determination of propositional content needs to be reconsidered. In this paper, I review the arguments which have been used as evidence against the truth-conditional status of epistemic modality. I suggest that such arguments are not convincing and that, in fact, epistemic modals *do* contribute to truth conditions—exactly as the above semantic analyses of modality predict. What the proposed diagnostics identify is an important interpretive property of conversational backgrounds for epistemic modality: that is, epistemic backgrounds are not always understood “objectively” in terms of “what is known” in the community but are often restricted to the speaker’s current knowledge state.

## 2. Standard diagnostics

There are several tests which have been used to demonstrate that epistemic modality (at least in canonical cases) does not contribute to truth conditions (for discussion of these tests from different perspectives, see Leech, 1971; Jackendoff, 1972; Lyons, 1977; McDowell, 1987; Palmer, 1990; Nuyts, 1993, 2001; Adger, 1997; Westmoreland, 1995; Cinque, 1999; Garrett, 2000; Drubig, 2001; Faller, 2002; von Stechow, 2003; among others). Perhaps the strongest piece of evidence for the view that epistemic modals do not contribute to truth conditions is the *scope diagnostic*. For instance, according to this test, if an element falls under the scope of a conditional, then it does contribute to truth conditions; if it lies outside the scope of the conditional, it is non-truth-conditional (for early applications of the test, see Cohen, 1971; Wilson, 1975). According to this test, the contrastive interpretation of *but* does not contribute to truth conditions:

(7) If Jane comes to the party but John doesn’t, the party will be a disaster.

Consider which of the following needs to hold in order for the party to be a disaster: (i) Jane comes to the party; (ii) John doesn’t come to the party; (iii) there is a contrast between (i) and (ii). Clearly, (iii) is irrelevant, hence that aspect of the meaning of *but* does not contribute to the propositional content of the utterance.

It turns out that epistemic interpretations of modals do not fall under the scope of a conditional—hence it is concluded that they are non-truth-conditional:

- (8) a. ?If Max must be lonely, his wife will be worried.  
b. ?If Max may be lonely, his wife will be worried.

A related piece of evidence for the alleged non-truth-conditionality of epistemic interpretations comes from extending the scope test to other embedding environments. Specifically, epistemic modals resist appearing in the complement of factive predicates or verbs of telling:

(9) Superman must be jealous of Lois.

- (10) a. ?It is surprising that Superman must be jealous of Lois.  
b. ?Spiderman told me that Superman must be jealous of Lois.

The idea here is that epistemic modality deals with the speaker’s qualification of the proposition expressed by the utterance, and as such cannot carry a factivity guarantee or be reported as a

statement of fact. A more felicitous way of reporting the content of (9), on this view, would be (11):

- (11) a. Spiderman told me he thought Superman must be jealous of Lois.  
b. Spiderman expressed the opinion that Superman must be jealous of Lois.

A second group of tests, which I will refer to collectively as the *assent/dissent diagnostic*, are intended to show that the content of an epistemically interpreted modal cannot be challenged or endorsed by the hearer—and should therefore belong to a level of meaning different from the truth-conditional meaning of the utterance. For instance, it has been noted that epistemically interpreted modal verbs cannot be the topic of agreement, disagreement or doubt: the speaker in (13) can be taken to be reacting to the embedded proposition, not the epistemic modal itself:

- (12) This professor must be smart.  
(13) a. ?Is that so? (= Is it the case that this professor must be smart?)  
b. ?I don't believe it. (= I don't believe that this professor must be smart)  
c. ?That's not true. (= It is not true that this professor must be smart)  
d. ?I agree. (= I agree that this professor must be smart)

Relatedly, epistemic interpretations of modals cannot occur sentence-initially in *Yes/No* interrogatives:

- (14) ?Must this professor be smart?

In sum, results from these tests suggest that epistemic operators, unlike other kinds of modal operators, remain outside the truth conditional content of the utterance. As they stand, these arguments look quite compelling. A closer look, however, reveals certain complications, both in the range of application of the tests and in the interpretation of their results.

### 3. Two types of epistemic modality?

As it turns out, the range of diagnostics in the previous section do not apply uniformly across the epistemic class. According to Lyons (1977), the tests apply to those epistemic modal interpretations which can be properly called 'subjective' but not to those which are 'objective'. The subjective–objective difference is illustrated in the different interpretations exhibited by (15) depending on whether it is uttered by a layman or a meteorologist (cf. Lyons, 1977):

- (15) It may rain tomorrow.

On its subjective reading, (15) expresses the view of someone who reasons on the basis of personal (and perhaps fallible and incomplete) evidence; on its objective reading, (15) is used to state a conclusion based on (more reliable and complete) scientific data and measurements. Lyons proposes that objective interpretations do contribute to truth conditions, since they mark an inference which is guaranteed by a stable and reliable body of data. In order to support this

position, he points out that while the subjective interpretation of (15) fails the scope and assent/dissent tests described in the previous section, as expected, the objective reading of (15) passes the tests, as shown in (16)–(19):

- (16) If it may rain tomorrow, people should take their umbrellas.
- (17) a. It is surprising that it may rain tomorrow, since there was no sign of a cloud all day today.  
b. The weather forecast told viewers that it may rain tomorrow.
- (18) a. Is that so? (= Is it the case that it may rain tomorrow?)  
b. I don't believe it. (= I don't believe that it may rain tomorrow)  
c. That's not true. (= It is not true that it may rain tomorrow)  
d. I agree. (= I agree that it may rain tomorrow)
- (19) May it rain tomorrow?

The distinction between subjective and objective epistemic modality is formally captured in scopal terms in Lyons' system. It is assumed that subjective epistemic interpretations are illocutionary force indicators and have higher scope than objective epistemic interpretations (see also Drubig, 2001; von Stechow and Iatridou, 2002; von Stechow, 2003). Lyons further suggests that the majority of epistemic interpretations of modal expressions in natural language are subjective and that these interpretations are more 'basic' than objective ones, which are closer to the logicians' 'alethic' modality.

Lyons' proposal raises a number of interesting questions with respect to the category of epistemic meanings. For instance, one may wonder whether there are epistemic modal expressions in natural language which, rather than admitting both a subjective and an objective construal, may be semantically specialized for just one of these types of modal meaning (see Nuyts, 1993; Kratzer, 1981, for an explicit adoption of this view). One may also wonder about where the subjective–objective distinction comes from and whether it has parallels in other areas of linguistic meaning outside modality. I will return to some of these issues later in the discussion. For the moment, I would like to consider the implications of this distinction for the issue of truth conditions.

Notice that, if Lyons' proposal is on the right track, the traditional claim that epistemic modality does not contribute to propositional content needs to be reformulated. According to the new (weaker) version of the claim, it is only *subjective* epistemic interpretations which fall outside the propositional content of the utterance. This proposal has the advantage of accommodating the presence of examples such as (16)–(19), which would have been clear counterexamples to the traditional view of epistemic modality. It also offers an explanation for some interpretive differences in epistemically modified utterances (e.g. the subjective–objective difference) which seems to capture our pre-theoretic intuitions about examples such as (15).

Nevertheless, I want to argue that there are several reasons to be skeptical towards the idea of excluding epistemic modal expressions – *even on their subjective construal* – from the propositional content of the utterance. First, the 'exclusionist' view often has the unwelcome consequence of making the main predication of the utterance irrelevant to truth conditions (e.g. in the case of modal verbs). Second, and more importantly, intuitions suggest that epistemic modality *does* make a difference for truth-conditional content. Consider (20):

- (20) a. My grandfather must be sick.  
 b. My grandfather may be sick.  
 c. My grandfather is sick.

If epistemic modal verbs do not contribute to the proposition expressed, all three utterances should express the same proposition (that the speaker's grandfather is sick), albeit with different degrees of speaker commitment. It follows that, if in fact that person is very healthy, what the speaker has said in (20a–c) is false—and furthermore, false for exactly the same reasons throughout (a–c). However, most people would agree that, in these circumstances, the speaker has said something false only in (20c). In (20a) or (20b), the speaker has simply said that, as far as she knows, it is necessary/possible that her grandfather is sick. This fact suggests that epistemic interpretations of modals belong to the propositional content of the utterance—for which the speaker can be held accountable at later stages of the conversational exchange.

Third, excluding subjective epistemic meanings from the proposition expressed often leads to strange results, as shown in (21):

- (21) Harry: Are you coming to the party?  
 Sally: Maybe./I might.

According to the exclusionist position, Sally has not said anything truth-evaluable: she has merely expressed a certain degree of commitment to a proposition. But surely Sally has said that there is a (subjective) possibility she'll go to the party. It is not clear how the exclusionist view could handle the frequent and quite regular cases where epistemic modal expressions occur unaccompanied by other (overt) propositional constituents.

Similarly, stripping propositional content from epistemic modality may result in unwanted contradictions. Imagine that Harry, after assessing whether Sally will come to the party, concludes:

- (22) Sally<sub>i</sub> may come, and (then) she<sub>i</sub> may not come.  
 (23) a.  $p \ \& \ (\sim p)$   
 b.  $(\diamond p) \ \& \ (\diamond \sim p)$

If epistemic modals do not contribute to propositional content, then the proposition expressed by (22) will take the form in (23a)—which is a contradiction. If the modals are admitted into truth-conditional content, we end up with the non-contradictory (23b)—where modality is epistemically interpreted: what (23b) says is that the speaker's beliefs are compatible with the proposition that Sally comes, as well as with the proposition that she doesn't come.

Finally, if we assume that subjectively interpreted epistemic modal expressions do not contribute to truth conditions, it is surprising that they can fall under the scope of negation. Even though this is generally hard to show with modal verbs for syntactic reasons, one can produce the effect with epistemically interpreted quasi-modals and adverbials, showing that there is no semantic block on such readings:

- (24) a. John does not have to be the prime suspect. ( $\sim \square$ )  
 b. John is not necessarily the prime suspect. ( $\sim \square$ )

Furthermore, there are perfectly epistemic modals which are almost specialized as narrow scope epistemics (von Fintel and Iatridou, 2002):

- (25) a. John need not be the prime suspect. ( $\sim\Box$ )  
 b. John can't be the prime suspect. ( $\sim\Diamond$ )

Beyond negation, it is possible to embed subjectively interpreted modals under other operators, such as the causal connective *since*: what the speaker says in (26) is that she is going home since *she thinks it's possible* that her son will come to visit:

- (26) I'm going home since my son may come to visit.

In sum, it seems that, whatever the subjective versus objective distinction amounts to, it does not coincide with the distinction between non-truth-conditional versus truth-conditional aspects of epistemic modal meaning. Rather, both subjective and objective interpretations appear to belong to the propositional level of meaning. We are now left with a puzzle: epistemic modals, on their 'subjective' interpretations, fail certain diagnostics which have been assumed to test for truth conditionality; yet there are independent grounds for believing that such modals contribute to propositional content in regular ways. How can we explain the fact that subjective interpretations pattern the way they do with respect to the standard diagnostics? In the next sections, I suggest that a reformulation of the subjective–objective distinction predicts the observed behavior of the two classes of epistemic interpretation without assuming a truth-conditional difference between them.

#### 4. The objective–subjective distinction reconsidered

Recall that epistemic interpretations occur when modal operators are understood in terms of 'what is known'. But known by whom? And when? Adopting a proposal by von Fintel and Gillies (2004), I now want to suggest that the subjective–objective distinction is best captured by allowing the epistemic agent holding the relevant knowledge to vary so that it may be the speaker alone, the speaker and the hearer, or some other subset of the speech community. 'Subjective' interpretations of epistemic modals are the limiting case where the speaker is the only member of the group and hence bases the modal claim on his or her private beliefs. On this view, we can reformulate the meaning of *may* as follows:

$$[[\textit{may } \varphi]]^{c, i} = 1 \text{ iff } \forall x \in G_c: \exists w' \in f_x(i): [[\varphi]]^{c, \langle w', ti \rangle} = 1.$$

(where  $G_c$  is the contextually supplied group and  $f_x$  delivers the set of worlds compatible with what  $x$  knows)

As von Fintel and Gillies point out, this semantics lacks a single conversational background which is checked for compatibility with  $\varphi$ : the semantics iterates over the knowledge bases of the individual members of  $G_c$  (in that sense, it does not reduce to Kratzer-type semantics).<sup>1</sup> Subjective interpretations come out as the limiting case where  $G_c = \{\text{the speaker}\}$ ; various other

<sup>1</sup> Von Fintel and Gillies ultimately modify this definition to allow for more sophisticated notions of group knowledge. Further details of their analysis lie beyond the scope of the present discussion.

options exist for building more complex notions of “relevant community” (for discussion, see DeRose, 1991; Hacking, 1967; Teller, 1972).

This approach leaves room for indeterminacy in the interpretation of epistemic modality since it may not be clear who should be taken to belong to the relevant community of  $G_c$  (and hence whether epistemic modality is subjective or non-subjective, and of exactly what kind). These interpretive differences can be very subtle. To modify Lyons’ original example, (27) may receive a subjective or objective interpretation if uttered by a meteorologist depending on whether we take the intended conversational background to be the meteorologist’s private beliefs or observable evidence available to his professional community:

(27) It may rain tomorrow.

I now propose that the main difference between subjective and objective epistemic modality is that the former, but not the latter, is *indexical*, in the sense that the possible worlds in the conversational background are restricted to what the *current* speaker knows *as of the time of utterance*. By contrast, in the case of objective epistemic modality, possible worlds in the conversational background include what is generally known to some community, or, in other words, what the publicly available evidence is. Even though it is not clear at this stage exactly how to capture this difference formally, the main idea is that subjective epistemic modality is time-dependent even though there is no temporal argument in epistemic modals themselves (see Iatridou, 1990 for a related view). By contrast, objective epistemic modality is not tied to the here-and-now of the talk exchange, and indeed can be used for discussing future and past possibilities<sup>2</sup>:

(28) Until Copernicus, it was certain that the Earth was the center of the universe.

(29) Yesterday it was possible that the stock market would go up today.

An analysis which recognizes the presence of an indexical element in subjective modal readings captures the intuition that (subjective) epistemic modality indicates degree of ‘speaker commitment’ to the embedded proposition (cf. Palmer, 1990; Bybee and Fleischman, 1995; Traugott, 1989; and many others). On the present analysis, this is an epiphenomenon of the fact that the required conversational background for subjective readings includes the current beliefs of the speaker at the moment of utterance. The indexicality analysis can also explain the much-cited observation that subjective epistemics bear certain similarities to performatives. Lyons (1977:805) is explicit about this parallel:

[The function of subjective epistemic modality] is to express different degrees of commitment to factuality; and in this respect it qualifies the illocutionary act in much the same way that a performative verb paranthetically qualifies, or modulates, the utterance of which it is a constituent in an explicitly performative utterance or a primary performative with a performative clause tagged on to it.

On his analysis, the epistemic modal in (30) is similar to the performative verbs in (31):

<sup>2</sup> This analysis suggests that different assertions of epistemically modalized utterances can express the same proposition in the case of objective epistemic modality (provided they rely on the same conversational background), but not in the case of subjective epistemic modality (since subjective epistemic backgrounds are time- and speaker-dependent). The implications of this will become obvious in the next section, when we discuss the assent/dissent test.

- (30) This must be Emma's sister.
- (31) a. I conclude that this is Emma's sister.  
b. This is Emma's sister, I conclude.

Naturally, there are several differences between epistemic modals and the class of performatives. For instance, epistemic modal verbs lack syntactically parenthetical uses; more importantly, they do not involve a verbal act but rather a mental act of evaluation of a state of affairs (cf. Nuyts, 2000; Faller, 2002). Nonetheless, crucially, both subjective epistemics and performatives are tied to the here-and-now of the conversational exchange. In this sense, subjective epistemic modals are close to a class of mental verbs such as *think*, *infer*, *conclude* and *conjecture*, even though not illocutionary force indicators themselves.<sup>3</sup>

A lot more needs to be said about the indexical behavior of the group parameter  $G_c$  in subjective epistemic interpretations and how it differs from 'objective' cases. Regardless of how this issue is to be resolved ultimately, I want to argue that the presence of indexicality is responsible for the fact that subjective interpretations of epistemic modal expressions escape standard tests for truth-conditionality.

## 5. Back to the standard diagnostics

### 5.1. The scope test

Consider first the core of the scope diagnostic: whenever an epistemic modal item is interpreted subjectively, embedding it in the antecedent of a conditional is unacceptable:

- (32) ?If Paul may get drunk, I'll be mad at him.

However, in cases where the interpretation can be objective, embedding in a conditional is acceptable:

- (33) If Paul may get drunk, I am not coming to the party.

If subjective epistemic modal expressions are indexical (in the sense of the previous section), this restriction is explained. The environment inside the antecedent of a conditional cannot be an environment in which the speaker performs a mental evaluation of a proposition with respect to her belief-set. Notice that a similar restriction applies to performatives: *I conclude*, for instance, in its performative use, cannot occur in the antecedent of a conditional:

- (34) ?If I conclude that the Earth is flat, then I'm in trouble.

If *I conclude* is not interpreted performatively but only as a description of a mental act (which may take place, say, in the future, or be executed by someone other than the speaker), the utterance becomes acceptable:

<sup>3</sup> The parallel between subjective epistemics and performatives/parentheticals is usually used as an additional piece of evidence for the non-truth-conditional nature of the former. Interestingly, several authors have recently argued that performatives and parentheticals *do* contribute to truth-conditional content themselves—an argument which strengthens the point of the present paper (see Recanati, 1987; Blakemore, 1990/1991; Asher, 2000; Ifantidou, 2001).

- (35) a. If in the future I conclude that the Earth is flat, then I'm in trouble.  
 b. If my students conclude that the Earth is flat, then I'm in trouble.

Similar contrasts have been noted for other speaker-oriented expressions, such as modal adverbials, and modal adjectives and other nominals (cf. Nuyts, 1993; Papafragou, 2000):

- (36) ?If the Earth is possibly flat, then I'm in trouble.  
 (37) If it is possible/there is a possibility that the Earth is flat, then I'm in trouble.

The observation that subjective epistemic modal interpretations do not appear in the complement of (factive) attitude verbs or verbs of telling can be explained along similar lines: these are not environments in which the speaker's evaluation of a proposition with respect to her current beliefs could feature. In cases where this evaluation is done with respect to public ('objective') evidence, embedding is felicitous:

- (38) a. It is surprising that the victim must have known the killer.  
 b. The police told reporters that the victim must have known the killer.

I conclude that the embedding tests do not show that subjective modal readings are non-truth-conditional; what the tests do show is that restrictions on the distribution of subjective modal readings follow from their indexical character. Unsurprisingly, performatives (especially mental act performatives) behave the same way: *I conclude* in (39) cannot be interpreted performatively:

- (39) ?I am surprised that I conclude that the Earth is flat.

## 5.2. The assent/dissent test

I now turn to the assent/dissent diagnostic, which I will discuss in some detail. At the core of this test lies the observation that it is not possible to doubt, agree, or disagree with the speaker's subjective evaluation of epistemic possibility or necessity. I propose that this observation, even though correct, is orthogonal to the issue of whether subjective epistemic modality contributes to truth conditions.<sup>4</sup>

Consider under which conditions a subjective epistemic modal utterance such as (40) would be false (see also Papafragou, 2000; Garrett, 2000; Faller, 2002):

- (40) Clark Kent must be Superman.

One possibility is that the modal relation between the embedded proposition and what the speaker currently believes is incorrectly specified: for instance, it may not follow from the

<sup>4</sup> An initially plausible hypothesis is that assent/dissent contexts (e.g. *I agree*, *I don't believe it*, etc.) do not target truth-conditional content at all but what can be called the 'main point' of the utterance (i.e. the main locus of cognitive effects; cf. Sperber and Wilson, 1995). However, this hypothesis does not explain why subjective and objective interpretations of epistemic modality should seem to elicit different patterns of agreement/disagreement (after all, the 'main point' of the utterance in both cases is the embedded proposition).

speaker's beliefs that Clark Kent is Superman (in which case the speaker has made a logical error). A second possibility is that the specification of modal background is incorrect (in which case the speaker is mistaken about her own beliefs). In either case, it is difficult to see how the hearer could challenge the truth of the modal proposition in (40); in order to do so, she would need to have secure and complete access to the speaker's current beliefs. I conclude that subjective epistemic modality cannot be challenged because it is *externally inscrutable*. Once again, the parallel with mental act performatives and related structures is instructive: it is hard to challenge the higher predicate of the following utterances because of the inscrutability of mental acts:

- (41) a. I infer that Clark Kent is Superman.  
 b. I conclude that Clark Kent is Superman.  
 c. It follows from what I currently know that Clark Kent is Superman.

There is a class of contexts in which the inscrutability of epistemic assessments is waived: these are cases where the speaker attempts to evaluate the evidence she has for a certain conclusion. In those contexts, epistemic modal force is challengeable by the speaker herself. In (42), the speaker corrects a mistake she has made in computing the modal relation, either by making it too weak, as in (42a), or too strong, as in (42b):

- (42) a. Clark Kent may be Superman. No, that's not right: Clark Kent *must* be Superman.  
 b. Superman must be Clark Kent; no, wait, that's not right. Superman *may* be Clark Kent.

Similarly, in (43), the speaker realizes she has overlooked a crucial piece of information which affects the grounds for the computation of modal force (i.e. the range of epistemically accessible worlds which form the conversational background) and goes on to challenge her own modal claim:

- (43) Clark Kent must be Superman. Wait a minute, no, that's not true: Clark Kent is afraid of heights. So Clark Kent *can't* be Superman.

Similar conditions obtain in deliberative questions, where the speaker is addressing a question to herself. In those contexts, subjective epistemic interpretations can occur in *Yes–No* interrogatives:

- (44) Might John be a liar?  
 (45) Must John be a liar?

In sum, it appears that subjective epistemic interpretations of modals can be challenged or questioned, if the inscrutability restriction is bypassed. As a result, the assent/dissent diagnostic does not constitute evidence for the non-truth-conditional nature of (subjective) epistemic modality.

Nevertheless, we still need to explain the intuition behind the original assent/dissent tests, namely, that people ignore subjective epistemic modality and instead choose to evaluate the embedded proposition in terms of their own knowledge state. This intuition has been recently

restated by several authors who have observed that “ordinary people evaluate present tense claims of epistemic modality as true or false by testing the claim against their own perspective” (Hawthorne, 2004, p. 29):

[S]uppose Angela doesn’t know whether Bill is alive or dead. Angela says *Bill might be dead*. Cornelius knows that Bill is alive. There is a tendency for Cornelius to say *Angela is wrong*. Yet, given Angela’s perspective, wasn’t it correct to say what she did? (ibid.)

Consider a similar example from MacFarlane (2003):

- (46) a. Sally: Joe might be in Boston.  
 b. George: He can’t be in Boston. I just saw him in the hall five minutes ago.  
 c. (i) Sally: Oh, then I guess I was wrong.  
 (ii) Sally: Oh, OK. So he can’t be in Boston. Nonetheless, when I said “Joe might be in Boston”, what I said was true, and I stand by that claim.

On a subjective interpretation, Sally’s response in (46c-ii) should be perfectly acceptable: (46a) is true if and only if Joe being in Boston is compatible with what Sally knows at the time of utterance—the discovery of other relevant facts later does not affect the truth of her initial statement. By the same reasoning, (46c-i) should be puzzling. However, in fact, the interpretive facts seem to go in the opposite direction. On the basis of such facts, it has been suggested that the semantics of epistemic modality need to make reference to the knowledge base of whoever it is who *assesses* the modal claim (e.g. the hearer, or the speaker at a later time), rather than the current speaker (MacFarlane, 2003; Egan et al., 2005—cf. also Groenendijk et al., 1996; Faller, 2002, p. 115).

There is an alternative explanation for the intuition that the conversational background for evaluating a (subjective) epistemic modal statement seems to shift during conversation. As von Stechow and Gillies (2004:11) put this:

When the interpretation of a sentence is sensitive to how the context resolves an indeterminacy in its logical form – and if the speaker chooses not to reduce the indeterminacy –, the speaker exposes themselves to challenges. As we have seen, epistemic modals need as one contextual parameter the group G whose knowledge is relevant to the epistemic claim. Unless there is a very specific *in view of* phrase or very strong contextual clues, there will be indeterminacy, that is there will be a non-trivial set of possible values of G. In such a case, the speaker is responsible for the fact that their statement could be interpreted with respect to a group G that is much bigger – and thus makes the statement much stronger – than it would be under a solipsistic [=subjective, A.P.] interpretation or even under an interpretation where the speaker and the addressee are the only relevant members of G.

Crucially, on this analysis, participants in a conversation need to take into account a ‘cloud of admissible contexts’ within which their conversation is situated, and which could be used to evaluate a modal claim (ibid., p. 12). These might include their own subjective knowledge but also more objective bodies of evidence also available to other members of the community. In this sense, speakers are responsible for anticipating (and preventing) unwanted assumptions about what is included in the knowledge base underlying a modal claim (and hence what counts as grounds for challenging such a claim). This indeterminacy as to the intended conversational base for interpreting epistemic modality is responsible for the fact that hearers may appear to evaluate

an epistemic modal statement from their own, not the original speaker's, point of view (which is precisely the observation at the core of the original assent/dissent tests).

Following von Stechow and Gillies (ibid.), we can explain the judgments underlying the exchange in (46): George and Sally form a relevant community for purposes of evaluating a modal statement such as (46a). Therefore, once new evidence has become available (through George's utterance), Sally's prior epistemic state becomes irrelevant.<sup>5</sup> But in other cases, new information could not have been considered to be within the knowledge base of the relevant community G:

- (47) a. Scientist X in 2006: There may be life on other planets.  
 b. Scientist Y in 42006: ??Scientist X was wrong./??I don't agree.  
 We now know that there is no life on other planets.

In this example, there is no sense in which the two scientists form a relevant group whose knowledge X's statement could have been sensitive to. Hence the epistemic modal claim cannot be challenged by checking the embedded proposition against Y's beliefs. This kind of approach explains how the very same statement can be challenged in a number of different ways depending on who could have been taken to belong to G.

Summarizing, the present account captures the intuition of previous proposals that certain epistemic modal interpretations are 'subjective'/'speaker-oriented'; that is, they indicate speaker commitment to a (base) proposition. However, this is taken to be an intuition not about truth conditions but about the type of epistemic agent providing the background assumptions for epistemic modality. More generally, the ambivalent attitude found in earlier work towards the truth-conditional contribution of epistemic modals (i.e. the 'subjective–objective' distinction) is a result of indeterminacy among the different types of knowledge base which can be taken to underlie a modal claim.

## 6. Conclusion

In this paper, I have surveyed a variety of arguments which have been taken in the literature to support the conclusion that epistemic modality does not contribute to truth-conditional content. I have suggested that such arguments do not amount to a convincing case, and hence that epistemic modality (alongside other types of modality) should be taken to contribute to the proposition expressed by the utterance. This approach preserves a symmetrical approach to the different types of modality, in which every class of modal interpretation contributes to truth conditions. It further captures the frequently mentioned fact that epistemic modal operators, on most of their uses, seem to have the function of a 'comment' on the base proposition.

It would be interesting to extend the arguments of this paper to related classes of propositional operators, such as evidentials. Just like epistemic modality, evidentiality has been assumed to have clausal scope and to be non-truth-conditional (van Valin and La Polla, 1997; Hengeveld, 1990; Anderson, 1986). Recent studies, however, have argued that evidential markers should not

<sup>5</sup> Similar indeterminacy characterizes deontic modality as well. Imagine that Alice is discussing the prospect of her divorce with her lawyer (example from Papafragou, 2000, p. 50). She says that she cannot take her children away from her husband. Her lawyer replies: *Of course you can: the law allows you to*. Alice's statement involves a conversational background including Alice's moral sense, while in the lawyer's response the background has shifted to legal regulations. On the flexibility and indeterminacy of conversational backgrounds and the need to accommodate such shifts, see Lewis (1979).

be automatically excluded from the level of propositional content (see Izvorski, 1997 on Bulgarian; Infantidou, 2001 on English; Garrett, 2000 on Tibetan; Faller, 2002 on Quechua). Given that formal accounts of evidentiality are only beginning to emerge, a more systematic comparison of evidentials and epistemic modals needs to await further research.

## Acknowledgement

I am very grateful to Neil Smith for being a wonderful teacher and mentor. This paper extends and modifies the discussion in chapters 2 and 3 of Papafragou (2000). Many thanks to Alex Klinge, Maribel Romero and two reviewers for helpful suggestions on this material.

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