

# On perfect(ive) morphology above and below modals. The *H-ident* hypothesis\*

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Received: September 9, 2017

Accepted: April 13, 2018

## Abstract

The purpose of this paper is to demonstrate that temporal-aspectual morphology can only be interpretable regarding root modals. It is not interpretable with epistemic modals. We will defend that this difference has its origin in the non-eventive nature of the latter. This proposal will take us, on the one hand, to support the *hypothesis of the identity of haber* ('have'), i.e., the semantic equivalence between examples in which the main predicate of the periphrastic structure ( $\langle \text{modal}_{\text{Epistemic}} + \text{have}_{\text{.INF}} - \text{V}_{\text{.PST.PTCP}} \rangle$ ) and the epistemic modal ( $\langle \text{have} - \text{modal}_{\text{Epistemic.PST.PTCP}} + \text{V}_{\text{.INF}} \rangle$ ) are construed with the auxiliary verb *haber*. On the other hand, we will maintain that epistemic modals are integrated into monoclausal structures. Conversely, the structures into which root modals are integrated would be biclausal.

**Keywords:** modal auxiliaries; syntactic scope; tense; grammatical aspect

**Resum.** *Sobre la morfologia perfectiva a sobre i a sota dels modals. La hipòtesi de la identitat d'haver*

El propòsit d'aquest treball és demostrar que la morfologia temporal i aspectual només pot interpretar-se amb els modals radicals. No és interpretable quan es tracta de modals epistèmics. Defensarem que aquesta diferència té el seu origen en la naturalesa no eventiva dels últims. Aquest plantejament ens portarà, d'una banda, a donar suport a la *hipòtesi de la identitat d'haver*, o, el que és el mateix, l'equivalència semàntica entre els exemples en els quals el predicat principal de la estructura perifràstica ( $\langle \text{modal}_{\text{Epistemic}} + \text{haver} - \text{V}_{\text{.Participi Passat}} \rangle$ ) i el modal epistèmic ( $\langle \text{haver} - \text{modal}_{\text{Epistemic.Participi Passat}} + \text{V}_{\text{.INF}} \rangle$ ) es construeixen amb l'auxiliar *haber*. Sostindrem, d'altra banda, que els modals epistèmics s'integren en estructures monoclausals. Per contra, les estructures en què s'integren els modals radicals serien biclausals.

**Paraules clau:** auxiliars modals; abast sintàctic; temps; aspecte gramatical

\* This study is part of the research project *Chains of auxiliary verbs in Spanish* (FFI2015-68656-P), financed by the Spanish Ministry of Economy and Competitiveness. I would like to thank José María Brucart Marraco and Teresa María Xiqués García very sincerely for their kindness in inviting me to participate in this monographic volume of *Catalan Journal of Linguistics*. I also want to acknowledge my gratitude to the two anonymous reviewers who read the first version of the paper for their helpful remarks and suggestions. Of course, all remaining errors are mine.

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*Any proposed analysis of the tense and aspect system of Spanish must meet the challenge presented by the interaction of these categories with the modal verbs.*

(Laca 2005: 10; translation ACG)

## 1. Introduction

It is a commonplace in the literature that modal verbs such as Spanish *deber* (*de*) or *tener* (*que*), associated with the notion of necessity, and *poder*, associated with that of possibility, are the expression of two types of modality: *epistemic modality*, in which the necessity or the possibility are related to the speaker's knowledge; and *root modality*, which relates to the circumstances that surround the main event and its participants. Consider examples (1) and (2). From now on, we will use the preposition *de* to distinguish between the epistemic (with *de*) and the root (without *de*) interpretation of the auxiliary *deber*.<sup>1,2</sup>

- (1) a. Juan {debe de/puede} haber llenado la piscina  
 Juan must<sub>.PRS.3SG</sub> of/may<sub>.PRS.3SG</sub> have<sub>.INF</sub> fill<sub>.PST.PTCP</sub> the<sub>.F.SG</sub> pool  
 a las 15:00,  
 at the<sub>.F.PL</sub> 15:00  
 'Juan must/may have filled the pool at 3:00 p.m.,
- b. que es cuando llega del trabajo, porque a  
 that be<sub>.PRS.3SG</sub> when arrive<sub>.PRS.3SG</sub> from-the<sub>.M.SG</sub> work, because at  
 las 16:00 ya estaba llena.  
 the<sub>.F.PL</sub> 16:00 already ESTAR<sub>.PST.IPFV.3SG</sub> full<sub>.F.SG</sub>  
 the time he comes home from work, because the pool was already full at  
 4:00 p.m.'

1. This distinction is made in standard European Spanish. Nonetheless, RAE & ASALE (2009: §28.6k; translation ACG) observe: "Because of its great extension in the Spanish-speaking world at all levels of language, the use of '*deber* + infinitive' with the sense of conjecture or inferred probability cannot be considered incorrect. To express obligation, the variety without preposition is recommended".
2. For the sake of simplicity, we will ignore *alethic* (also called *logical* or *metaphysical*) modality, which concerns analytic statements, that is, statements whose truth values are independent of experience.

- (2) a. Los primeros niños llegarán a las 16:00, así que Juan  
 the<sub>.M.PL</sub> first<sub>.M.PL</sub> children arrive<sub>.FUT.3PL</sub> at the<sub>.F.PL</sub> 16:00, so that Juan  
 debe haber llenado la piscina antes de comer.  
 must<sub>.PRS.3SG</sub> have<sub>.INF</sub> fill<sub>.PST.PTCP</sub> the<sub>.F.SG</sub> pool before of eat<sub>.INF</sub>  
 ‘The first children will arrive at 4:00 p.m., so Juan will have to get the pool  
 full before lunch.’
- b. Dado que es tan cabezota, Juan puede haber  
 give<sub>.PST.PTCP</sub> that be<sub>.PRS.3SG</sub> so headstrong Juan can<sub>.PRS.3SG</sub> have<sub>.INF</sub>  
 llenado la piscina antes de que lleguen los  
 fill<sub>.PST.PTCP</sub> the<sub>.F.SG</sub> pool before of that arrive<sub>.PRS.SBJV.3PL</sub> the<sub>.M.PL</sub>  
 niños.  
 children  
 ‘Given that he is so headstrong, Juan will be able to have filled the pool  
 before the children arrive.’

The sentences of (1a) represent the speaker’s conjectures. Those conjectures are based on the available information (1b), namely that the pool is full at 16:00, that Juan is in charge of filling the pool and that Juan arrives from work at 15:00. The selection of the auxiliary verb reveals a greater (*deber de*) or lesser (*poder*) commitment to the truth of the proposition. By contrast, in (2a) the situation denoted by *haber llenado la piscina antes de comer* is presented as necessary in accordance with the obligations imposed by the visit of some children; in (2b), it is presented as possible due to Juan’s temperament.<sup>3</sup>

There is broad consensus on the idea that epistemic modal verbs are generated in higher positions than root modal verbs. This consensus originates in the observation, reflected in the restriction of linearization of (3) (Laca 2005:14), that a root modal verb can never precede an epistemic auxiliary (Rivero 1976: 250; Tasmowski 1980: 45; Picallo 1985: 232-233, 1990: 294; Bosque 2000: 16; Wurmbrand 2001: 185-186; RAE & ASALE 2009: §28.6e-g; Bravo 2015: 46, 2017: 49, among others). The contrast between the English paraphrases (4b,c) of the sentences in (4a) may serve as an illustration:

- (3) \*ROOT MODAL > EPISTEMIC MODAL

3. See, among others, Sueur (1975, 1979, 1983), Lyons (1977), Kratzer (1981), Fleischman (1982), Perkins (1982), Palmer (1986), Brennan (1993), Bybee, Perkins & Pagliuca (1994), Kronning (1996, 2001), Le Querler (1996, 2001), Papafragou (1998a, 1998b), Vetter (2004), Portner (2009), Hacquard (2011), Mari (2015). The term *root* is attributed to Hoffmann (1966). It is normally used to encompass both *deontic* and *dynamic* modality. Deontic modality is related to the notions of obligation and permission (see example 2a). With dynamic modality, what makes possible or necessary the actualization of a determined state of affairs are certain circumstances, understood either as characteristics of an individual (see example 2b) or as general conditions existing in the world (Palmer 1986: 102-103): *Aquí puede crecer cualquier cosa* (‘Anything can grow here’); *Debes irte ahora, si quieres coger el autobús* (‘You must go now, if you wish to catch the bus’).

- (4) a. Debe (de) poder dormir todo el día.  
 must<sub>.PRS.3SG</sub> (of) can<sub>.INF</sub> sleep<sub>.INF</sub> all the<sub>.M.SG</sub> day
- b. ‘According to the available evidence (I infer that), s/he is allowed to sleep the whole day.’  
 $\sqrt{\text{Ep}} > \text{Root}$
- c. ‘S/he is allowed to be possible that s/he sleeps the whole day.’ #Root > Ep

The disagreement begins, however, when it comes to determining the positions of epistemic and deontic modals with respect to the syntactic projections related to temporal and aspectual values, i.e., T(ense) and Asp(ect), respectively. In the literature on English modal verbs, it is generally assumed that root modals are within the scope of T and Asp, whereas epistemic modals take scope over these functional projections (Tasmowski 1980; Picallo 1985, 1990; Butler 2003; Stowell 2004; Werner 2005; Hacquard 2006, 2009; Zagona 2007; Ramchand 2012, among many others).<sup>4</sup> This point of view is represented in Cinque’s (1999) hierarchy (see 5):<sup>5</sup>

- (5) CINQUE’S HIERARCHY (irrelevant projections omitted):  
 Modal<sub>EPISTEMIC</sub> > T > Asp > Modal<sub>ROOT</sub>

The reason to propose (5) is the fact that temporal-aspectual<sup>6</sup> morphology seems to have semantic repercussion exclusively on root modals (the number of the examples corresponds to the original paper):

When these modals [*can* and *could*] are used to convey the root modal senses of ability and permission, they participate in a semantically viable present/past tense alternation, just like normal verbs. This is illustrated in (9), where *UT* designates the utterance time.

- (9) a. Carl can’t move his arm. (ability at UT)  
 b. Carl couldn’t move his arm. (ability at a past time)  
 c. Max can’t go out after dark. (permission at UT)  
 d. Max couldn’t go out after dark. (permission at a past time)

[...] In contrast, when *could* is used epistemically in simple sentences, it cannot have a past tense interpretation.

- (10) a. Jack’s wife can’t be very rich.  
 ‘It is not possible that Jack’s wife is very rich.’  
 b. Jack’s wife couldn’t be very rich.  
 ‘It is not possible that Jack’s wife is very rich.’  
 \*‘It was not possible that Jack’s wife was very rich.’

Stowell (2004: 625)

4. Several studies which maintain that epistemic modals end up within the scope of a defective tense could also be included in this list of references. In Condoravdi (2002), for example, this defective tense would be the present, when the context is extensional, or a zero tense, when the context is intensional. See also Demirdache & Uribe-Etxebarria (2008a, 2008b) for the idea that there is an empty structural position above epistemic auxiliaries.
5. Although the approach we have adopted in this paper is formalist, in functionalist works such as Dik’s (1989) epistemic operators are also conceived as more external than root operators.
6. We borrow this term from Bertinetto (1997: chap. 5).

On the contrary, in the literature on languages different from English, especially those with rich inflectional systems, such as French and Spanish, we find two different approaches. On the one hand, there are studies that assume Cinque's hierarchy and, consequently, maintain that the temporal-aspectual morphology that epistemic modals display would be vacuous (Borgonovo & Cummins 2007; Borgonovo 2011). That means that temporal-aspectual morphology would not have any influence on their interpretation and, hence, that the speaker's conjectures would always be related to the utterance time. On the other hand, there are studies not based on Cinque's hierarchy that defend that T and Asp could take scope over epistemic modals (Eide 2002, 2003, 2011; Boogaart 2007; von Stechow and Gillies 2008; Martin 2011; Homer 2013; Mari 2015). Accordingly, temporal-aspectual morphology would not be vacuous: the speaker's conjectures could be placed before or after the utterance time.

The consequences of supporting one or the other position are immediate. In this study we will concentrate on examples like (6a,b):

- (6) a. Debe de haber llenado la piscina a las 15:00.  
 must<sub>:PRS.3SG</sub> of have<sub>:INF</sub> fill<sub>:PST.PTCP</sub> the<sub>:F.SG</sub> pool at the<sub>:F.PL</sub> 15:00
- b. Ha debido de llenar la piscina a las 15:00.  
 have<sub>:PRS.3SG</sub> must<sub>:PST.PTCP</sub> of fill<sub>:INF</sub> the<sub>:F.SG</sub> pool at the<sub>:F.PL</sub> 15:00
- c. 'According to the available evidence (I infer that), s/he filled the pool at 3:00 pm.'

In (6a), the auxiliary *haber* ('have') precedes the main predicate of the periphrastic structure; in (6b), it precedes the modal verb. If the temporal-aspectual morphology of the epistemic modal is vacuous, these sentences will share the same reading (see the English paraphrase in 6c).<sup>7</sup> This is what Martin (2011) calls the *hypothesis of the identity of haber*. But if the morphology regarding temporal-aspectual values is not vacuous, the meanings should be different.<sup>8</sup>

The aim of this article is to account for the syntax and interpretation of sentences such as (6a,b) in Spanish. We will side with those who affirm that the temporal-aspectual morphology of epistemic modals is vacuous. The hypothesis from which we proceed is that epistemic modals are not eventive predicates.<sup>9</sup> This question is seldom discussed in the literature, and when it is, it is either to emphasize the exceptional character of certain modal verbs in one of their readings (see Bhatt 1999, for example, with respect to the 'get' or 'achieve' senses of the English modal expression *be able*); or to characterize homogeneously all modal verbs (see, for example, Bravo, García Fernández & Krivochen 2015 for the consideration as

7. The term *vacuous* should not be understood as synonymous with *non-overt*. It is a well-known fact that there are morphological contrasts that are not explicit, i.e., that lack overt markers.

8. For simplicity, we will ignore the perfect reading of compound verbal forms until sections 2.1.2, 3.1 and 3.2.

9. We will use the terms *event* and *situation* in a broad sense, that is, to make reference to the denotations of both dynamic and non-dynamic or stative predicates.

eventive of both epistemic and root modals; or Boogart 2007 for the classification as stative of all of them). Here we intend to demonstrate that temporal-aspectual morphology will only have consequences for the interpretation of predicates that denote situations that can be located on the timeline. Epistemic auxiliaries do not denote situations, i.e., are non-eventive; but root auxiliaries do. We will also look into this approach, which connects with some studies that recognize lexical properties in modal verbs (see Wurmbrand 2001).

The paper is organized as follows. In section 2, we collect the evidence to assert that epistemic modals bear vacuous temporal-aspectual morphology (§ 2.1) and that they are non-eventive (§ 2.2). In section 3, we will refute the arguments against the *hypothesis of the identity of haber* (§ 3.1), and we will advance our syntactic proposal for the sentences in which either the main predicate of the periphrastic structure or the epistemic modal are preceded by the auxiliary *haber* (§ 3.2).

## 2. Above better than below

Any syntactic solution for the breach of compositionality that means that the temporal-aspectual morphology of epistemic modals is not interpreted in the place where it is shown is costly from a theoretical point of view: “For this reason there must be very strong empirical evidence [...] beyond the intuition that [...] the past tense affects the state of affairs described in the preadjacent proposition and not the time of the modal evaluation” (Laca 2005: 23; translation ACG). In this section we present a broad sampling of this type of evidence, grouped in three classes: restrictions on the temporal-aspectual morphology of the modal verb caused by the actional nature of the main predicate (§ 2.1.1); interpretation effects of the aspectual values of the main predicate (§ 2.1.2); and counterarguments to the idea that epistemic modals could be evaluated with respect to a time different from the time of utterance (§ 2.1.3).

### 2.1. Empirical evidence

#### 2.1.1. Restrictions on the temporal-aspectual morphology of modal verbs

The proofs in this section are taken from Tasmowski (1980). This author observes that epistemic auxiliaries cannot adopt any form freely. The restrictions that affect the temporal-aspectual morphology of the modal verb derive from the main predicate. Below, we select three types of examples, which we translate into Spanish. Consider in the first place (7a,b) (Tasmowski 1980: §2.1):

- (7) a. Juan {nació / \*nacía} durante una tormenta.  
 Juan be<sub>.PST.PFV.3SG</sub>/born/be<sub>.PST.IPFV.3SG</sub>.born during a<sub>F</sub> storm  
 ‘Juan was born during a storm.’
- b. Juan {debió / \*debía} de nacer durante una tormenta.  
 Juan must<sub>.PST.PFV.3SG</sub>/must<sub>.PST.IPFV.3SG</sub> of be.born<sub>.INF</sub> during a<sub>F</sub> storm  
 ‘Juan must have been born during a storm.’

Two factors are involved in the different judgments of the sentences in (7a). The first is the difference between the perfective and the imperfective aspectual meanings. Following Klein (1992, 1994), we assume that Aspect is a non-deictic grammatical category that joins two intervals: the Situation Time (TSIT), i.e., the whole time of the event denoted by the verbal predicate, and the Topic Time (TT), i.e., the time which is asserted. If the aspectual meaning is perfective, TT includes TSIT. This means that an assertion is being made on the entire event time.<sup>10</sup> If the aspectual meaning is imperfective, TT is included in TSIT. Nothing can be asserted, therefore, regarding the limits of the event, namely when it begins or when it ends or is interrupted.

The second factor is the actional properties of the achievement predicate *nacer* ('be born'). Achievements are telic predicates that denote instantaneous events. In combination with imperfective aspectual morphology they usually result in ungrammaticality. The events denoted by achievement predicates have no duration, so it is not possible to establish the relation of inclusion between TT and TSIT.<sup>11</sup>

Now we can come back to the sentences in (7b). What is relevant here is that the imperfective form is excluded, as in (7a). However, it is not possible to attribute this coincidence to the actional nature of *deber de*. If we asserted that the epistemic modal and *nacer* have the same actional properties, we would not be able to explain what happens in (8). As in (7), there is no difference in the judgments of the grammaticality of (8a) and (8b). Nevertheless, these examples illustrate the resistance of permanent stative predicates to perfective aspect morphology (Tasmowski 1980: §2.1):

- (8) a. Había una.vez una reina [...] {era /\*fue}  
 There.be<sub>:PST.IPFV.3SG</sub> once a<sub>:F</sub> queen be<sub>:PST.IPFV.3SG</sub>/<sub>:PST.PFV.3SG</sub>  
 muy anciana.  
 very old<sub>:F.SG</sub>  
 'Once upon a time, there was a queen [...] she was very old.'
- b. Había una.vez una reina [...] {debía /\*debió}  
 There.be<sub>:PST.IPFV.3SG</sub> once a<sub>:F</sub> queen must<sub>:PST.IPFV.3SG</sub>/<sub>:PST.PFV.3SG</sub>  
 de ser muy anciana.  
 of be<sub>:INF</sub> very old<sub>:F.SG</sub>  
 'Once upon a time, there was a queen [...] she must have been very old.'

In the second place, let's pay attention to (9a,b):

10. The original definition of perfective aspect that can be found in Klein (1992: 537) is the following: "TT including end of TSIT and beginning of time after TSIT". For the definition we adopt, see Smith (1991: 103).
11. (7a) is acceptable if *nacía* is interpreted as a narrative imperfect past. In (7b) this interpretation is blocked by the epistemic auxiliary. Besides, the inclusion relation could be established if a derived plural situation may be construed (*Muchos niños nacían durante una tormenta*, 'Many children were born during a storm'). I would want to thank an anonymous reviewer for this observation.

- (9) a. {Escribió / \*Escribía} esa novela en menos de un año.  
 write<sub>:PST.PFV.3SG</sub> / write<sub>:PST.IPFV.3SG</sub> that<sub>:F</sub> novel in less than a<sub>:M</sub> year  
 ‘S/he wrote that novel in less than a year.’
- b. {Debió / \*Debía} de escribir esa novela en menos  
 must<sub>:PST.PFV.3SG</sub> / must<sub>:PST.IPFV.3SG</sub> of write<sub>:INF</sub> that<sub>:F</sub> novel in less  
 de un año.  
 than a<sub>:M</sub> year  
 ‘S/he must have written that novel in less than a year.’

The predicate of these examples denotes a durative telic event. Only telic events are compatible with temporal expressions like *en menos de un año* (‘in less than a year’). If the event is durative as well, the temporal expression measures the time from the beginning of the event to its culmination. The contrast illustrated in (9a) is due to the fact that imperfective morphology is disallowed with durative telic predicates modified by these temporal expressions. With imperfective morphology the limits of the event cannot be asserted. The same contrast is observed in (9b), although *en menos de un año* does not modify the epistemic auxiliary. In other words, the temporal expression does not measure the time of the commitment of the speaker to the truth of the proposition:<sup>12,13</sup>

In the same vein, temporal expressions headed by *desde* (‘since’) and bounding the time of the verbal event just on the left, i.e., its beginning, are instead compatible with imperfective verbal forms but reject perfective morphology (cf. 10a). Perfective morphology focuses on the whole time of the event. As in the previous examples, *desde abril* (‘since April’) does not modify the modal auxiliary. Despite this, the sentences of (10b) deserve the same judgments as those of (10a): the perfective verbal form *debieron* (‘must<sub>:PST.PFV.3PL</sub>’) results in ungrammaticality (Tasmowski 1980: §2.4):<sup>14</sup>

- (10) a. {Salían / \*Salieron} juntos desde abril.  
 go.out<sub>:PST.IPFV.3PL</sub> / go.out<sub>:PST.PFV.3PL</sub> together since April  
 ‘They had been dating since April.’
- b. {Debían / \*Debieron} de salir juntos desde abril.  
 must<sub>:PST.IPFV.3PL</sub> / must<sub>:PST.PFV.3PL</sub> of go.out<sub>:INF</sub> together since April  
 ‘They must have been dating since April.’

Finally, Tasmowski (1980: §2.2) points out the incompatibility of a non-habitual imperfective past with expressions of frequency. This can be seen in (11a). The

12. Whenever we talk about something that happens habitually, the combination with imperfective morphology is possible. This interpretation is absent in the cases at hand due to the deictic determiner *esa* (‘that<sub>:F</sub>’), which does not allow us to consider more than one single referent.
13. The Spanish examples *Juan debió/\*debía de marcar ese gol en cinco minutos* (‘Juan must<sub>:PFV/\*IPFV</sub> scored that goal in five minutes’) are very similar and allow us to broaden the argument to non-durative telic predicates. In this case, what is measured is the time up to the occurrence of the event.
14. See Vikner (1988: 7) for the same behavior of the Danish modals.



example of (11b) demonstrates that the same restriction applies to the epistemic auxiliary, although, once again, it is not the speaker's high degree of commitment to the truth of the proposition that is being submitted to quantification:

- (11) a. Los actores {saludaron /#saludaban} tres veces antes de  
 the actors<sub>.M.PL</sub> bow<sub>.PST.PFV.3PL</sub> /bow<sub>.PST.IPFV.3PL</sub> tree times before of  
 desaparecer.  
 disappear<sub>.INF</sub>  
 'The actors bowed three times before disappearing.'
- b. Los actores {debieron /#debían} de saludar tres veces  
 the actors<sub>.M.PL</sub> must<sub>.PST.PFV.3PL</sub> /must<sub>.PST.IPFV.3PL</sub> of bow<sub>.INF</sub> tree times  
 antes de desaparecer.  
 before of disappear<sub>.INF</sub>  
 'The actors must have bowed three times before disappearing.'

If we now apply the same proofs to root modals, we confirm that the actional nature of the main predicate of the periphrasis has no effect on the morphology of the auxiliary verb. This would be an indication that the temporal-aspectual morphology of root modals is not vacuous:

- (12) a. Juan debía nacer durante una tormenta. (Cf. 7b)  
 Juan must<sub>.IPFV.3SG</sub> be.born<sub>.INF</sub> during a<sub>F</sub> storm  
 'Juan had to be born during a storm.'
- b. \*Esa reina debía /debió ser muy anciana. (Cf. 8b)  
 that queen must<sub>.PST.IPFV.3SG</sub> /must<sub>.PST.PFV.3SG</sub> be<sub>.INF</sub> very old<sub>.F.SG</sub>  
 'That queen had to be very old.'

Firstly, note that the modal of (12a) can admit imperfective morphology even when the main predicate of the periphrastic structure is an achievement. As for (12b), the ungrammaticality affects both the perfective modal and the imperfective one. This indicates that what conflicts with the actional properties of the predicate is not the aspectual information, but the deontic interpretation of the auxiliary: being very old cannot be conceived as taking part in the obligations of a queen.

Secondly, (13a) illustrates the compatibility of imperfective root modals with predicates modified by temporal expressions such as *en menos de un año*, which measures the time of the event from its beginning to its culmination. In (13b), we see that it is also possible to find perfective root modals with predicates modified by temporal expressions such as *desde abril*, which bounds the time of the event on the left (13b):

- (13) a. Debía escribir esa novela en menos de un año. (Cf. 9b)  
 must<sub>.PST.IPFV.3SG</sub> write<sub>.INF</sub> that<sub>.F</sub> novel in less than a<sub>.M</sub> year  
 ‘S/he had to write that novel in less than a year.’
- b. Debieron salir juntos desde abril. (Cfr. 10b)  
 must<sub>.PST.PFV.3PL</sub> go.out<sub>.INF</sub> together since April  
 ‘They had been having to date since April.’

Finally, (14) does not describe a habit of the actors necessarily. That is, the sentence can refer to the obligation of the actors in a specific circumstance. Nonetheless, the imperfective root modal does not cause ungrammaticality when combined with a verbal predicate modified by a quantifying expression of frequency:

- (14) Los actores debían saludar tres veces antes de desaparecer. (Cf. 11b)  
 the actors must<sub>.PST.IPFV.3PL</sub> bow<sub>.INF</sub> tree times before of disappear<sub>.INF</sub>  
 ‘The actors had to bow three times before disappearing.’

### 2.1.2. Interpretation effects of the the main predicate aspectual values

Whatever the syntactic solution chosen, another way to argue for the different positions of epistemic and root auxiliaries with respect to T and Asp is to compare the effects of grammatical aspect meanings on the interpretation of predicates. The first two proofs come from Borgonovo & Cummins (2007) (see also Borgonovo 2011); the third is ours.

One of the observations of Borgonovo & Cummins (2007) is that imperfective aspectual meaning leads to progressive or habitual interpretations when combined with dynamic predicates. Consider (15a,b) and (16):

- (15) a. Pedro abría la puerta cuando sonó el  
 Pedro open<sub>.PST.IPFV.3SG</sub> the<sub>.F.SG</sub> door when ring<sub>.PST.PFV.3SG</sub> the<sub>.M.SG</sub>  
 teléfono.  
 phone  
 ‘Pedro was opening the door when the phone rang.’
- b. Pedro abría la puerta en verano al despertar=se.  
 Pedro open<sub>.PST.IPFV.3SG</sub> the<sub>.F.SG</sub> door in summer to-the<sub>.M.SG</sub> wake.up<sub>.INF</sub>  
 ‘Pedro used to open the door in summer when he woke up.’
- (16) Pedro debía [de] abrir la puerta.  
 Pedro must<sub>.PST.IPFV.3SG</sub> [of] open<sub>.INF</sub> the<sub>.F.SG</sub> door  
 ‘P must have been opening the door.’ or ‘P must have opened the door (habitually).’  
 [Borgonovo & Cummins (2007: 3); example (2a)]

The former sentences can be used either to place a single occurrence of the verbal event on the timeline as coincident with the phone call, as in (15a) (*progressive reading*), or to describe the usual behavior of the entity denoted by the subject in

summer, as in (15b) (*habitual reading*). But what is interesting is that the dynamic predicate would receive these same two interpretations, even though the temporal-aspectual markers fall on the epistemic auxiliary, as in (16). Thus, the epistemic modal is ‘transparent’ regarding the aforementioned aspectual values, so to speak.

The second observation of Borgonovo & Cummins (2007) concerns the interpretation of the verb *conocer*. Consider (17) and (18):

- (17) a. Pedro conocía a Marta.  
 Pedro know<sub>PST.IPFV.3SG</sub> toMarta  
 ‘Pedro knew Marta’
- b. Pedro conoció a Marta en la fiesta.  
 Pedro know<sub>PST.PFV.3SG</sub> to Marta at the<sub>F.SG</sub> party  
 ‘P met M at the party.’  
 [Borgonovo & Cummins (2007: 4); examples (5a,b)]

- (18) Pedro debió [de] conocer a Marta en la fiesta.  
 Pedro must<sub>PST.PFV.3SG</sub> [of] know<sub>INF</sub> to Marta at the<sub>F.SG</sub> party  
 ‘P must have met M at the party.’  
 [Borgonovo & Cummins (2007: 4); example (4b)]

If the verbal form is an imperfective past (see 17a), we should understand that Pedro was acquainted with Marta. If the verbal form is a perfective past (see 17b), we should understand that Marta was introduced to Pedro at the party. The second reading is the one obtained in (18), despite the fact that the temporal-aspectual marker falls on the epistemic auxiliary.

To complete the argument, we can add that the behavior of root auxiliaries is the opposite, something that is overlooked in the literature. In (19) we observe that neither the progressive (19a) nor the habitual reading (19b) have to do with the event denoted by the main predicate of the periphrastic structure, but with the obligation imposed on Pedro. This is why sentences (20a,b) can be the continuations of (19a,b), respectively, but are contradictory as the continuations of those in (15a,b):

- (19) a. Pedro debía abrir la puerta cuando sonó  
 Pedro must<sub>PST.IPFV.3SG</sub> open<sub>INF</sub> the<sub>F.SG</sub> door when ring<sub>PST.PFV.3SG</sub>  
 el teléfono.  
 the<sub>M.SG</sub> phone  
 ‘Pedro had to open the door when the phone rang.’
- b. Pedro debía abrir la puerta en verano al  
 Pedro must<sub>PST.IPFV.3SG</sub> open<sub>INF</sub> the<sub>F.SG</sub> door in summer to-the<sub>M.SG</sub>  
 despertar=se.  
 wake.up<sub>INF</sub>  
 ‘Pedro used to have to open the door in summer when he woke up.’

- (20) a. La llamada lo distrajo.  
 the<sub>F.SG</sub> call him distract<sub>PST.PFV.3SG</sub>  
 ‘The call distracted him.’
- b. Pero casi siempre lo olvidaba.  
 but almost always it<sub>ACC</sub> forget<sub>PST.IPFV.3SG</sub>  
 ‘But almost always he forgot it.’

The example (21a) likewise proves that the interpretation of the main predicate is independent of the morphology displayed by the root modal (see the English paraphrases in 21b,c):

- (21) a. Pedro {debió /debía} conocer a Marta.  
 Pedro must<sub>PST.PFV.3SG</sub>/must<sub>PST.IPFV.3SG</sub> know<sub>INF</sub> to Marta
- b. ‘It was<sub>PFV/IPFV</sub> compulsory for Pedro to be acquainted with Marta.’
- c. ‘It was<sub>PFV/IPFV</sub> compulsory for Pedro to be introduced to Marta.’

To close this section, let us consider the experiential and resultative perfects:

(22) EXPERIENTIAL PERFECT:

El resultado es magnífico...  
 the<sub>M.SG</sub> result be<sub>PRS.3SG</sub> great  
 ‘The result is great...’

- a. Sin duda, Juan ya ha limpiado {la  
 without doubt, Juan already have<sub>PRS.3SG</sub> clean<sub>PST.PTCP</sub> the<sub>F.SG</sub>  
 piscina/piscinas} en otras ocasiones.  
 pool /pools in other<sub>F.PL</sub> times  
 ‘Undoubtedly, Juan has already cleaned the pool some other times.’
- b. Juan ya ha debido de limpiar {la  
 Juan already have<sub>PRS.3SG</sub> must<sub>PST.PTCP</sub> of clean<sub>INF</sub> the<sub>F.SG</sub>  
 piscina/piscinas} en otras ocasiones.  
 pool /pools in other<sub>F.PL</sub> times  
 ‘Juan must already have cleaned the pool some other times.’

(23) RESULTATIVE PERFECT:

Voy a darme un baño, que  
 go<sub>PRS.1SG</sub> to give<sub>INF=me:DAT</sub> a<sub>M</sub> bath, that  
 ‘I am going to take a bath, because [...]

- a. Juan ya ha limpiado {la piscina/#piscinas}.  
 Juan already have<sub>PRS.3SG</sub> clean<sub>PST.PTCP</sub> the<sub>F.SG</sub> pool /pools  
 Juan has already cleaned {the pool/pools}.’
- b. Juan ya ha debido de limpiar {la  
 Juan already have<sub>PRS.3SG</sub> must<sub>PST.PTCP</sub> of clean<sub>INF</sub> the<sub>F.SG</sub>  
 piscina/#piscinas}.  
 pool/pools  
 ‘Juan must already have cleaned the pool.’

Perfect aspectual meaning allows us to make an assertion about the state of affairs that follows the verbal event (Carrasco 2015). In the experiential interpretation, this state of affairs characterizes the entity denoted by the subject by her/his participation in a situation that has taken place at least once in an interval of time that includes the reference time: in (22), clean the pool or clean pools. By contrast, in the resultative interpretation, the state of affairs is conceived as the consequence of an earlier situation. It is a final state or goal, which in (23) corresponds to the pool being clean. As is shown in the examples, while telic predicates as *limpiar la piscina* ('clean the pool') can give rise to both interpretations, with atelic predicates like *limpiar piscinas* ('clean pools') it is only possible to obtain the experiential interpretation. Again, the judgments are identical in the constructions with epistemic modals.<sup>15</sup>

However, things are quite different with root modals. The perfect then receives only the experiential interpretation.<sup>16</sup> The main predicate of the examples of (24) is telic. Consequently, it is necessary to find the reason why the resultative reading is excluded in the actional nature of the modal verb (see section 2.2):

- (24) a. Como castigo, Juan ya ha tenido que limpiar  
 as punishment, Juan already have.<sub>PRS.3SG</sub> have.<sub>PST.PTCP</sub> that clean.<sub>INF</sub>  
 la piscina (en otras ocasiones). [EXPERIENTIAL/ #RESULTATIVE]  
 the.<sub>F.SG</sub> pool (in other.<sub>F.PL</sub> times)  
 'As a punishment, Juan has already had to clean the pool some other times.'
- b. Como premio, Juan ya ha podido limpiar la  
 as reward, Juan already have.<sub>PRS.3SG</sub> can.<sub>PST.PTCP</sub> clean.<sub>INF</sub> the.<sub>F.SG</sub>  
 piscina (en otras ocasiones). [EXPERIENTIAL/ #RESULTATIVE]  
 pool (in other.<sub>F.PL</sub> times)  
 'As a reward, Juan has already been allowed to clean the pool some other times.'

### 2.1.3. *High ma non troppo*

The title of this section corresponds to that of Homer's (2013) article. The author defends the idea that epistemic auxiliaries are generated above the head ASP but under the scope of T (see also van Gelderen 2003). He bases this position on examples like the following, which we translate from French:

- (25) *(On the day of the utterance D0, the speaker's grandfather asks her why she panicked and stormed out of the house yelling on D-6, when she saw him lying on the floor. The man is 90 years old but the speaker knows at D0 that he has never had any health*

15. From here on we will use the adverb *ya* ('already') to mark the perfect reading of compound tenses.
16. Exceptionally, the perfect can be understood as resultative when the modal is dynamic, i.e., if what makes possible the actualization of a determined state of affairs are the characteristics of the individual denoted by the subject. We leave this interpretation for future research.

*problem; right after her fit of panic on D-6, the speaker realized that her grandfather was in fact meditating on the floor.)*

Tú podías perfectamente haber sufrido un ataque  
 you can.<sub>:PST.IPFV.2SG</sub> perfectly have.<sub>:INF</sub> suffer.<sub>:PST.PTCP</sub> an.<sub>:M</sub> attack  
 al corazón.<sup>17</sup>  
 to.the.<sub>:M.SG</sub> heart  
 ‘You might very well have had a heart attack.’

At the time of speech, the speaker does not harbor any doubt about the good health of her grandfather. Therefore, the epistemic modal would seem to place the speaker’s conjectures in the past, i.e., in another moment, anterior to that of speaking, in which that doubt existed. Note that if this interpretation were correct, we should admit that the temporal-aspectual morphology of the modal verb is not vacuous. This is Homer’s (2013) point of view.

To defend the alternative approach, i.e., that the temporal-aspectual morphology is vacuous, it is necessary to relate the modal verb to the time of an implicit event. This is what we intend to indicate in (26) by means of the verb *pensar* (‘think’) in brackets (see also Bravo 2017: 69-70). In other words, the epistemic modal would place the speaker’s conjectures at the time of thinking. With respect to this time, *podías* (‘think :PST.IPFV.2SG’) is not past, but present:<sup>18</sup>

(26) [Pensé que] podías haber sufrido un ataque  
 think.<sub>:PST.PFV.1SG</sub> that can.<sub>:PST.IPFV.2SG</sub> have.<sub>:INF</sub> suffer.<sub>:PST.PTCP</sub> an.<sub>:M</sub> attack  
 al corazón.  
 to.the.<sub>:M.SG</sub> heart  
 ‘[I thought that] you might have had a heart attack.’

Against Homer (2013), we will point out, firstly, that in Spanish it is possible to coordinate the epistemic modal with a *condicional* (posterior past). Consider the examples in (27):

(27) a. Grité para pedir auxilio. Tú podías haber  
 shout.<sub>:PST.PFV.1SG</sub> to call.<sub>:INF</sub>.for help you can.<sub>:PST.IPFV.3SG</sub> have.<sub>:INF</sub>  
 sufrido un ataque al corazón y la ambulancia  
 suffer.<sub>:PST.PTCP</sub> an.<sub>:M</sub> attack to.the.<sub>:M.SG</sub> heart and the.<sub>:F.SG</sub> ambulance  
 llegaría muy tarde.  
 would.arrive.<sub>:3SG</sub> very late  
 ‘I shouted for help. You might have had a heart attack and the ambulance would arrive too late.’

17. For other examples of the same type, see Hacquard (2006), Boogaart (2007), von Fintel & Gillies (2008), Mari & Schweitzer (2010), Martin (2011), Matthewson (2012), Rullmann & Matthewson (2018).

18. Hacquard (2011) gives a different explanation: these imperfective pasts can only be possible as replies to questions with *why*. The change in the temporal anchor could be caused by the fact that the sentence in which the modal appears is actually causal, but with a concealed *because*. Causes precede their consequences.

- b. [Pensé que] la ambulancia llegaría muy tarde,  
 think<sub>:PST.PFV.1SG</sub> that the<sub>:F.SG</sub> ambulance would.arrive<sub>:3SG</sub> very late  
 ‘I thought that the ambulance would arrive too late,
- c. [Un despiste de un segundo y ya no pudo  
 an<sub>:M</sub> absentmindedness of one second and already not can<sub>:PST.PFV.3SG</sub>  
 hacer nada para evitar el choque frontal.] La  
 do<sub>:INF</sub> nothing to avoid<sub>:INF</sub> the<sub>:M.SG</sub> crash frontal the<sub>:F.SG</sub>  
 ambulancia llegaría muy tarde,  
 ambulance would.arrive<sub>:3SG</sub> very late  
 ‘Due to a one-second absentmindedness he could do nothing to avoid the  
 frontal crash. The ambulance arrived too late,
- d. pero me=equivocé.  
 but me mistake<sub>:PST.PFV.1SG</sub>  
 but I was wrong.’

The *condicional* is primarily a relative tense with a post-preterit meaning (27b), but it can also behave secondarily as an absolute past (27c). The absolute verbal form locates TT, i.e., the time asserted, on the timeline as anterior to the speech time: the ambulance of (27c) did not arrive in time. For this reason, the sentence of (27d) is not an acceptable continuation. On the contrary, the relative verbal form locates TT on the timeline as posterior to a past interval. The position of TT with respect to the speech time remains undetermined. This is why (27d) is an adequate continuation for (27b), and, what is more interesting, observe that it is also an adequate continuation for (27a). This proves that the *condicional* of (27a) is the same relative verbal form as the *condicional* of (27b).

Furthermore, the modal can adopt the form of a perfective *pretérito pluscuamperfecto* (anterior past) (28a). The *pretérito pluscuamperfecto* is unacceptable in independent clauses because it needs to be anchored to another past verbal form (28b,c). We must conclude, then, that the acceptability of (28a) is the result of the *pretérito pluscuamperfecto* being anchored to an implicit past tense:<sup>19</sup>

- (28) a. Habías podido sufrir un ataque al corazón  
 have<sub>:PST.IPFV.2SG</sub> can<sub>:PST.PTCP</sub> suffer<sub>:INF</sub> an<sub>:M</sub> attack to.the<sub>:M.SG</sub> heart  
 cuando te dejé solo.  
 when you<sub>:ACC</sub> leave<sub>:PST.PFV.1SG</sub> alone  
 ‘You might have had a heart attack when I left you alone.’
- b. #Juan había sufrido un ataque al corazón  
 Juan have<sub>:PST.IPFV.3SG</sub> suffer<sub>:PST.PTCP</sub> an<sub>:M</sub> attack to.the<sub>:M.SG</sub> heart  
 cuando le dejaron solo.  
 when him leave<sub>:PST.PFV.3PL</sub> alone  
 ‘Juan had had a heart attack when they left him alone.’

19. Recall that (28a) and (25) can be considered equivalent from the point of view of their temporal-aspectual interpretation (see section 3.1).

- c. Ayer le conté a mi madre que Juan había  
 yesterday him tell<sub>.PST.PFV.1SG</sub> to my mother that Juan have<sub>.PST.IPFV.3SG</sub>  
 sufrido un ataque al corazón cuando le  
 suffer<sub>.PST.PTCP</sub> an<sub>.M</sub> attack to.the<sub>.M.SG</sub> heart when him  
 dejaron solo.  
 leave<sub>.PST.PFV.3PL</sub> alone  
 ‘Yesterday I told my mother that Juan had had a heart attack when they  
 left him alone.’

Finally, let us look at (29):

- (29) a. Ayer le expliqué a mi madre que tú podías  
 yesterday her explain<sub>.PST.PFV.1SG</sub> to my mother that you can<sub>.PST.IPFV.2SG</sub>  
 haber sufrido un ataque al corazón,  
 have<sub>.INF</sub> suffer<sub>.PST.PTCP</sub> an<sub>.M</sub> attack to.the<sub>.M.SG</sub> heart  
 ‘Yesterday I explained to my mother that you might have had a heart  
 attack,
- b. y que la ambulancia llegaría muy tarde.  
 and that the<sub>.F.SG</sub> ambulance would.arrive<sub>.3SG</sub> very late  
 and that the ambulance would arrive too late.’

For Homer (2013), examples like this demonstrate that even if the modal verb’s sentence is embedded under an explicit matrix predicate, it is not compulsory to conceive that the time of the speaker’s conjecture and the time of the matrix event coincide. The reason would be the interpretation that is of interest here: the doubt harbored by the speaker about her grandfather’s heart attack would not be evaluated with respect to the moment when she gives an explanation to her mother, but, rather, five days earlier. However, in our opinion, the modal of (29a) continues to depend on an implicit time of evaluation. We have the proof in the possible continuation of (29b). As we know, the *condicional* of (29b) is a relative verbal form, like the *pluscuamperfecto* of the examples of (28): it cannot be oriented with respect to the speech time independently, nor can it be anchored to the event time denoted by *explicar* (‘explain’) in the interpretation under discussion.

We close this section by underlining two theoretical problems. The first one is that Homer’s (2013) proposal presents the same defect as other studies that assert that the temporal-aspectual morphology of epistemic modals is non-vacuous: the efforts to explain the interpretation of the epistemic modal in examples such as (25) are not commensurate with a corresponding effort to fit its interpretation into contexts in which necessity or possibility are evaluated at the speech time. This last reading always exists, as can be inferred from the paraphrase of (30). This being the case, it would have been necessary to explain why temporal-aspectual morphology is sometimes interpretable and sometimes vacuous:<sup>20</sup>

20. Homer (2013) does not offer any explanation. On the contrary, the only syntactic clarification refers to epistemic modals that are not evaluated at the speech time: “The anaphoric relation between



- (30) Il pouv<sub>epis</sub>-ait/dev<sub>epis</sub>-ait pleuvoir.  
 It might-past/ must-past rain  
 ‘It is held possible/certain (by me) now that it was raining then.’  
 Or: ‘It was held possible/certain (by me) then that it was raining then.’  
 [Homer (2013); example (1)]

Our last observation is that from the point of view that we defend in this study, namely that Tense and grammatical Aspect are categories with interpretive effects just regarding eventive verbal predicates, Homer’s syntactic proposal that epistemic auxiliaries are generated above the head Asp but under the scope of T is even more problematic than those that assume Cinque’s hierarchy. The categories related to temporal reference and grammatical aspect go hand-in-hand. Aspect relates the time asserted, TT, to the whole time of the verbal situation, TSIT; Tense allows us to locate TT on the timeline with respect to the axis of the temporal deixis. Epistemic modals are non-eventive, thus the temporal-aspectual morphology is ‘read’ in the main predicate of the periphrasis. That means, on the one hand, that the sentence assertion concerns the time of the situation denoted by the main predicate; and, on the other hand, that it is this time, more specifically the part focused on by grammatical Aspect, what is located on the timeline. Thus, if we maintained that epistemic modals are below the head T and above Asp, we would be assuming that temporal meaning concerns the modal auxiliary, but aspectual meaning concerns the main predicate. To put it in other words, the time focused on by Aspect would not be what is situated on the timeline, and the time that would be situated on the timeline would not be the time focused on by Aspect.

In sum, the arguments examined in §§ 2.1.1-2.1.3 support the hypothesis that only the temporal-aspectual morphology of root modals is interpretable. Conversely, the temporal-aspectual morphology of epistemic modals is vacuous. Our hypothesis is that root modals are eventive, i.e., they denote events that can be situated on the timeline. Epistemic modals would not. We devote the following section to look further into this difference.

## 2.2. *The (non-) eventive nature of modal auxiliaries*

In addition to the evidence in the foregoing sections, there are two other kinds of proofs that confirm that root modals denote events. The first is the effect of modification by means of expressions like *otra vez* (‘again’) in structures consisting of more than one verb.<sup>21</sup> In (31a) and (32a) the expression *otra vez* appears before the auxiliary verbs of the progressive and modal periphrases; in (31b) and (32b), it is put after them. The idea is the following: if the periphrastic structures denote a single event, there will be no differences between the readings of (31a) and (31b),

T[ime of]M[odal]E[valuation] and R[eference]T[ime] is a binding one. These reasons militate against generating epistemic modals above T”. For another example, see Martin (2011).

21. This is Napoli’s (1981: 874) argument. See Wurmbbrand (2001: 148 and ss) for a review. Similar examples are also found in Bravo, García Fernández & Krivochen (2015: 93).

or between those of (32a) and (32b). On the contrary, if the periphrastic structures denote two events, the interpretations will not match:

- (31) a. Juan otra.vez está llenando la piscina.  
 Juan again ESTAR.<sub>PRS.3SG</sub> fill.<sub>GER</sub> the.<sub>F.SG</sub> pool  
 ‘Juan is again filling the pool.’
- b. Juan está llenando la piscina otra.vez.  
 Juan ESTAR.<sub>PRS.3SG</sub> fill.<sub>GER</sub> the.<sub>F.SG</sub> pool again  
 ‘Juan is filling the pool again.’
- (32) a. Juan otra.vez ha debido llenar la piscina.  
 Juan again have.<sub>PRS.3SG</sub> must.<sub>PST.PTCP</sub> fill.<sub>INF</sub> the.<sub>F.SG</sub> pool  
 ‘Juan has again had to fill the pool.’
- b. Juan ha debido llenar la piscina otra.vez.  
 Juan have.<sub>PRS.3SG</sub> must.<sub>PST.PTCP</sub> fill.<sub>INF</sub> the.<sub>F.SG</sub> pool again  
 ‘Juan has had to fill the pool again.’

Note that (31a) and (31b) are, indeed, interpreted in the same way. *Otra vez* generates the presupposition that the event denoted by the predicate it modifies has taken place before. In both sentences, it is the event of filling the pool. By contrast, the interpretations of (32a) and (32b) are different. In (32b), the event that is assumed to have taken place previously is again the event denoted by the main predicate, *llenar la piscina* (‘fill the pool’). But in (32a), what it is supposed to have happened before is Juan’s being forced or required to fill the pool. The latter option is completely natural, for example, in the context of a weekly assignment of chores: Juan is responsible, once more, for filling the pool. For the former to be natural, we could imagine Juan as responsible just for refilling an almost empty and dirty pool after a summer birthday party.

In (33) we prove that the anteposition (33a) or postposition (33b) of the expression *otra vez* does not change the interpretation of the sentences with an epistemic modal (33c). This is to be expected if, as we defend in this paper, these modals do not denote events:

- (33) a. Juan otra.vez ha debido de llenar la piscina.  
 Juan again have.<sub>PRS.3SG</sub> must.<sub>PST.PTCP</sub> of fill.<sub>INF</sub> the.<sub>F.SG</sub> pool
- b. Juan ha debido de llenar la piscina otra.vez.  
 Juan have.<sub>PRS.3SG</sub> must.<sub>PST.PTCP</sub> of fill.<sub>INF</sub> the.<sub>F.SG</sub> pool again
- c. ‘According to the available evidence (I infer that), Juan filled the pool again.’

The second proof in favor of the eventive character of root modals is illustrated in (34) and (35): the root modal of a temporal clause can establish temporal relations with the verb of the matrix clause:

- (34) a. Cayeron las primeras gotas justo cuando Juan  
 fall<sub>:PST.PFV.3PL</sub> the<sub>:F.PL</sub> first<sub>:F.PL</sub> drops just when Juan  
 lavaba su coche...  
 wash<sub>:PST.IPFV.3SG</sub> his car
- b. Cayeron las primeras gotas justo cuando Juan debía  
 fall<sub>:PST.PFV.3PL</sub> the<sub>:F.PL</sub> first<sub>:F.PL</sub> drops just when Juan must<sub>:PST.IPFV.3SG</sub>  
 lavar su coche  
 wash<sub>:INF</sub> his car  
 ‘The first drops fell just when Juan had to wash the car...’
- c. así.que dejó que la lluvia hiciera el resto.  
 so let<sub>:PST.PFV.3SG</sub> that the<sub>:F.SG</sub> rain do<sub>:PST.IPFV.SBJV.3SG</sub> the<sub>:M.SG</sub> rest  
 so he let the rain do the rest.’
- (35) a. Se encenderá una luz cuando subas al escenario...  
 one turn.on<sub>:FUT.3SG</sub> a<sub>:F</sub> light when go.up<sub>:PRES.SBJV.2SG</sub> to.the<sub>:M.SG</sub> stage  
 ‘A light will turn on when you go on stage.’
- b. Se encenderá una luz cuando tengas que subir  
 one turn.on<sub>:FUT.3SG</sub> a<sub>:F</sub> light when have<sub>:PRES.SBJV.2SG</sub> that go.up<sub>:INF</sub>  
 al escenario...  
 to.the<sub>:M.SG</sub> stage  
 ‘A light will turn on when you have to go on stage...’
- c. después de eso, oirás un estornudo.  
 after of that hear<sub>:FUT.2SG</sub> a<sub>:M</sub> sneeze  
 after that, you will hear a sneeze.’

Oversimplifying for brevity’s sake, in (34a), the time of the event of the matrix clause is included in the time of the event of the temporal clause headed by *cuando* (‘when’); in (35a) it is posterior. The same temporal relations are observed in (34b) and (35b). Notice, however, that in (34b) and (35b) the temporal relations are established between the time of the event of the matrix clause and the time of the obligation, either to wash the car or to take the stage. As the time of the obligation must precede the time of washing the car, it is possible to conceive a situation in which the event of washing did not happen because of the rain. This is the reason why (34c) could not be an appropriate continuation for (34b). It could, instead, be an adequate continuation for (34a), which presents the event of washing the car as ongoing.

In the same vein, if we add (35c) to (35a), the sneeze is heard after taking the stage. But, if we consider (35c) as a continuation of (35b), the sneeze is heard before. That is, (35c) can be understood as a second condition for taking the stage. This is possible because what is located on the timeline is the obligation denoted by the root modal. The event of taking the stage has not yet taken place.

As on other occasions, the behavior of the epistemic modal is completely different. According to our proposal, the epistemic auxiliary is inserted into the temporal-aspectual syntactic structure of the main predicate of the periphrastic structure,

but the resulting complex does not denote two events, but rather a single one (see section 3.2). Consider (36a):

- (36) a. Cayeron las primeras gotas justo cuando Juan debía  
 fall.<sub>:PST.PFV.3PL</sub> the.<sub>:F.PL</sub> first.<sub>:F.PL</sub> drops just when Juan must.<sub>:PST.IPFV.3SG</sub>  
 de lavar su coche...  
 of wash.<sub>:INF</sub> his car  
 ‘The first drops fell just when Juan must have been washing the car...’
- b. así.que dejó que la lluvia hiciera el resto.  
 so let.<sub>:PST.PFV.3SG</sub> that the.<sub>:F.SG</sub> rain do.<sub>:PST.IPFV.SBJV.3SG</sub> the.<sub>:M.SG</sub> rest  
 so he let the rain do the rest.’

In (36a), the time of the event denoted by the matrix predicate *cayeron las primeras gotas* is included in the time of the event denoted by the embedded predicate *lavar su coche*. The event of washing the car, although a conjecture on the part of the speaker, is again presented as ongoing. That is why (36b) could be an appropriate continuation of (36a).

In the literature, the stative character of the whole class of modal verbs has been defended (Eide 2003; Hacquard 2006; Boogaart 2007; Zagona 2007; Mari & Martin 2008; Borgonovo 2011; Homer 2011; Bravo 2015; Bravo, García Fernández & Krivochen 2015; Guéron 2015, among others). Nevertheless, the foregoing data have allowed us to corroborate the proposal that epistemic modals do not have an eventive nature. As a consequence, we can only attribute actional properties to root modals. This characteristic, which explains that the temporal-aspectual morphology that they bear may not be vacuous, converts them into semi-lexical categories (Corver & van Riemsdijk 2001). In a study in preparation we are carefully delving into this characterization.

We close this section with a prediction that the data of (32), (34b) and (35b) allow us to formulate: given that root modals are eventive, it should be possible to independently locate on the timeline both the event denoted by the root modal and the event denoted by the main predicate of the periphrastic structure. (37a) shows that the prediction is borne out:

- (37) a. Ahora no puedo salir, que debo entregar mañana  
 now not can.<sub>:PRS.1SG</sub> go.out.<sub>:INF</sub>, that must.<sub>:PRS.1SG</sub> submit.<sub>:INF</sub> tomorrow  
 el trabajo de Ciencias Sociales.  
 the.<sub>:M.SG</sub> paper of Sciences Social.<sub>:PL</sub>  
 ‘Now I cannot go out, because I must turn in the Social Sciences paper tomorrow.’
- b. \*Ahora no puedo salir, que entregaré mañana el  
 now not can.<sub>:PRS.1SG</sub> go.out.<sub>:INF</sub>, that submit.<sub>:FUT.1SG</sub> tomorrow the.<sub>:M.SG</sub>  
 trabajo de Ciencias Sociales.  
 paper of Sciences Social.<sub>:PL</sub>  
 ‘Now I cannot go out, because I will turn in the Social Sciences paper tomorrow.’

The adverb *ahora* (‘now’) contributes to place on the timeline the events denoted by the modal of the matrix clause *puedo* (‘*can:PRS.ISG*’) and the modal of the subordinate clause *debo* (‘*must:PRS.ISG*’). *Mañana* (‘tomorrow’), however, places on the timeline the event denoted by *entregar el trabajo de Ciencias Sociales* (‘submit the paper of Social Sciences’). Observe that if the modal verb *debo* is eliminated, the result is ungrammatical, as (37b) shows.

The possibility of independent temporal modification of the infinitive suggests that there would be projections of Tense and Aspect above the main predicate of the periphrasis, meaning that root modals are part and parcel of biclausal structures. According to Wurmbrand’s (2001, 2014) typology, this implies that the structures with root modals may be included among the constructions with a *low* level of restructuring (the boldface font in the quotation is ours):

*Degrees of restructuring (Wurmbrand 2001):*

a. matrix V	[ <sub>CP</sub>	[ <sub>TP/wol/MP</sub>	[ <sub>VP</sub>	[ <sub>VP</sub> ]]]]	no restructuring
<b>b. matrix V</b>	<b>[<sub>TP/wol/MP</sub></b>	<b>[<sub>VP</sub></b>	<b>[<sub>VP</sub>]]</b>	<b>[<sub>VP</sub>]]]]</b>	<b>“a little” restructuring</b>
c. matrix V			[ <sub>VP</sub> ]]	[ <sub>VP</sub> ]]]]	“more” restructuring
d. matrix V			[ <sub>VP</sub> ]	[ <sub>VP</sub> ]]]]	“most” restructuring
e. *matrix V	[ <sub>TP/wol/MP</sub>			[ <sub>VP</sub> ]]]]	*truncation from the middle

(Wurmbrand 2014: 424)

The syntax of epistemic modals must necessarily be different. The data examined until now make it possible to defend a hierarchy like Cinque’s (1999) at the interpretive level. That is, this hierarchy is useful to understand the way temporal-aspectual morphology is interpreted: the epistemic auxiliary is represented above Tense and Aspect because the temporal-aspectual morphology of the modal is vacuous, and thus it is just interpretable regarding the main predicate of the periphrasis. Nonetheless, we think that Cinque’s hierarchy should not be taken literally, at least in languages such as Spanish, if we are interested in giving an account of the syntax behind this interpretation. To this respect, we are in favor of considering instead that epistemic modals are integrated into the structure which provides, compositionally, the temporal-aspectual information of sentences. We will offer an outline of our syntactic proposal in section 3.2. But first, in 3.1, we return to the goal of this paper: to demonstrate the semantic equivalence of examples like those of (6a,b).

### 3. The hypothesis of the identity of *haber*

#### 3.1. Against Martin (2011)

In Martin (2011) we find some arguments against one of the predictions of the hypothesis according to which the temporal-aspectual morphology of epistemic modals is vacuous: that there is semantic equivalence between sentences in which either the main predicate of the periphrastic structure (MOD-HAVE-SS, 38a) or the epistemic modal (HAVE-MOD-SS, 38b) are construed with the auxiliary *haber*. The author calls this prediction *Hypothesis of the identity of haber* (H-ident). By extension, the critique is also directed against the syntactic solution invoked to explain

this supposed equivalence: the movement of *haber* and the realisation of the participial morphology on the modal (i.e. *perfect raising*, 38c). In this section we will demonstrate that Martin's arguments confirm, precisely, the pertinence of this hypothesis in Spanish.

- (38) a. MOD-HAVE-SS: Debe de haber llenado la piscina.  
 must<sub>:PRS.3SG</sub> of have<sub>:INF</sub> fill<sub>:PST.PTCP</sub> the<sub>:F.SG</sub> pool
- b. HAVE-MOD-SS: Ha debido de llenar la piscina.  
 have<sub>:PRS.3SG</sub> must<sub>:PST.PTCP</sub> of fill<sub>:INF</sub> the<sub>:F.SG</sub> pool
- c. PERFECT RAISING: [have + Modal<sub>EPISTEMIC:PST.PTCP</sub> [have + V<sub>:PST.PTCP</sub>]]

Martin's first observation is that MOD-HAVE-SS give rise to generic readings in French (39a), while HAVE-MOD-SS do not (39b). If the HAVE-MOD structure were obtained derivatively from the MOD-HAVE one, (39a) would also be odd. But that is not the case:

- (39) a. On **peut** (/pouvait) très bien **avoir été** membre d'un parti communiste sans avoir été véritablement communiste.  $\sqrt{\text{MOD-HAVE-SS}}$   
 One can-PRES (can-PAST.IMP) very well have been member of a party communist without have been really communist  
 'One might be very well have been a member of the communist party without having really been a communist'
- b. #On **a** très bien **pu être** membre d'un parti communiste sans avoir été véritablement communiste. #HAVE-MOD-SS  
 One can-PRES.PERF very well be member of a party communist without have been really communist  
 [Martin (2011: 187); examples (5) and (6)]

The author defends that the temporal-aspectual morphology of the epistemic modal is interpreted *in situ*, i.e., is non-vacuous. Hence, she attributes the unacceptability of (39b) to the fact that "perfect(ive) sentences normally do not have a generic interpretation" (p. 187).<sup>22</sup> The data of (40) prove that Spanish sentences do not show the aforementioned contrast:

22. Consider the sentence from von Stechow and Gilles (2008) of (i) and the translations into French of (ii). Another of Martin's (2011) arguments is that the English MOD-HAVE-SS of (i) can be made to correspond in the French versions: (a) with a simple infinitive (*avoir*, iia); (b) with a parallel MOD-HAVE-SS (*avoir eu*, iic); and (c) with a HAVE-MOD-SS (*a pu*, iib). According to the author, that would be a problem for the identity hypothesis:

- (i) There might have been ice-cream in the freezer.  
 (ii) a. Il pouvait y avoir de la glace au frigo.  
 b. Il a pu y avoir de la glace au frigo.  
 c. Il peut y avoir eu de la glace au frigo.  
 [Martin (2011: 185-186); examples (2)-(4)]

In our opinion, this argument is not valid. Firstly, it is not legitimate to establish the identity between the MOD-HAVE-SS of (i) and the HAVE-MOD-S of (iib) because they belong to different

- (40) a. Se debe de haber sufrido mucho cuando se  
 one must<sub>.PRS.3SG</sub> of have<sub>.INF</sub> suffer<sub>.PST.PTCP</sub> a.lot when one  
 rehúye el recuerdo.  
 shun<sub>.PRS.3SG</sub> the memory  
 ‘One must have suffered a lot if one avoids remembering.’  
√MOD-HAVE-Ss
- b. Se ha debido de sufrir mucho cuando se  
 one have<sub>.PRS.3SG</sub> must<sub>.PST.PTCP</sub> of suffer<sub>.INF</sub> a.lot when one  
 rehúye el recuerdo.  
 shun<sub>.PRS.3SG</sub> the memory  
 ‘One must have suffered a lot if one avoids remembering.’  
√HAVE-MOD-Ss

The second observation is that French MOD-HAVE-Ss are compatible with temporal expressions that denote posteriority (41a); HAVE-MOD-Ss sentences do not (41b). The reasoning is the same: (41b) cannot be obtained by derivation from (41a). If that were possible, both sentences would be ungrammatical:

- (41) a. Votre voiture **peut** très bien **avoir** été détruite demain.  
 Your car can-PRST very well have been destroyed tomorrow  
 ‘Your car might very well have been destroyed tomorrow.’ √MOD-HAVE-Ss
- b. \*Votre voiture **a** très bien **pu** être détruite  
 Your car has very well can-PRES.PRFCT have been destroyed  
 demain.  
 tomorrow  
 ‘Your car might very well be destroyed tomorrow.’ \*HAVE-MOD-Ss  
 [Martin (2011: 188); examples (8) and (9)]

As can be seen in (42a,b), there seems to be no difference between French and Spanish sentences:

- (42) a. Vuestro coche puede haber sido destruido mañana.  
 Your car may<sub>.PRS.3SG</sub> have<sub>.INF</sub> be<sub>.PST.PTCP</sub> destroy<sub>.PST.PTCP</sub> tomorrow.  
 ‘Your car might have been destroyed tomorrow.’ √MOD-HAVE-Ss
- b. \*Vuestro coche ha podido ser destruido mañana.  
 Your car have<sub>.PRS.3SG</sub> may<sub>.PST.PTCP</sub> be<sub>.INF</sub> destroy<sub>.PST.PTCP</sub> tomorrow
- c. Vuestro coche habrá podido ser destruido mañana.  
 Your car have<sub>.FUT.3SG</sub> may<sub>.PST.PTCP</sub> be<sub>.INF</sub> destroy<sub>.PST.PTCP</sub> tomorrow  
 ‘Your car might have been destroyed tomorrow.’ √HAVE-MOD-Ss

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languages. Secondly, the supposed semantic equivalence of the sentences in (ii) is established in relation to the sentence they are translations of. This means that all of them are believed to be possible interpretations for (i). That is one thing, and another very different one is that (iia,b,c) are actually equivalent sentences in French. The fact that they appear in different epistemic contexts proves precisely the opposite.

In our opinion, however, in establishing the semantic equivalence between sentences like (42a) and (42b) there is a mistaken point of departure, namely the temporal indication of the infinitive is ignored. In the examples under consideration, the non-finite verbal form *haber sido destruido* ('have been destroyed') is modified by the adverb *mañana* ('tomorrow'). Consequently, the event it denotes should be understood as posterior to the speech time. That is why the semantic equivalence should not be established between (42a) and sentences like (42b), but rather between (42a) and sentences like (42c). In (42c) the inflected auxiliary *habrá* exhibits future morphology.

In the third place, Martin provides three types of examples against the claim that the temporal-aspectual morphology of the epistemic modal always matches the choice that would be made in the corresponding sentence without the auxiliary. Firstly, consider (43a). This example shows the incompatibility between the *passé composé* (present perfect) and the progressive periphrasis. Note, however, that the HAVE-MOD-Ss of (43b) does not inherit the oddity of (43a):

- (43) a. ??Pierre a été en train de travailler.  
 Pierre be-PRES.PRFT PROG work  
 'Pierre has been working.'
- b. Pierre a très bien pu être en train de travailler.  
 Pierre can-PRES.PRFT very well be-PROG to work  
 'Pierre might very well have been working.'  
 [Martin (2011: 188); examples (14) and (13)]

Given that the imperfective morphology of the progressive periphrasis does not render the sentence (43b) ungrammatical, the author needs to assume that the modal verb and the infinitive are parts of different structures with their own temporal-aspectual specifications (see Martin 2011: 193). There would be two more facts that appear to point to the same conclusion. Both of them would prove that "while the perfect inflection always conveys a perfect(ive) interpretation on the matrix verb, it is *not* the case when on the infinitival" (p. 189). Firstly, Martin refers to the incompatibility of the Norwegian present perfect with adverbials referring to the "previous cycle", as *I går* ('yesterday') (44a). The effect disappears in the MOD-HAVE-Ss (44b):<sup>23</sup>

- (44) a. \*Marit har spist grøten sin I går.  
 Marit has eaten porridge.DEF POSSREFL yesterday  
 'Marit has eaten her porridge yesterday.'
- b. Marit må har spist grøten sin I går.  
 Marit must have eaten porridge.DEF POSSREFL yesterday  
 'Marit must have eaten her porridge yesterday.'  
 [Martin (2011: 189); examples (16) and (17)]

23. See Eide (2011: 15): "The Norwegian present perfect is always felicitous with adverbials referring to the current cycle ('this week', 'this morning', 'this year', 'this century', etc.), and always infelicitous with adverbials denoting the previous cycle ('last week', 'last year', 'last month', etc.)."



Secondly, Martin considers “hard-core” *individual level predicates*, i.e., predicates that instantiate the whole life of an individual. In French and Dutch, they “are strange with the present perfect, because it implies that the state is verified for only a part of the individual’s life” (Martin 2011: 189). See (45a,b). Once again, there is no incompatibility under the modal verb (45c,d):

- (45) a. #Pierre a été albinos.  
 ‘Pierre has been an albino.’  
 b. # Scriabin is een genie geweest.  
 ‘Scrabin has been a genius.’  
 c. Pierre peut très bien avoir été albinos.  
 ‘Pierre might very well have been an albino.’  
 d. Scriabin moet een genie geweest zijn.  
 ‘Scrabin must have been a genius.’  
 [Martin (2011: 190); examples (19), (18), (21) and (20)]

In (46)-(48), we see that none of the three contrasts mentioned above is found in Spanish:

- (46) a. Pedro ha estado trabajando.  
 Pedro have<sub>.PRS.3SG</sub> ESTAR<sub>.PST.PTCP</sub> work<sub>.GER</sub>  
 ‘Pedro has been working.’  
 b. Pedro debe de haber estado trabajando.  $\sqrt{\text{MOD-HAVE-SS}}$   
 Pedro must<sub>.PRS.3SG</sub> of have<sub>.INF</sub> estar<sub>.PST.PTCP</sub> work<sub>.GER</sub>  
 ‘Pedro must have been working.’  
 c. Pedro ha debido de estar trabajando.  $\sqrt{\text{HAVE-MOD-SS}}$   
 Pedro ha<sub>.PRS.3SG</sub> must<sub>.PST.PTCP</sub> of estar<sub>.INF</sub> work<sub>.GER</sub>  
 ‘Pedro must have been working.’
- (47) a. \*María se ha comido su bocadillo ayer.  
 María se have<sub>.PRS.3SG</sub> eat<sub>.PST.PTCP</sub> her sandwich ayer  
 ‘María has eaten her sandwich yesterday.’  
 b. \*María debe de haber=se comido su bocadillo ayer.  
 María must<sub>.PRS.3SG</sub> of have<sub>.INF</sub>=SE eat<sub>.PST.PTCP</sub> her sandwich ayer  
 ‘María must have eaten her sandwich yesterday.’ \*MOD-HAVE-SS  
 c. \*María ha debido de comer=se su bocadillo ayer.  
 María have<sub>.PRS.3SG</sub> must<sub>.PST.PTCP</sub> of eat<sub>.INF</sub>=SE her sandwich ayer  
 ‘María must have eaten her sandwich yesterday.’ \*HAVE-MOD-SS

- (48) a. \*Pedro ha sido albino.  
 Pedro have<sub>:PRS.3SG</sub> be<sub>:PST.PTCP</sub> albino  
 ‘Pedro has been albino.’
- b. ?\*Pedro debe de haber sido albino. ?\*MOD-HAVE-Ss  
 Pedro must<sub>:PRS.3SG</sub> of have<sub>:INF</sub> be<sub>:PST.PTCP</sub> albino  
 ‘Pedro might have been albino.’
- c. ?\*Pedro ha debido de ser albino. ?\*HAVE-MOD-Ss  
 Pedro have<sub>:PRS.3SG</sub> must<sub>:PST.PTCP</sub> of be<sub>:INF</sub> albino  
 ‘Pedro might have been albino.’

From examples like (44) and (45), Martin concludes that the “perfect infinitival under a modal is underspecified with respect to Aspect (more precisely, it can have an imperfective value)” (p. 186). This would be one of the reasons why the H-IDENT would not be sustainable. What we wish to emphasize is the circularity of the conclusion. As we know, imperfectivity means that TT is included in T<sub>SIT</sub>. But the author does not verify whether this interpretation, or an equivalent one, is obtained in the examples cited. It would also have been necessary to provide data that confirmed independently that the infinitive can be interpreted as imperfective in MOD-HAVE-Ss. For example, if the infinitive had imperfective value, we would expect the meaning of the verb *conocer* in examples like (49a) to be that Pedro was acquainted to Marta. Note that this prediction is not fulfilled. Quite the contrary, just as in (49b), we obtain the sense linked to the perfective value: that Marta was introduced to Pedro (see examples 17a,b, above):

- (49) a. Juan debe de haber conocido a Marta.  
 Juan must<sub>:PRS.3SG</sub> of have<sub>:INF</sub> meet<sub>:PST.PTCP</sub> to Marta  
 ‘Juan must have met Marta.’
- b. Juan ha debido de conocer a Marta.  
 Juan have<sub>:PRS.3SG</sub> must<sub>:PST.PTCP</sub> of meet<sub>:INF</sub> to Marta  
 ‘Juan must have met Marta.’

We close this section with some observations regarding the interpretation of the HAVE-MOD-Ss. Martin (2011: 193) affirms that the epistemic reading is lost when a *passé composé* (present perfect) is replaced by a *passé simple* (simple past):

- (50) ??Il put très bien y avoir de la glace au frigo  
 it can-PFTIVE PAST very well have of the ice cream in-the freezer  
 ‘It might have been ice cream in the freezer.’  
 [Martin (2011: 193); example (26)]

The *passé simple* is perfective. The *passé composé* can convey both perfective and perfect meaning. The author proposes, therefore, that the *passé composé* admits the epistemic reading because of the latter aspectual value. Sentences as (51), with a perfect *passé composé*, “systematically describe a past bounded pos-

sibility in MOD[al]-T[ime] ('pu'), contemplated from the U[ttérance]-T[ime] ('a'), that P [the adjacent, i.e., the proposition embedded under the modal] is verified in ADJ[acent]-T[ime]" (p. 198):

(51) Il a pu y avoir de la glace au frigo.

'Based on the evidence I **have now** [present point of view], it **was possible** that there was some ice cream in the freezer.'

[Martin (2011: 196); example (2')]

To be more precise, the epistemic interpretation of (51) is claimed to depend on the imperfect present morphology of the *passé composé*. Martin adopts Boogaart's (2007) point of view that imperfective verbal forms include a reference point in their temporal structure. So, when interpreted as perfect, the *passé composé* would provide this reference time (52b), but the *passé simple* would never do (52a):

(52) a. *put*: E < S

b. *a pu*: E < S, R

The reference point is supposed to function as the evaluation point required by the epistemic modal. The structures in (52) are based on Boogaart (2007: 54 and 62).<sup>24</sup> The primitives S, R and E stand for time of speech, time of reference and time of the event, respectively, as in Reichenbach (1947) (see footnote 26). With the comma, simultaneity is expressed; with the angle bracket, temporal succession:

The approach just summarized presents several problems. The first one is that the point E of the formula (52b) does not correspond to the time of the situation denoted by the main predicate. As the paraphrase below (51) shows, it would correspond to a past bounded possibility. Given that the grammatical categories of Tense and Aspect contribute to place the asserted time of the verbal situation on the timeline, this would be the same as maintaining that epistemic modals are eventive. In section 2.2 of this study we have argued against this point of view.

The second problem is that in the formula of (52b) the evaluation time of the modal is represented by R, which is simultaneous with the speech time; necessity and possibility are represented by E, which is anterior. This assumption is decisive to differentiate between the interpretation of HAVE-MOD-SS as *Il a pu y avoir de la glace au frigo* and the interpretation of MOD-HAVE-SS as *Il peut y avoir eu de la glace au frigo* (see footnote 22). In the former, what is situated in the past is the

24. For the sake of simplicity, we have ignored the original Boogaart's temporal structure for the present perfect: E2<E1,R,S. This is the author's explanation:

... in addition to a situation in the past, as expressed by the past participle, the present perfect, by means of the present tense auxiliary, presents a state holding at the moment of utterance. It could thus be argued that the present perfect combines perfective and imperfective meaning: the past participle expresses perfective aspect (an event E1 completed before the moment of utterance), whereas the finite verb form presents a state (E2) and thus [...] gets an imperfective reading. The reference point at which the imperfective state presented by means of the finite verb form is holding, is obviously constituted by the point of speech. (Boogaart 2007: 62)

possibility; in the latter, it is the situation denoted by the main predicate of the periphrasis. Nonetheless, in pulling apart the evaluation time of the modal (R) and the notions of necessity and possibility (E) Martin departs from what is usual in the literature without justifying her position adequately.

The third thing that we wish to point out is not strictly a problem concerning Martin's (2011) proposal, but rather to its possible application to languages other than French. The behavior of Spanish is more complex, for example. On the one hand, the epistemic interpretation is preserved on substituting the *pretérito perfecto simple* (simple past) (53b) for the *pretérito perfecto compuesto* (present perfect) (53a):

- (53) a. Ha debido de llover ayer /hace un momento}.<sup>25</sup>  
 have<sub>.PRS.3SG</sub> must<sub>.PST.PTCP</sub> of rain<sub>.INF</sub> yesterday/ ago a<sub>.M</sub> moment  
 'It must have rained yesterday/a moment ago.'
- b. Debíó de llover {ayer /\*hace un momento}.  
 must<sub>.PST.PFV.3SG</sub> of rain<sub>.INF</sub> yesterday/ ago a<sub>.M</sub> moment  
 'It must have rained yesterday/a moment ago.'

The temporal indications of these tenses are different. The *pretérito perfecto simple* is compatible with temporal expressions such as *ayer* ('yesterday'), which situate TT in the past temporal sphere, i.e., the part of the timeline that precedes but does not include the speech time; instead, the *pretérito perfecto compuesto* is compatible with temporal expressions like *hace un momento* ('a moment ago'), which situate TT in the present temporal sphere, i.e., the part of the timeline that does include the speech time.

Let us now look at (54):

- (54) Debe de haber llovido {\*ayer /hace un momento}.  
 must<sub>.PRS.3SG</sub> of have<sub>.INF</sub> rain<sub>.PST.PTCP</sub> yesterday/ ago a<sub>.M</sub> moment  
 'It must have rained yesterday/a moment ago.'

The MOD-HAVE-SS of (54) shows the same incompatibility as the HAVE-MOD-SS of (53a) with expressions of the type of *ayer*. If the compound infinitive were able to orient freely the time of the event that it denotes with respect to the axis of the temporal deixis, what we would expect is that both the combination with *ayer* and the combination with *hace un momento* were possible.

On the other hand, the *pretérito perfecto compuesto* of (53a) is perfective, but it is also possible to obtain HAVE-MOD-SS with perfect meaning (55a). The *pretérito perfecto compuesto* behaves then as a present tense, hence it is infelicitous with *ayer* or *hace un momento*. We observe the same behavior in the equivalent MOD-HAVE-SS (55b):

25. Our description is based on standard European Spanish.

- (55) a. \*Ya ha debido de llover {ayer /hace un  
 already have<sub>.PRS.3SG</sub> must<sub>.PST.PTCP</sub> of rain<sub>.INF</sub> yesterday/ ago a<sub>.M</sub>  
 momento}.  
 moment  
 ‘It must already have rained yesterday/a moment ago.’
- b. \*Ya debe de haber llovido {ayer /hace un  
 already must<sub>.PRS.3SG</sub> of have<sub>.INF</sub> rain<sub>.PST.PTCP</sub> yesterday/ ago a<sub>.M</sub>  
 momento}.  
 moment  
 ‘It must already have rained yesterday/a moment ago.’

The data of this section have allowed us to corroborate that Spanish MOD-HAVE-SS and HAVE-MOD-SS are semantically equivalent. We finish this article with a proposal regarding how to reflect syntactically this fact without an operation like *perfect raising*.

### 3.2. Toward a syntactic proposal

We assume with Reichenbach (1947) that the meaning of all verb tenses can be obtained from the various combinations of a limited number of theoretical primitives.<sup>26</sup> We handle four of these primitives: the speech time (S), two reference times (R1 and R2) and the Topic Time (TT). In (56a,b) we show the temporal-aspectual structures of the perfective and perfect readings of the *préterito perfecto compuesto*, respectively:

- (56) a. Pretérito perfecto compuesto (Perfective):  
 Tense: (TT-R1) + (R1,R2) + (S,R1)  
 Aspect: TSIT  $\subset$  TT
- b. Pretérito perfecto compuesto (Perfect):  
 Tense: (R2,TT) + (R1,R2) + (S,R1)  
 Aspect: < TSIT – > TT

As in Hornstein (1990: 117-118), we present the temporal-aspectual primitives in pairs. The hyphen represents the relation of temporal succession, and the comma that of simultaneity. The simultaneity of R1 with S implies that a verbal tense belongs to the present temporal sphere; the simultaneity of R2 with R1, that it does not belong to the sub-sphere of the future. TSIT in the formulas stands for the time of the verbal event. This time is included in TT if the verbal form is perfective. If the verbal form is perfect, TSIT is anterior to TT. The angle brackets are to indicate that TSIT is not visible, namely that it cannot be situated on the timeline by means of temporal expressions. As we know, only the asserted time, i.e. TT, is visible.

26. Reichenbach’s original proposal includes three temporal primitives: the point of speech (S), the point of the event (E) and the point of reference (R). See Carrasco Gutiérrez (1998) for a deep bibliographical review of this seminal work.

Each of the theoretical primitives necessary to provide the meanings of all the verbal forms would be linked to the projection of a functional head: S to CompP; R1 to T1P; R2 to T<sub>2</sub>P; and TT to Asp. For details that we will omit so as not to deviate from the objectives of this study, see Carrasco Gutiérrez (1998). As an illustration, in (57) we show two simplified diagrams of the syntactic structure of a compound infinitive construed with the epistemic modal *deber de*. In (57a) we represent the temporal-aspectual meaning of the perfective *pretérito perfecto compuesto*; in (57b), the temporal-aspectual meaning of the perfect *pretérito perfecto compuesto*. By means of the suffix *-do* either in T<sub>2</sub> (57a) or in Asp (57b) we intend to indicate that the combination <*haber* + past participle (V<sub>-do</sub>)> can be related to the temporal meaning of anteriority of TT with respect to R2 or to the aspectual value of perfect, <T<sub>SIT</sub> -> TT, respectively:

- (57) a. Debe de haber V<sub>-do</sub>.  
 must<sub>:PRS.3SG</sub> of have<sub>:INF</sub> V<sub>:PST.PTCP</sub>  
 [<sub>T1</sub> debe ... [<sub>Aux1</sub> debe ... [<sub>Aux2</sub> haber ... [<sub>T2</sub> V<sub>-do</sub> ... [<sub>Asp</sub> V ... [<sub>V</sub> V ... ]]]]]]]]
- b. Ya debe de haber V<sub>-do</sub>.  
 already must<sub>:PRS.3SG</sub> of have<sub>:INF</sub> V<sub>:PST.PTCP</sub>  
 [<sub>T1</sub> debe ... [<sub>T2</sub> debe ... [<sub>Aux1</sub> debe ... [<sub>Aux2</sub> haber ... [<sub>Asp</sub> V<sub>-do</sub> ... [<sub>V</sub> V ... ]]]]]]]]

There are two differences between the structures above and those corresponding to sentences without an epistemic modal, represented in (58):

- (58) a. Ha V<sub>-do</sub>.  
 have<sub>:PRS.3SG</sub> V<sub>:PST.PTCP</sub>  
 [<sub>T1</sub> ha ... [<sub>Aux</sub> ha ... [<sub>T2</sub> V<sub>-do</sub> ... [<sub>Asp</sub> V ... [<sub>V</sub> V ... ]]]]]]]]
- b. Ya ha V<sub>-do</sub>.  
 already have<sub>:PRS.3SG</sub> V<sub>:PST.PTCP</sub>  
 [<sub>T1</sub> ha ... [<sub>T2</sub> ha ... [<sub>Aux</sub> ha ... [<sub>Asp</sub> V<sub>-do</sub> ... [<sub>V</sub> V ... ]]]]]]]]

The first is syntactic: in (57a,b) the epistemic modal appears in the higher projection; in (58a,b), that position is occupied by the auxiliary *haber*. In spite of this, both the diagrams of (57a) and (58a) correspond to the temporal-aspectual meaning of the perfective *pretérito perfecto compuesto* (56a); and both the diagrams of (57b) and (58b) correspond to the temporal-aspectual meaning of the perfect *pretérito perfecto compuesto* (56b).

We defend, then, that the complete syntactic configuration determines the information regarding Tense and grammatical Aspect compositionally.<sup>27</sup> The examples of (59) serve to support this idea:

27. Our proposal implies confining the discussion on whether the modal verbs are inserted into a raising or a control structure to root auxiliaries. See Picallo (1985), Barbiers (1995), Wurmbrand (1998, 2001), Bosque (2000), Eide (2002), Schepper & Zwarts (2009), Krivochen (2013), Mari (2015), among many others.

(59) Cuando llegaron,

when arrive.<sub>:PST.PFV.3PL</sub>  
‘When they arrived,

- a. ...debió de llover. (cf. ..., llovió.)  
must.<sub>:PST.PFV.3SG</sub> of rain.<sub>:INF</sub> (cf. ..., rain.<sub>:PST.PFV.3SG</sub>)  
...it must have rained (i.e., it must have started raining).’
- b. ...debía de llover. (cf. ..., llovía.)  
must.<sub>:PST.IPFV.3SG</sub> of rain.<sub>:INF</sub> (cf. ..., rain.<sub>:PST.IPFV.3SG</sub>)  
...it must have been raining.’
- c. ...debía de haber llovido. (cf. ..., había llovido.)  
must.<sub>:PST.IPFV.3SG</sub> of have.<sub>:INF</sub> rain.<sub>:PST.PTCP</sub> (cf. ..., have.<sub>:PST.IPFV.3SG</sub> llovido.)  
rain.<sub>:PST.PTCP</sub>  
...it must have rained (i.e., it must have rained before the arrival).’
- d. ...\*debió de haber llovido. (cf. \*..., hubo llovido.)  
must.<sub>:PST.PFV.3SG</sub> of have.<sub>:INF</sub> rain.<sub>:PST.PTCP</sub> (cf. ..., have.<sub>:PST.PFV.3SG</sub> llovido.)  
rain.<sub>:PST.PTCP</sub>  
...it must have rained (i.e., it must have rained before the arrival).’

In (59a) the event of raining is situated immediately after the event of arriving; in (59b) the two events overlap. As the sentences in parentheses show, these same temporal relations would be obtained with the simple verbal forms *llovió* and *llovía*. In (59c) the event of raining is necessarily anterior to the event of arriving. This relation is possible because the temporal structure of *debía de haber llovido* is that of a perfect *pretérito pluscuamperfecto*. But (59d) is not interpretable, hence its ungrammaticality. The reason is that *debió de haber llovido* would have the temporal structure of a *pretérito anterior*, a tense whose distribution is strongly restricted in Spanish (García Fernández 2008).<sup>28</sup>

The second difference between the structures of (57) and (58) is obviously semantic and corresponds to the contribution of the modal verb. Remember that in sentences with epistemic auxiliaries the speaker expresses her/his degree of commitment to the truth of the proposition at the speech time. If epistemic auxiliaries were subordinated, as in (60), it would be the entity denoted by the subject of the matrix clause, *Juan*, who would express his degree of commitment to the truth of the proposition. Moreover, the time of speech would be substituted by the time of the matrix event (Eide 2003; Stowell 2004; Boogaart 2007; Zagona 2007, 2008;

28. Temporal clauses are a typical context. Nevertheless, the following contrast does not invalidate our argument: *En cuanto {hubo llenado/\*debió de haber llenado} la piscina, se fue* (‘As soon as she {had<sub>PFV</sub> filled/must<sub>PFV</sub> have filled} the pool, she left’). As Sueur (1975: 32, 1979: 110, 1983: 167) and Tasmowski (1980: 44) observe, epistemic modals do not fit well into this type of subordinate clauses. This is a question that we cannot go into more deeply at this time.

Laca 2016). If this time is located in the past sphere, as in (60a,b), the embedded modal must share the indication (R1-S) with the matrix verb:

- (60) Juan nos dijo ayer que ...  
 Juan us tell<sub>.PST.PFV.3SG</sub> yesterday that  
 ‘Juan told us yesterday that...’
- a. ya debía de haber llovido.  
 already must<sub>.PST.IPFV.3SG</sub> of have<sub>.INF</sub> rain<sub>.PST.PTCP</sub>  
 (cf. ..., ya había llovido.)  
 (cf. ..., already have<sub>.PST.IPFV.3SG</sub> rain<sub>.PST.PTCP</sub>)  
 it must already have rained.’
- b. debía de haber llovido la tarde anterior.  
 must<sub>.PST.IPFV.3SG</sub> of have<sub>.INF</sub> rain<sub>.PST.PTCP</sub> the<sub>.F.SG</sub> afternoon previous  
 (cf. ..., había llovido la tarde anterior.)  
 (cf. ..., have<sub>.PST.IPFV.3SG</sub> rain<sub>.PST.PTCP</sub> the<sub>.F.SG</sub> afternoon previous)  
 it must have rained the previous afternoon.’

This phenomenon is called *sequence of tenses* (see Carrasco Gutiérrez 1998). Both the perfect *pretérito pluscuamperfecto* of (60a) and the perfective *pretérito pluscuamperfecto* of (60b) are past sphere tenses (R1-S). With the former, the state of affairs that follows the event of raining is understood as simultaneous with the matrix event time. With the latter, the event of raining is described as anterior. The same temporal relationships are observed when there is no epistemic modal in the embedded sentence.

The present epistemic auxiliary of (61) is not an exception (Zagona 2007: 224):

- (61) Juan nos dijo {la semana pasada /#hace dos años}  
 Juan us tell<sub>.PST.PFV.3SG</sub> the<sub>.F.SG</sub> week previous<sub>.F.SG</sub>/ago two years  
 que María  
 that María  
 ‘Juan told us last week/two years ago that María  
 debe de estar embarazada. (cf. ... está embarazada.)  
 must<sub>.PRS.3SG</sub> of estar<sub>.INF</sub> pregnant<sub>.F.SG</sub> (cf. ... estar<sub>.PRS.3SG</sub> pregnant<sub>.F.SG</sub>.)  
 must be pregnant.’

When there is a verb of speech in the matrix clause, verbal forms of the sphere of the present are admitted in the complement clause. These embedded verbal forms receive what is called a *double-access* reading (Enç 1987). That means that the present tense of (61) expresses simultaneity both with the speech time and with the time of the matrix event. The proof is the unacceptability of the sentence with the expression *hace dos años* (‘to years ago’). In other words, the simultaneity with both times is obtained only if the event of being pregnant extends from the time of the matrix event to the speech time. However, from our



knowledge of the world we know that the period of human pregnancy does not last for two years. Once again, there is no interpretive differences with respect to complement clauses without epistemic modals.

As the speaker's degree of commitment to the truth of the proposition is determined with respect to the speech time (or with respect to the time that plays its role), the immediate prediction is that epistemic modals cannot appear in structures headed by nonfinite verbal forms, as infinitives, gerunds and participles are non-deictic, i.e., cannot locate the TT on the timeline regarding S (Zagona 2007: 230-231):

- (62) a. \*Lo vi                    deber    de salir        de su oficina a las  
 it<sub>.ACC</sub> see<sub>.PST.PFV.1SG</sub> must<sub>.INF</sub> of go.out<sub>.INF</sub> from his office at the<sub>.F.PL</sub>  
 15:00.  
 15:00  
 'I saw him have to leave his office at 3:00 p.m.'
- b. \*Salió                    de su oficina debiendo de gritar.  
 go.out<sub>.PST.PFV.3SG</sub> from his office must<sub>.GER</sub> of shout<sub>.INF</sub>  
 'He left his office having to shout.'

Finally, epistemic modals will likewise be excluded from contexts in which necessity or possibility are not established with relation to the speaker's knowledge but, for example, with relation to her/his wishes (63a); or from the contexts in which it is precisely the speaker's knowledge that does not permit the truth of the proposition to be left in suspense (63b):

- (63) a. \*¡Ojalá    deba                    de llover!  
 hopefully must<sub>.PRS.SBJV.3SG</sub> of rain<sub>.INF</sub>!  
 'I hope it must be raining.'
- b. \*Estamos    seguros    de que debe                    de llover.  
 ESTAR<sub>.PRS.1PL</sub> sure<sub>.M.PL</sub> of that must<sub>.PRS.3SG</sub> of rain<sub>.INF</sub>  
 'We are sure that it must be raining.'

The examples reviewed in section 3.1 confirm that in Spanish MOD-HAVE-Ss and HAVE-MOD-Ss have the same distribution. In our terms, this is possible because the information on Tense and grammatical Aspect is determined in a compositionally equivalent manner. We close this section with the structures of (64). These structures would correspond to sentences parallel to those of (57), but with the auxiliary *haber* above the modal:<sup>29</sup>

29. For questions of macro- and microvariation with respect to the possibility of finding compound modal verbs, see Laca (2016).

- (64) a. Ha           deber<sub>-do</sub>       de V<sub>inf</sub>  
 have.<sub>PRS.3SG</sub> must.<sub>PST.PTCP</sub> of V<sub>inf</sub>  
 [T<sub>1</sub> ha ... [Aux1 **ha** [T<sub>2</sub> **deber**<sub>-do</sub> ... [Asp **deber** ... [Aux2 **deber** ... [V V ... ]]]]]]]
- b. Ya           deber<sub>-do</sub>       de V<sub>inf</sub>  
 already have.<sub>PRS.3SG</sub> must.<sub>PST.PTCP</sub> of V<sub>inf</sub>  
 [T<sub>1</sub> ha ... [T<sub>2</sub> **ha** ... [Aux1 **ha** ... [Asp **deber**<sub>-do</sub> ... [Aux2 **deber** ... [V V ... ]]]]]]]

Notice that we are not recurring to the operation of *perfect raising*. We opt instead for proposing a different starting position for the epistemic modal verb.<sup>30</sup> At this moment, we have no explanation for the existence of these alternative structures. However, it is evident that the interpretive consequences of choosing between one or the other are null. The reason is that the extended projection configured by all the functional heads involved contains information regarding a single event, i.e., the event denoted by the main predicate of the periphrastic structure.<sup>31</sup> The information provided by Aspect makes part of the entire event time visible. The information provided by Tense situates it in relation to the axis of the temporal deixis.

#### 4. Conclusions

In this study we have demonstrated that the temporal-aspectual morphology of Spanish epistemic auxiliaries is vacuous. The temporal-aspectual morphology of root modals is not. Thus, we join those who defend that T and Asp do not take scope, in semantic terms, over the first class of modal verbs. However, our approach is different from that of other authors in that we attribute this difference between epistemic and root modals to a characteristic not discussed until now: the

30. Spanish admits the compound infinitive optionally in sentences with epistemic modals having a perfective or perfect aspectual meaning (Bosque 2000: 12, footnote 5; Laca 2005: 11; RAE & ASALE 2009: 28.7k; Bravo 2016: 170): (*Ya*) *ha debido de haber llovido* [(*already*) *ha* .<sub>PRS.3SG</sub> *must* .<sub>PST.PTCP</sub> *of have* .<sub>INF</sub> *rain* .<sub>PST.PTCP</sub>]. Laca (2016: 18) suggests that a sentence like the previous one, also possible in Norwegian (Eide 2003), Italian (Mari 2015) and French (Martin 2011), could represent a stage in the development toward structures with a perfect or perfective morphology in the epistemic modal: *Debe haber llovido* [*must* .<sub>PRS.3SG</sub> *have* .<sub>INF</sub> *rain* .<sub>PST.PTCP</sub>] > *ha debido de haber llovido* [*ha* .<sub>PRS.3SG</sub> *must* .<sub>PST.PTCP</sub> *of have* .<sub>INF</sub> *rain* .<sub>PST.PTCP</sub>] > *ha debido de llover* [*ha* .<sub>PRS.3SG</sub> *must* .<sub>PST.PTCP</sub> *of rain* .<sub>INF</sub>], and thus be connected with the phenomenon of *externalization of inflection*:

... the process by which such higher perfects come into existence shows a tantalizing analogy to the better known process of externalization of inflection, by which inflectional morphology that becomes trapped between a stem and other morphological material migrates towards the edge of the word (Haspelmath 1993). Revealingly, in intermediate stages this process involves doubling of the inflectional material, which appears both at its original site and at the edge of the word. *Mutatis mutandis*, in the case of perfect morphology, we would have perfect morphology which has acquired past-tense-like properties and is trapped in the infinitival complement of the modal migrating towards the standard site of realization of tense morphology, the inflection on the modal. (Laca 2016: 18)

31. Behind the term *extended projection* (Grimshaw 1991) is the idea that the highest level of projection of a lexical head includes the projections of the functional categories related to it. For the matter under consideration, those functional categories are those referred to the temporal-aspectual information of the clause: Comp, T<sub>1</sub>, T<sub>2</sub>, Asp. The *lowest* position of this extended projection is occupied by the lexical head V. Functional heads cannot be dominated by lexical heads in extended projections.

solely eventive nature of the second class of auxiliaries. Things could be no other way given that we consider that Tense and grammatical Aspect are the categories that permit us to locate the time asserted in a sentence with respect to the axis of the temporal deixis. The advantage of defending that the temporal-aspectual morphology can only be interpretable regarding eventive predicates is that the treatment of T and Asp within modal contexts and outside them is homogeneous.

We have maintained, as well, that the nature, eventive or not, of the modal auxiliaries is inevitably reflected not only in semantic differences but also in syntactic ones. Epistemic modals would be inserted into monoclausal structures. Actually, the possibility of conjugating this type of modal verbs in all verbal tenses suggests that they are integrated into the conjugation of Spanish, adding to the temporal-aspectual information of verbal forms the meaning that the speaker cannot make an absolute commitment to the truth of the proposition. On the contrary, root modals would be inserted into biclausal structures, a characteristic that we will develop in future studies.

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