

LOGICAL AND DISCURSIVE PROPERTIES OF MODALITY

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Abstract. The (extended) standard approach to modality claims that modal expressions are semantically characterized by three parameters: modal force, conversational background and modal time. However, these parameters cannot by themselves (a) explain the behaviour of epistemic modality with respect to temporality and propositional operators, and (b) determine the type of modality in context. Epistemic modality in non embedded sentences anchors modal time to utterance time. However, epistemic modality with a past perspective is attested, which seems to mean that epistemic modality sometimes interacts with tense. With respect to the proposition expressed, epistemic modality sometimes makes no contribution to the truth conditional content of the modalized sentence, but measures the degree of confidence the speaker shows towards the prejacent; a fact that impinges epistemic modality with a flavour of evidentiality. Another serious problem for the standard approach is that a propositional constraint of quantification is not enough for automatically deriving the type of modality. All these questions seem to militate against a uniform semantic account of modality. However, a semantically uniform analysis of modality can be maintained if the pragmatics of modality can offer an account for these problems. The hypothesis that is pursued in this paper is that modality interacts with three different contextual abstract structures: (i) The Focus of Current Situation (FCS), (ii) the Common Ground (CG) and (iii) the To-Do List (T-DL). If a modal expression interacts with CG, it receives a dynamic interpretation; if interacts with T-DL, it has a priority interpretation and if interacts with FCS, it has an epistemic interpretation.

Keywords: modal time, temporal perspective, propositional operators, common ground, evidentiality.

1. Introduction²

Modality (the linguistic expression of possibility) is expressed across languages by syntactically different types of expressions. A well-known cross-linguistic semantic characteristic of modality is that modal expressions have multiple

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meanings. It is not difficult to imagine contexts where the utterance of the Spanish sentence (1) receives deontic or ability readings. Similar multiplicity of meaning is observed in other languages. However, modal meanings can be blocked by different mechanisms, as examples (2)-(5) show and some of them are language-specific:

- (1) La presidenta puede hablar euskera
DEF president can-PRES speak-INF Basque
The president can speak Basque
- (2) La presidenta sabe hablar euskera
DEF president knows-PRES speak-INF Basque
The president can speak Basque
- (3) Dada la normativa del Congreso, la presidenta no puede hablar euskera
Given DEF normative of DEF Congress, DEF president NEG can-PRES
speak Basque
Given the normative of the Congress, the president cannot speak Basque
- (4) La presidenta puede haber estado en el despacho
DEF president can-PRES have-PERF been in DEF office
The president can have been in the office
- (5) Puede llover
Can-PRESS rain
It can rain

In sentence (2) the modal meaning of the verb ‘saber’ (to know) has only an ability reading, a fact that has to be marked in its lexical entry. In (3), it is linguistic context that forces a deontic reading. What (4) illustrates is that epistemic reading is mandatory in Spanish with composed past tense. Finally, the meteorological predicate of sentence (5) forces an epistemic reading. The conclusion is that modality interacts with multiple linguistic phenomena.

At this point it is worth offering a broad classification of modality, even though any classification has the risk of unconsciously convey theoretical prejudices. Following the work of Portner (2009), we will assume that there are three main types of modality and different subtypes:

(6)

Epistemic modality	Priority modality	Dynamic Modality
<i>Subjective</i>	<i>Deontic</i>	<i>Circumstantial</i>
<i>Intersubjective</i>	<i>Teleological</i>	<i>Objective (alethic)</i>
	<i>Bouletic</i>	<i>Ability</i>

In epistemic modality, the source of the possibilities under consideration is an agent's epistemic state. Epistemic modality is subjective if the agent of the epistemic state is the speaker and intersubjective if the agent is a group. In the case of priority modals, possibilities come from some standard of behavior, be it a norm, a goal or a will that is in force in the circumstance of interpretation. Finally, dynamic modality comes from possibilities related to states of affairs; states of affairs that can be constrained to some set of variable circumstances, a whole range of well-established circumstances or circumstances that conform an individual's abilities.

The standard semantic analysis of modality (Kratzer 1977, 1981 [2012]) assumes that modal expressions are uniformly interpreted following two different parameters: The modal force and the conversational background, which, in turn, is composed of the modal base and the ordering source.

The modal force determines the existential or universal quantification over alternatives. The type of quantification of a modal expression is conventionally fixed in its lexical entry. The modal base is a function f that, in terms of Possible Worlds Semantics, takes as argument the circumstance of interpretation and gives a set of possible worlds³. Finally, the ordering source is a function g that takes the set

³ The circumstance of interpretation can be the 'real' world at hand (for priority and dynamic modality) or the world as the epistemic agent figures it (for epistemic modality).

of possible worlds picked up by f and puts them into an ordered structure. The ordering source fixes the order of possible worlds according to preferences (that have a doxastic or an informational nature in case of epistemic interpretation, a deontic nature in case of a deontic one, etc.) and selects the ‘better’ worlds for the domain of quantification. That is, modal base and ordering source select together the domain of quantification of modal expressions.

Modality does not only involve quantification over selected alternatives. Given the metaphysical conception of time and modality in (7), modality has also an inherent temporal meaning. As the schema in (7) shows, time draws on linearly and, at any given time t_n , different paths open toward the future. Each opened path represents an alternative:



The time with respect to which the modal base is applied constitutes the initial point of the temporal span where the alternatives are situated. This time span is called ‘temporal perspective’ and is represented by ‘[t,_)’ (Condoravdi 2002). Temporal perspective expands toward the future without limit.

Given all these elements, the lexical entries for modal expressions are as follows:

- (8) a. POSSIBLE: $\lambda w \lambda f_t \lambda g \lambda t \lambda P \exists w' [w' \in f_t(w) \ \& \ g(f_t(w)) \ \& \ AT([t, _), P(w')]]$
 b. NECESSARY: $\lambda w \lambda f_t \lambda g \lambda t \lambda P \forall w' [w' \in f_t(w) \ \& \ g(f_t(w)) \ \rightarrow \ AT([t, _), P(w')]]$

Where w' is any possible world into the conversational background and P is the semantic representation of the prejacent (i.e. the sentence under the modal operator), so that $P(w')$ means that P is true in w' . The predicate ‘AT’ makes the work of inserting eventualities in time (Kamp & Reyle 1993).

The standard semantic analysis of modality constitutes a very elegant way of solving the systematic multiplicity of meanings that modal expressions show across

languages⁴. However, there are deep problems that have been pointed out in the literature. This paper will focus on two of them. The first problem is a foundational one, and was posed by Nauze (Nauze 2008). The objection basically says that even though the conversational background functions *f* and *g* select possible worlds (i.e., propositions), they cannot *a priori* identify those propositions as epistemic, deontic or as pertaining to any other type of modality (Nauze 2008: 154-155). The conclusion that Nauze draws from this is that conversational background fixes the content for evaluation but not the type of modality. Therefore, modal expressions that do not show strict lexical restrictions have to be, after all, ambiguous.

The second problem comes from the fact that there are different linguistic phenomena that systematically take the epistemic interpretations apart from the other types of modal interpretations⁵. Nothing in the semantic apparatus of modality can establish a dichotomy between different types of modality. The linguistic phenomena that show such a dichotomy have to do with (i) the interaction between modality, time and aspect (Condoravdi 2002, Hacquard 2006, Demirdache & Uribe-Exebarria 2008, 2014, Ramchand 2012) and (ii) the interaction of modality with propositional operators like negation or conditional (Drubig 2001, Papafragou 2000, 2006, Portner 2007a, von Stechow and Gillies 2007a, 2007b).

The guiding idea of this paper is that the logical properties of modality cannot by themselves solve the aforementioned problems. In this sense, logical properties of modality have to be put at work hand by hand with its discursive properties.

The paper is organized as follows. The next section analyzes the interaction between modality, time and aspect. In section three, the discussion will be focused on the proposition expressed by epistemic modality and the allegedly evidential character of epistemic modality. Section four is devoted to the analysis of the abstract structure of discourse and to the discursive properties of modality. Given the hypothesis proposed in section four, the puzzles of the standard semantic theory

⁴ If modal expressions were ambiguous, it would be impossible to explain the cross-linguistic nature of the multiplicity of modal meanings.

⁵ The systematic distinction between epistemic modality and the other types of modality has led the scholars to lump the non-epistemic modality under one simple label; so, 'root modality' is the usual term for non-epistemic modality. In this paper, a distinction will be drawn between epistemic and non-epistemic modality.

of modality pointed out in this paper will be addressed. The paper ends with some conclusions and some proposals for future research.

2. Modality, time, and aspect

All sentences display a double fold temporal dimension: The *temporal location* of the situation described with respect to the utterance time and the *temporal structure* of the very same situation. These two dimensions correspond, respectively, to the categories of Tense and Aspect. The category of Aspect divides itself into two categories: Viewpoint aspect and situation type aspect (Smith 1991). The former has to do with the visibility of the endpoints of a situation. Situation type aspect depends on the temporal extension and the telicity of the situation⁶.

As has been said before, modalized sentences introduce an additional temporal dimension, the ‘temporal perspective’. Given that modalized sentences necessarily contain a prejacent, a temporal relation can be identified between the temporal perspective of the modal and the time when the eventuality described by the prejacent holds. This temporal relation is called ‘temporal orientation’.

The crucial data with respect to temporal perspective and temporal orientation was discussed in detail by Condoravdi (Condoravdi 2002). The results can be summarized in the following table:

(9)

Modal	Tense of the modal	Temporal	Temporal
Interpretation	verb	Perspective	Orientation

Root	Present	Present	Future
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⁶ The classical aspectual categories and their features are the followings (where T represent telicity and E, temporal extension):

Eventualities	States (+T, -E)		
	Eventives	Activities (-T,+E)	
		Events	Accomplishments (+T,+E)
			Achievements (+T,-E)

Epistemic	Present	Present	Present
Root	Past	Past	Future
Epistemic	Past	Present	Past

The first relevant observation is that the temporal orientation of root modality is always future, but its temporal perspective depends on Tense. These data has been interpreted as follows: Root modality is such that (a) the situation designated by the prejacent is not settled when the temporal perspective comes up and (b) Tense has scope over modality. This last point is formalized as follows:

$$(10) \quad T(\text{MOD}(\varphi))$$

In contrast, the temporal orientation of epistemic modality cannot be future and the temporal orientation (in matrix sentences) is always present. Following the generalizations, it has been claimed that: Epistemic modality is such that (a') The situation designed by the prejacent is settled when the temporal perspective comes up (even though the speaker does not know in which 'direction' it has been settled) and (b') Tense is under the scope of modality. Formally:

$$(11) \quad \text{MOD} (T(\varphi))$$

The following examples illustrate the interpretative difference between (10) and (11):

(12) The children may have won the race

(13) a. In view of what now I know, the children may have won the race
b. MODAL (PERFECT (the children win the race))

(14) a. In view of the circumstances in the past, the children had the opportunity of winning the race
b. PERFECT (MODAL ((the children win the race)))

In the epistemic interpretation (13b), the modal time [t,_) is anchored to the utterance time. The perfect shifts the time of the prejacent to the past. Therefore, the epistemic interpretation in (13a) has a present temporal perspective and a past orientation. In the non epistemic interpretation, the perfect makes the modal time

shift to the past. Therefore, non epistemic interpretation has a past perspective and a future temporal orientation.

Since semantic interpretation goes hand by hand with syntactic configuration, it can be said that epistemic modality appears syntactically above Tense and root modality under Tense. In other words, the basic type of modality is read off from syntactic configuration (Hacquard 2006, Ramchand 2012).

As for the interaction between sentence aspect and modality, the crucial point is that with present modality, only statives are compatible with an epistemic interpretation (Ramchand 2012):

- (15)
- a. The children may play the piano (root modality)
 - b. The children may be playing the piano (epistemic modality)
 - c. The children may be at home (epistemic or root modality)
 - d. The children may have played the piano (epistemic or root modality)

Sentence (15a), whose prejacent is eventive, has a non-epistemic interpretation. But the progressive aspect of the prejacent forces an epistemic interpretation (example (15b)). If the prejacent is stative, as in (15c), all (available) modal interpretations are acceptable. As the example in (15d) shows, with respect to aspect, no restriction applies to past modality.

The interaction of modality, tense and aspect can be addressed by a system that works as follows (Condoravdi 2002, Ramchand 2012). In the case of present tense modality, if the prejacent is stative, the modalized sentence ends up with any available modal interpretation. To illustrate this case, the semantic interpretation of (16) goes as follows:

- (16) The child may be in the garden (=P)
 $\exists w' [w' \in f_1(w) \ \& \ g(f_1(w)) \ \& \ \exists e [P(w')(e) \ \& \ \tau(e, w') \circ [UT-T, _]]]$

The overlap of the temporal spans $\tau(e, w')$ and $[UT-T, _]$ makes the sentence compatible with the temporal orientation of any type of modality.

The semantic interpretation of a present modal with an eventive prejacent differs from the interpretation of a stative because the temporal insertion of the eventuality into the modal span is an inclusive one:

- (17) a. The child may play the piano (=Q)
 b. $\exists w'[w' \in f_{UT-T}(w_0) \ \& \ g(f_{UT-T}(w_0)) \ \& \ \exists e [Q(w')(e) \ \& \ \tau(e, w') \subseteq [UT-T_]]]$

The eventuality time, being the prejacent an eventive in (17a) [= (15a)], has to be included in the modal span. This means that the only possible modal orientation is future. This is why epistemic reading is excluded⁷.

No such restriction occurs when the perfect shift the modal span to the past and, so, (15d) can receive both interpretations.

As has been said, epistemic modals in matrix sentences are anchored to the utterance time. In embedded sentences, the temporal perspective of epistemic modals is determined by the tense value of the main verb:

- (18) The parents thought that the children may have played the piano

In (18), the epistemic agent is the subject of the main clause (i.e., the parents) and the epistemic state that counts for the calculation of alternatives is a past epistemic state.

Even though the formal system that has been put to work seems to offer a general explanation of the main data⁸, there are many problems that have to be addressed. In this paper, the attention will be focused on the temporal perspective of epistemic modality.

The generalization according to which epistemic modality always has a present temporal perspective is questioned by examples like (19) for English (Mari and Schweitzer 2010) and von Stechow and Gillies (2007a) and (20) for Dutch (Boogaart 2007):

- (19) [*Context: Jack Bauer is testifying before a commission about his actions during a period when the president was kidnapped*] The President could have already been dead, so I called the vice president.

- (20) Given what we knew at the time, John might have been the thief

⁷ The fact that epistemic modality cannot have future orientation can be stated in terms of a settledness presupposition: Epistemic modality presupposes that the prejacent is settled (Condoravdi 2002). However, the use in this case of the term ‘presupposition’ is misleading.

⁸ A point that cannot be addressed in this paper is the variability between languages with respect to the interaction between modality, tense and aspect.

- (21) Hij moest ziek zijn
 He must-PAST ill be
 = It was very likely that he was ill
 ≠ It is very likely that he was ill

These examples are taken to be cases of epistemic modality in matrix sentences with past temporal perspective. If this is correct, the modal time of epistemic modality (in non embedded sentences) would be not necessarily anchored to the utterance time and the data that has been discussed in this section would remain without explanation.

3. Modality, proposition expressed and propositional attitude

In the literature on modality, phenomena related to the proposition expressed by a modalized sentence have been widely discussed (Papafragou 2000, 2006; von Stechow 2007a, b; Portner 2007a, 2009). The basic theoretical assumption underlying the discussion is that the proposition expressed by a sentence reflects its truth conditional meaning. In this sense, any component of the proposition expressed contributes to the truth conditions of the proposition and interacts with propositional operators such as negation and implication.

According to the standard analysis of modality, modal expressions uniformly contribute to the proposition expressed by the modalized sentence because all of them quantify over alternatives selected by the conversational background. However, the truth conditional behaviour of epistemic modality poses interesting challenges to the standard analysis of modality. Take the following examples:

- (22) a. It must be raining outside; # I see / smell the rain
 b. It must be raining outside; I hear the sound of water splashing in
 the window

Example (22a) shows that the information attached to the prejacent of an epistemic modal expression cannot come from direct experience, but has to be inferred by the speaker. In the case of (22b), the sound of water serves as a premise to reach the conclusion that it is raining outside. Following this line of reasoning, the function of epistemic modality would be to establish the informational source of the prejacent and the degree of commitment toward the proposition expressed by the prejacent rather than to quantify over alternatives. That is, in epistemic modality,

the force of the modal expression would just indicate the degree of commitment of the speaker towards the proposition of the prejacent⁹. In other words, epistemic modality would not be a type of modality proper but as a type of evidential expression¹⁰.

The crucial data for resolving this point makes reference to the interaction of modality and negation and the behaviour of modality in conditionals.

As for negation, it has been observed that the dissent behaviour with respect to modalized sentences is not as uniform as the standard theory of modality predicts. When the hearer dissents from the speaker's modalized sentence, the target of the dissent is the whole sentence under a non epistemic interpretation but the prejacent under an epistemic interpretation:

- (23) A.- The children may be at home
 B.- No, that's not true

If A's utterance is interpreted by B as epistemic, B's utterance means that that the prejacent is not true (as is shown in (24a)). The target of B's dissent cannot be the mental state of A that has led her to think that it is possible that the children are at home:

- (24) a. B': It is not true that the children are at home
 b. B'': # It is not true that in view of what A knows, the children
 may be at home

The situation is completely different if A's utterance in (23) has a non epistemic interpretation. Under this interpretation, the target of negation has to be the modalized sentence.

- (25) a. It is not true that in view of their parents' rules, the children
 may be at home
 b. # It is not true that the children are at home

⁹ Epistemic modal expressions would then be a tool for marking the source of information and, simultaneously, would mark (via modal force) the speaker's attitude towards the information contained in the prejacent; High commitment in the case of necessity modals and low commitment in the case of possibility modals. These features turn epistemic modality into evidential markers only if these features are their primary meaning (see section 4).

¹⁰ See Dendale and Tasmowski (2001) for a broad view of the theories that relate modality and evidentiality.

That epistemic modality is not affected by negation means that epistemic modality necessarily takes scope over negation. Other examples that show these facts are the following (Drubig 2001):

- (26) John may not be at home
(27) a- MAY (\neg be-at-home (john)) (epistemic / non epistemic)
b. \neg MAY (be-at-home (john)) (non epistemic)

If negation is interpreted under the scope of the modal, as in (27a), all ‘potential’ interpretations are available. If, for simplicity, the interpretations are restricted to the epistemic and the deontic ones, (27a) can get any of them:

- (28) a. In view of what I know, it is possible that John is not at home
(epistemic)
b. In view of some norm, John has the permission of not being at home (deontic)

However, if negation takes scope over the modal, as in (27b), the only available interpretation is the deontic one.

Moreover, if negation is unambiguously interpreted over the modal, the epistemic interpretation is not available:

- (29) Nobody may be at home (non epistemic)

However, other examples show that epistemic modality does in fact interact with negation. In the case of dissent behaviour, if the source of the information is ‘sound’, the negation may target the modalized sentence (Portner 2007a). Given the following professional conversation between meteorologists, B’s utterance has the whole modalized sentence as its target:

- (30) A.- It may rain this afternoon
B.- No, that’s not true (= It is not true that it may rain this afternoon)

Other examples that show that modality interacts with negation are the following (Papafragou 2006):

- (31) a. John need not to be the main suspect
b. \neg NECESSARY (be-the-main-suspect (john))

Contrary to the facts shown in (27b) and (29), negation in (31) scopes over an epistemic modal expression.

The main conclusion that can be reached at this point is that epistemic modal expressions do contribute to the proposition expressed by the modalized sentence, but this contribution can be bypassed under certain circumstances. Obviously, some explanation for the data in (33)-(41) has to be offered, but, for our purposes, the important point is that the interaction between modality and negation is more intricate than the standard theory of modality presumes.

It is interesting to note here that the assent behaviour with respect to epistemic modal expressions is also unexpected given the truth conditional analysis of modality. When a participant assents to a modalized epistemic sentence, she shifts the agent of evaluation (von Fintel and Gillies 2007b):

- (32) A: The children may be at home
 B: Yes, you are right

B's utterance has the interpretation in *a*, never the interpretation in *b*:

- (33) a Yes, In view of what B knows, the children may be at home
 b. # Yes, in view of what A knows, the children may be at home

A second type of phenomena related to the problem of the truth conditional contribution of modal expressions has to do with modality in conditionals. A modalized sentence in the antecedent of a conditional has only a non epistemic interpretation:

- (34) If the children may be at home, we might buy some pizzas for
 them

The fact that epistemic modal expressions cannot appear in the antecedent of a conditional can be attributed to the fact that non truth conditional components of meaning lie outside the scope of the conditional. However, two facts have to be considered before working out the conclusion that epistemic modal expressions do not contribute to the proposition expressed. First, alternative explanations for this

restriction are possible¹¹. Second, sometimes, epistemic modal expressions are acceptable in antecedent position (von Stechow and Gillies 2007a):

- (35) If there might have been a mistake, the editor will have to reread the manuscript.

It seems, then, that sometimes epistemic modal expressions do not contribute to the proposition expressed by the modalized sentence and that sometimes they do. In this paper, some explanations for this unexpected behaviour of epistemic modal expressions will be explored. The first step in this direction consists in the analysis of the discursive features of modality. This is the topic of the following section.

4. Modality in discourse

Even though the standard theory gives the context a fundamental role in the interpretation process of modality, the way context works in relation to modality and, therefore, the discursive properties of modality remain in the obscurity. In order to shed some light on these questions, some general remarks on linguistic activity are necessary.

Linguistic activity is carried out into a discourse; a discourse that linguistic activity contributes to create¹². But, what is the structure of discourse?

4.1. An informal presentation of a formal theory of discourse

Discourse is an abstract structure where different types of information are represented. The discourse stores contextual information in two levels: the Common Ground (Stalnaker 1978, 2002) and the To-Do List (Portner 2004). The flow of information is governed by a set of questions stored in the Question Under Discussion Stack (Ginzburg 1994). Discourse, as an abstract structure, feeds and is fed by an abstract structure where each interlocutor's environment is represented: The Focus of Current Situation (Sánchez de Zavala 1994, 1995).

Different studies in cognition have stressed the paper of conscious attention in perception (Sperber 2005, Simons & Chabris 1999). Perception is not a neutral and passive cognitive process. On the contrary, perception of the environment involves

¹¹ See Papafragou 2006 for the discussion of these data.

¹² This is why discourse is inherently dynamic.

the integration of stimuli into the individual’s cognitive system¹³. The information read off from the stimuli is stored in FCS¹⁴. As such, FCS performs two important functions. On the one hand, it establishes the current circumstance (i.e., the world and time coordinates) of evaluation. On the other hand, since utterances are (linguistic) stimuli, the information read off from them is sent to FCS and remains there. If the information is accepted, it is sent to one of the structures of the discourse for the storage of information: the Common Ground or the To-Do List¹⁵.

The Common Ground is the abstract structure where the descriptive information that speaker and addressee accept as shared by them is kept (Stalnaker 1978, 2002)¹⁶. Descriptive information comes mainly from declarative sentences, but descriptive information is also found in other types of sentences. So, for example, descriptive information is found in presuppositions and in entailments triggered by questions and imperatives.

The propositions contained in the Common Ground are taken as if they were factual. In this sense, the intersection of the propositions that are in the Common Ground (i.e. the worlds compatible with the Common Ground) establish the alleged real world and its history for the interpretation of an utterance in discourse.

Another contextual abstract structure is the To-Do List. For each participant in the discourse, there is a ‘To-Do List’ assigned to her. The To-Do List of a participant *a* lumps together the ‘duties’ that all participants assume *a* is tied to bring about if she is going to fulfil her requirements, desires or goals. Imperatives feed this component of context. Formally, a To-Do List is a set of properties that represent actions. To illustrate this component:

$$(36) \quad \text{To-Do List } (a) = \{\lambda w \lambda x [x \text{ is quiet in } w \wedge x=a], \lambda w \lambda x [x \text{ comes here in } w \wedge x=a], \dots\}$$

¹³ See Jackendoff 2002, chapter 10.

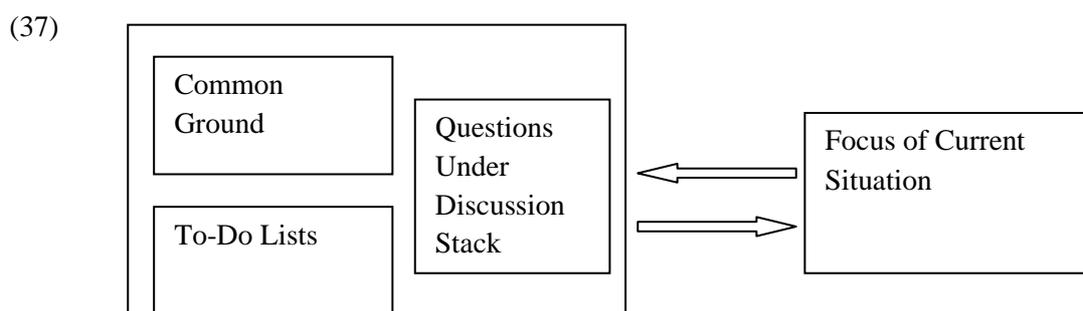
¹⁴ This structure shows certain similarities to the common propositional space (CPS) proposed by Portner (Portner 2007a). Portner defines the common propositional space as the set of “propositions of which the participants are mutually aware and which are candidate for inclusion in the common ground” (Portner 2007a: 10).

¹⁵ The hypothesis that the interpretation process is made in two steps is not new. In some sense, it is recognized in Stalnaker (1998): “First, the addressee takes in and adjust to the fact that a particular proposition has been asserted –that it has been proposed that a certain piece of information be mutually accepted; second, the addressee accepts or rejects the proposal” (Stalnaker 1998 [1999: 102]).

¹⁶ In this sense, the CG feeds speaker’s presuppositions because speaker’s presuppositions are the speaker’s belief about the common ground (Stalnaker 2002: 717).

Another abstract structure of discourse is the Question Under Discussion Stack. The Question Under Discussion Stack keeps track of the accepted but not yet answered questions in the course of the linguistic activity (Ginzburg 1994, Roberts 1996). So, QUD is a (partially) ordered set of questions. The main question under discussion (and its possible sub-questions) guides the dynamics of the discourse by: (i) determining the information structure of sentences and (ii) giving coherence to the discourse.

To summarize, the schematic structure of discourse is as follows:



Once the structure of discourse has been designed, our next goal is to analyse how modal expressions are integrated in discourse.

4.2. Modal expressions in discourse

4.2.1. Epistemic modality

Epistemic modal expressions (in addition to the assertive component of meaning) fulfil a discursive function that consists in bringing the prejacent to the FCS¹⁷.

This idea can be compared to the proposal made by von Stechow & Gilles (2007) according to which epistemic modal expressions *proffer* the prejacent. The proffered content is the move the speaker makes to achieve the goals of the discourse¹⁸.

The discursive function of epistemic modal expressions that has been proposed here explains the following data. First, the source of the information of the

¹⁷ In this sense, epistemic modality is performative in Portner's sense: "I refer to a modal as performative if, by virtue of its conventional meaning, it causes the utterance of a declarative sentence to perform a speech act in addition to, or instead of, the act of assertion which is normally associated with declarative clauses" (Portner 2009: 137)

¹⁸ The goal of the discourse consists in offering an answer to the questions under discussion.

prejacent sentence cannot be the physical environment. Since the information coming from the physical environment is already in FCS, it makes no sense to bring that information to FCS with a modal quantificational force¹⁹. That is, if it is raining in the physical environment and the speaker wants to linguistically express this fact, she just utters (38a) and not (38b):

- (38) a. It is raining
 b. It must be raining

Note that the explanation does not make reference to the force of the claim attached to these expressions (see Karttunen 1972, von Stechow and Gillies 2010).

The evidential character associated to epistemic modality is derivative. That is, modal expressions are not inherent evidential markers. On the contrary, the evidential character of epistemic modal expressions derives from their discursive function. The information associated to the prejacent is an inference worked out from information that the epistemic agent holds. This is why the Common Ground has to be a subset of any epistemic conversational background (Portner 2007b: 368):

- (39) A: The book is not in the library
 B: Yes. #Maybe it's on the fourth floor of the library

Another interesting result is that, given the discursive function of epistemic modal expressions, when the prejacent is stored in FCS, it has to be decided whether it has to be accepted (i.e. has to be sent to the Common Ground) or rejected.

In the assent case, two possibilities arise. First, the prejacent is accepted and recognized as a fact:

- (40) A.- The children might be at home
 B.- Yes, it's true. The children are at home

The second possibility goes as follows: B accepts the prejacent, but it remains modalized. Now, the point of view changes from A to B, so that B takes responsibility over the prejacent:

- (41) A.- The children might be at home

¹⁹ Similarly, it would be strange to say (non ironically or with another special pragmatic intention) 'It is raining' in a rainfall situation.

B.- Yes, it's true. (In view of what I (=B) know) The children may be at home

The second possibility illustrated in (41) is also represented by the following conversation:

- (42) A.- The children might be at home
B.- Ok, I'll keep it in mind (=I'll keep in mind that the children might be at home)

The dissent case is parallel to the assent case. There are also two possibilities. In the first one, negation only affects the prejacent:

- (43) A.- The children might be at home
B.- No, that's not true. The children are not at home

The second possibility has been illustrated by the meteorologists discussing about the *possibility* of raining. In this case, B refuses to keep in mind the epistemic possibility expressed by A:

- (44) A.- The children might be at home
B.- No, that's not true. The children might not be at home

The chameleonic behaviour of epistemic modality is explained by its main discursive property. Epistemic modality brings the prejacent to FCS, and, therefore, it puts the prejacent under discussion. But simultaneously, the speaker has expressed a modalized proposition²⁰.

As a consequence, epistemic modality has a truth conditional component of meaning that cannot be dropped out. This component is semantic and follows the mechanism posed by the standard theory of modality. But in addition, epistemic modal expressions perform a discursive function: They bring the antecedent to the FCS.

²⁰ Lyons distinguished between subjective and objective epistemic modality (Lyons 1977). Lyons said that objective epistemic modals (but not subjective) are an 'act of telling' and that, therefore, can be denied, accepted, questioned and hypothesized. Our hypothesis is that subjective (and intersubjective) epistemic modality interacts with propositional operators when the question under discussion is an 'act of telling', but the interaction disappears when the main point of the utterance is to bring the prejacent to the FCS.

The discursive function of epistemic modals also explains why epistemic modality is attached to the present. Epistemic modals put the prejacent under discussion. This means that it is the current information state of the speaker what counts:

- (45) a. The children may have been in the garden
 b. In view of what now I know, there is now a possibility of taking
 ‘*the children have been in the garden*’ as true.

Epistemic modality is anchored to the utterance time given that its performative function is to carry the prejacent to the focus of *current* situation. However, as the assent/dissent examples have shown, propositions containing epistemic modals can be stored in the CG. The claim is that only epistemic modals that come from already modalized propositions in the CG have past perspective. In some sense, epistemic modals with past perspective describe a mental state, which means that these examples are cases of implicit citation. So, given the context in (46), the epistemic modality of (47a) has to be interpreted as (47b):

- (46) Jack Bauer is testifying before a commission about his actions
 during a period when the president was kidnapped
(47) a. The President could have already been dead, so I called the vice
 president.
 b. I thought that the President could have already been dead, so I
 called the vice president.

As has been already said (example (18)), the temporal perspective of epistemic modals in embedded sentences is determined by the tense value of the main verb.

As for conditionals, the discursive function of epistemic modals is incompatible with having the epistemic modal in the antecedent of a conditional sentence. However, the analysis of epistemic modal expressions in the antecedent of conditionals would require a deep study of the semantics and pragmatics of conditionals, a work that goes beyond the extension of this paper.

4.2.2. *Priority and dynamic modality*

A performative component of meaning for priority modals has been proposed (Ninan 2005, Portner 2007b). In this case, the discursive function of priority modals consist in linking their prejacent to a To-Do List. One important argument is that priority modals and imperatives show the same threefold division in their

interpretation²¹. The following examples show respectively a deontic, bouletic and teleological interpretation of imperatives and modals (Portner 2007b):

- (48) a. Sit down right now
b. Noah should sit down right now
- (49) a. Have a piece of fruit
b. Noah should have a piece of fruit
- (50) a. Talk to your advisor more often
b. Noah should talk to his advisor more often

Given that imperatives insert new properties in To-Do Lists, imperatives are contextual clues for priority modal readings, as the following examples show (Portner 2007b):

- (51) A: Go present this proposal to our bankers today!
B: I should take the 7 a.m. flight to New York then

Imperative in (51A) creates a new file in the teleological To-Do List. The information in this file is crucial for the interpretation of (61B) as teleological.

In the case of dynamic modality, there is no additional performative component. This means that dynamic modality is directly tied to the CG.

4.3. The interpretation of modality in discourse

Now, the challenge to the standard analysis of modality posed by Nauze can be addressed. Remember that the point of Nauze's criticism was that conversational background is able to fix the content for evaluation but not the type of modality.

Now, a division of labour can be established. Whereas the logical properties of modal expressions fix the content of evaluation, the discursive properties of modal expressions determine the type of modality²². The following relations can be stated:

I.- A modalized sentences is epistemic if the speaker intends to link the prejacent to FCS.

²¹ The second argument rests on the grammatical reality of the subdivisions of To-Do List (see Portner 2007b).

²² In fact, this hypothesis is not far from Nauze's proposal.

II.- A modalized sentence is of the priority type if the speaker intends to link the prejacent to the To-Do List.

III.- A modalized sentence is dynamic if the speaker intends to link the sentence to the Common Ground.

These are, then, the three main discursive aspects of modality. Now, what triggers the discursive function of a particular modal expression if (given the lexical meaning of the modal, the temporality and the predicates involved in the sentence) more than one interpretation is available?

If the discursive function of modality has to be conventionally attached to the lexical entry of modal expressions, it should be recognized that modal expressions show lexical ambiguity after all. The proposal that seems to be more plausible is that the discursive function of modality is not lexically stored. Discursive functions are general mechanisms that come from the interaction between the general and universal structure of the discourse and the notional category of possibility.

5. Conclusions

The standard theory of modality has established the logical properties of modal expressions. Modal expressions quantify over alternatives and the domain of quantification is restricted by the conversational background. Moreover, modal expressions have an inherent temporal feature.

The standard theory cannot by itself explain why some linguistic phenomena make a systematic distinction between epistemic and non epistemic interpretations. The specificity of epistemic modality consist in that (i) epistemic interpretations in matrix sentences have a present temporal perspective and (ii) epistemic expressions under certain circumstances do not interact with propositional operators like negation and conditional. Moreover, as Nauze has shown, the logical properties of modality cannot univocally determine the type of modality of a modalized utterance.

The guiding thesis that has been proposed in this paper is that modal expressions have logical and discursive properties. Logical properties are in line with the standard theory, so that the aforementioned problems can be addressed if the focus is put on the discursive properties of modality. This means that, first of all, it is necessary to have a theory of discourse as detailed as possible.

Discourse is a structured abstract representation system. The main components of this structure are: The Common Ground (CG), the To-Do List (T-DL), the Question Under Discussion stack (QUD) and the Focus of Current Situation (FCS).

The discursive properties of modality are the following: (i) Epistemic modality brings the prejacent to the FCS, (ii) Priority modality relates the prejacent to the To-Do List and (iii) Dynamic modality relates the modalized utterance to the CG.

The discursive properties of modality are not conventionally attached to the lexical entry of a modal expression. They are general and universal mechanisms that comes from the structure of discourse and the notional category of possibility.

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